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Integrating Payment for Environmental Services into an Approach Informed by the Ecology of Law:
A Case Study on Brazilian Waste Pickers

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Integrating Payment for Environmental Services into an Ecology of Law-informed Approach:
A Brazilian Waste Pickers' Case Study

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A Case Study on Brazilian Waste Pickers

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A thesis submitted in fulfilment of the requirements for the
degree of Doctor of Philosophy in Law*
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This thesis is dedicated to the waste pickers, people who transform waste into food, resistance, dreams, and livelihoods.

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Poeta

Poeta, em que medita?
Por que vives triste assim?
É que eu a acho bonita
E você não gosta de mim.
Poeta, tua alma é nobre
És triste, o que o desgosta?
Amo-a. Mas sou tão pobre
E dos pobres ninguém gosta.
Poeta, fita o espaço
E deixa de meditar.
É que... eu quero um abraço
E você persiste em negar.
Poeta, está triste eu vejo
Por que cisma tanto assim?
Queria apenas um beijo
Não deu, não gosta de mim.
Poeta!
Não queixas suas aflições
Aos que vivem em ricas vivendas
Não lhe darão atenções
Sofrimentos, para eles, são lendas.
(JESUS, 1996)

RESUMO

Reciclagem e gestão de resíduos são questões ambientais essenciais para a urbanização do Sul Global e do Brasil. Esses serviços são, em grande parte, fornecidos por trabalhadores informais conhecidos como catadores. O ambiente de trabalhos dos catadores é desafiador por muitos motivos - incluindo a precariedade do trabalho, a falta de proteções legais e de reconhecimento do seu papel na prestação de serviços ambientais e a atual ameaça aos seus meios de subsistência por novas tecnologias, principalmente a incineração de resíduos com recuperação energética. Assim, é crucial uma maior inclusão dos catadores na formulação e implementação de políticas públicas, de forma a os envolver, apoiar e fornecer soluções locais eficazes. No entanto, as deficiências intrínsecas da filosofia subjacente ao direito ambiental contemporâneo dificultam o desenvolvimento de tais políticas. Em contraste, as abordagens ecologicamente informadas para o meio ambiente (Direito Ecológico) e o ecolaw surgem como alternativas inovadoras para orientar a legislação ambiental. Atualmente, os catadores no Brasil defendem o pagamento em contraprestação aos serviços ambientais que eles geram para a sociedade por meio do Pagamento por Serviços Ambientais (PSA). Apesar de ser criticado por sua limitada eficácia socioambiental, esse instrumento tem sido amplamente implementado no Brasil, principalmente nas áreas rurais. Entre os países do Sul Global, o Brasil tem sido um terreno fértil para discussões sobre o papel dos catadores, pois é o país líder em termos de legislação e cooperativas engajando e apoiando esses trabalhadores. Portanto, esta tese tem como objetivo responder como o PSA pode ser reconceituado para apoiar e atender às necessidades dos catadores no Brasil. Esta investigação é particularmente importante para viabilizar uma futura legislação baseada em uma teoria que reconhece soluções orientadas localmente, legitima processos de formulação de políticas e cria uma regulamentação socialmente justa e ambientalmente sustentável. Dessa forma, o desenho de um modelo de PSA eficaz possibilita a mitigação dos problemas socioambientais (ou seja, poluição e condições de vida) da gestão de resíduos no Brasil. Para examinar as preocupações com as condições, desafios e oportunidades locais, esta tese adota uma metodologia sócio-jurídica, que envolve um estudo de caso sobre o Brasil. Além disso, o ecolaw é implantado como um quadro analítico para identificar as lacunas da lei nos diferentes modelos de gestão. Também é usado para conceber uma solução, nomeadamente um novo modelo PES. Esta tese não é teórica por natureza; é principalmente uma análise da política e prática, e é um estudo voltado para a reforma da legislação. Nesse sentido, conclui-se que o PSA amadurece por meio das diretrizes adaptadas do ecolaw, tornando-se um mecanismo legítimo de sustentação dos catadores no Brasil. Esta pesquisa é significativa porque os catadores são vitais para a gestão sustentável de resíduos no Sul Global. Atualmente, os sistemas do Brasil falham em colocar a legislação em prática de forma adequada, deixando esses trabalhadores marginalizados dos sistemas formais de gestão de resíduos. O modelo de PSA reconceptualizado para catadores desenvolvido nesta tese pode servir como um modelo para outras jurisdições preocupadas com a sustentabilidade, que podem usá-lo para desenvolver sistemas eficazes de gestão de resíduos que reconheçam as contribuições do setor informal.

Palavras-chave: Catadores de materiais recicláveis, Direito Ecológico, Pagamentos por Serviços Ambientais.

RESUMO EXPANDIDO

A gestão de resíduos sólidos é um desafio global crítico para as cidades, que são responsáveis pela gestão dos resíduos municipais, o que contribui para se ter um meio ambiente saudável. Assim como no restante do Sul Global, no Brasil, os catadores são importantes fornecedores de reciclagem, contribuindo fortemente para a gestão sustentável dos resíduos. No entanto, esses trabalhadores enfrentam vários desafios, como a precariedade das condições de trabalho, a falta de proteções legais e de reconhecimento do seu papel na prestação de serviços ambientais e a atual chegada de novas tecnologias, principalmente a incineração de resíduos com recuperação energética. Assim, é crucial uma maior inclusão dos catadores na formulação e implementação de políticas públicas, para os envolver, apoiar e fornecer soluções locais eficazes. As deficiências intrínsecas da filosofia subjacente ao direito ambiental contemporâneo, contudo, são obstáculos para a criação dessas políticas. As abordagens ecologicamente informadas para o meio ambiente (Direito Ecológico) e o ecolaw surgem como alternativas inovadoras para orientar a legislação ambiental. Atualmente, os catadores no Brasil defendem o pagamento em contraprestação aos serviços ambientais que eles geram para a sociedade por meio do Pagamento por Serviços Ambientais (PSA). Apesar de ser criticado por sua limitada eficácia socioambiental, esse instrumento é vastamente implementado no meio rural brasileiro. Entre os países do Sul Global, o Brasil tem sido um terreno fértil para discussões sobre o papel dos catadores, pois é o país líder em termos de legislação e formação de cooperativas apoiando esses trabalhadores.

É necessário fornecer uma abordagem reconceituada para o PSA com o intuito de minimizar os desafios ambientais e sociais da gestão de resíduos no Brasil. Ao mesmo tempo, é possível aplicar essa abordagem ao Sul Global de forma mais geral pois os catadores são atores de destaque na gestão de resíduos nessa região. É particularmente importante ter uma legislação futura baseada no Direito Ecológico e na teoria do ecolaw, teorias que reconhecem soluções locais, legitimam os processos de formulação de políticas e criam regulamentações socialmente justas e ambientalmente sustentáveis. O *corpus* da literatura é centrado nos PSAs rurais e no confronto entre as duas narrativas principais - o PSA baseado no mercado e o PSA de base social. Embora alguns estudos tenham sido realizados sobre o uso desse instrumento em áreas urbanas e sua aplicação aos catadores, esses temas permanecem em sua maioria inexplorados. Esta tese continua as discussões sobre a implementação de PSA nas cidades e no setor de reciclagem informal, e passa para o contexto de implementação de reformas sociais, ambientais, econômicas e jurídicas mais amplas. A defesa do PSA pelos próprios catadores e a limitação deste instrumento demonstrada na revisão da literatura pedem uma estrutura para moldar um esquema de PSA para a reciclagem urbana. Essas observações levaram a uma cadeia de perguntas e resultados.

A questão central desta tese é como o PSA pode ser reconceituado para melhor atender às necessidades dos catadores no Brasil. A hipótese central é que os legisladores de políticas de PSA devem usar critérios ecológicos do ecolaw para enquadrar essa política. Essa abordagem implica ir além do quadro dualista das abordagens de mercado e social, levando PSA sob os critérios de ecolaw para o contexto urbano. Ainda, por último, integrar os catadores organizados, a fim de representar com precisão o contexto do Brasil, localizado no tempo e espaço nas experiências vividas.

Esta tese tem quatro objetivos específicos, que informam as questões de pesquisa que a fundamentam. Combinados, tais objetivos implantam uma estrutura analítica inovadora para orientar a legislação ambiental - ou seja, uma abordagem ecológica para questões regulatórias ambientais e ecolaw, que é uma nova ferramenta para novas políticas de gestão de resíduos. O primeiro objetivo da tese é analisar os fundamentos do direito ambiental contemporâneo e as

limitações da prática atual. A lógica subjacente ao direito ambiental contemporâneo passou da proteção do bem comum para a proteção do capital, uma visão baseada nos conceitos de propriedade privada, soberania estatal e inacessibilidade legal. Atualmente, este raciocínio limita o direito ambiental devido ao antropocentrismo, fragmentação e compartimentação. Uma nova perspectiva surgiu na ciência, mostrando que o mundo é uma rede de comunidades e interações fluidas. As abordagens ecológicas ao direito ambiental e a estrutura do ecolaw propõem uma lógica semelhante à da lei, fornecendo os conceitos básicos e a estrutura de uma ordem jurídica consistente com as preocupações socioambientais, comunitárias e organizacionais na abordagem em rede. Ao incorporar esses conceitos, a legislação ambiental pode começar a superar algumas questões prementes, como a gestão de resíduos no Sul Global.

O segundo objetivo da pesquisa é examinar o sistema de resíduos que opera no Sul Global e verificar se ele atende às necessidades locais. No Brasil, os catadores são os principais fornecedores de reciclagem. No entanto, a incineração de resíduos para a produção de energia é a principal narrativa concorrente. A estrutura analítica do ecolaw defende técnicas que apoiam as abordagens de rede. As políticas baseadas em incineradores de transformação de resíduos em energia são inconsistentes com essa visão porque essa técnica está na base da hierarquia de resíduos *a priori* e prejudica as práticas favorecidas e as tecnologias locais. Os catadores têm muitas conexões com a nova lógica do direito e com o ecolaw por causa de seus efeitos socioambientais positivos, propriedade coletiva e valores comunitários.

O terceiro objetivo da pesquisa é identificar um modelo de PSA que possa fornecer um instrumento estruturado, adequado para os catadores no Brasil e a nova lógica do direito ambiental. A estrutura analítica informada pelo ecolaw dá forma a um novo modelo de PSA, fora das duas teorias centrais. Ou seja, o PSA de base social reconhece o valor do contexto do Sul Global do Brasil e amadurece por meio da conformação com os critérios do ecodireito. Isso permite a criação do PSA baseado em ecolaw, que recupera e aprimora os elementos baseados no mercado. Dessa forma, o PSA passa a ser um instrumento socialmente inclusivo e ecologicamente sustentável adequado aos catadores brasileiros.

O objetivo final da pesquisa é analisar os requisitos para projetar um modelo de PES eficaz para integrar os catadores aos sistemas formais de gestão de resíduos. Um solo fértil e o alinhamento com o contexto são características importantes. Primeiro, ele precisa ser desenvolvido em terreno fértil. O Brasil está em uma posição ímpar para assumir a liderança nessa questão. O país possui muitos catadores organizados, com um histórico de campanhas pela gestão inclusiva de resíduos e um PSA personalizado. Em segundo lugar, os processos requerem o entendimento do sistema federal brasileiro, respeitando os critérios do ecolaw e reconhecendo os efeitos da divisão Norte Global - Sul Global sobre os resíduos.

Para atingir os objetivos da pesquisa, esta tese tem quatro questões de pesquisa correspondentes. Para analisar a lógica por trás do direito ambiental contemporâneo e as limitações da prática atual, a primeira pergunta é: qual é a lógica e as limitações do direito ambiental contemporâneo? Para analisar o impacto das ideias do Norte Global sobre gestão de resíduos sobre as regulamentações de resíduos no Sul Global, a segunda pergunta é: quais são os impactos das ideias que sustentam a gestão de resíduos do Norte Global para o Sul Global? Para examinar as limitações de concepções e teorias de PSA anteriores e as conexões com a estrutura de ecolaw, a terceira pergunta é: quais são as concepções de PSA anteriores e como elas se conectam à estrutura do ecolaw? Para propor uma nova conceituação de PSA para atender às necessidades dos catadores no Brasil de forma mais eficaz, a quarta pergunta é: quais são os requisitos para projetar um modelo de PSA eficaz para integrar os catadores aos sistemas formais de gestão de resíduos? Esses quatro objetivos e questões são discutidos separadamente nos capítulos 2, 3, 4 e 5. Em suma, esta tese tem como objetivo responder como o PSA pode ser reconceituado para apoiar e atender às necessidades dos catadores no Brasil.

Para entender como o sistema operacional de resíduos no Brasil se expressa na legislação e na política ambiental, é adotada uma metodologia sociolegal para considerar as questões relacionadas às condições, desafios e oportunidades locais. Esta é uma metodologia importante porque a lei é considerada uma instituição social, ou em resumo, a lei não é criada no vácuo. Embora esta tese se concentre principalmente na política e prática, ao invés do conteúdo das regras legais formais, o uso desta metodologia é importante porque ajuda a expor as complexidades da gestão de resíduos no Brasil e no Sul Global e a necessidade de medidas de gestão de resíduos que atendam a o contexto local e que as suposições do Norte Global em relação à gestão eficaz de resíduos não devem ser transplantadas para o Sul Global. Assim, na abordagem sócio-jurídica, a metodologia considera o direito ao buscar desenvolver uma análise contextual. Por este motivo, optou-se por explorar as preocupações da tese por meio do estudo de caso dos catadores brasileiros.

Uma sequência de atividades foi realizada como parte da metodologia. Esta pesquisa iniciou com uma revisão da literatura teórica e prática sobre gestão de resíduos no Sul Global, identificando que os catadores têm um papel significativo, principalmente na coleta e reciclagem de resíduos. Essa revisão revelou que o Brasil tem papel de liderança nesta região, haja vista sua legislação progressiva e inclusiva e a quantidade de catadores brasileiros organizados em cooperativas e associações. Também indicou os conflitos entre as atividades dos catadores e a incineração de resíduos para a produção de energia e que a principal demanda dos catadores organizados no Brasil é a proibição da incineração.

A revisão da legislação brasileira pertinente mostrou que a Política Nacional de Resíduos Sólidos[1] (PNRS) de 2010 visa a integração dos catadores organizados aos sistemas de gestão de resíduos. No entanto, a pesquisa de campo do Instituto de Pesquisa Econômica Aplicada (IPEA)[2] e de outros[3] demonstrou que essa integração continua inadequada. O Movimento Nacional de Catadores de Materiais Recicláveis e Reutilizáveis (MNCR) no Brasil defende um esquema de PSA sob medida para preencher essa lacuna.[4] Nesse sentido, esta pesquisa realizou uma revisão sobre PSA, em geral, e PSA no Brasil, em particular.

Cabe salientar que o ecolaw é aplicado nessa tese como estrutura analítica. Esta ferramenta é usada para analisar a lógica da lei e da política no Capítulo 2 e os diferentes modelos de gestão de resíduos - os catadores e a incineração de resíduos para a produção de energia - no Capítulo 3. No entanto, sua aplicação principal está nos Capítulos 4 e 5, nos quais esta tese desenvolve uma versão reconceituada do PSA para equilibrar os problemas contextuais e incluir os catadores nos sistemas formais de gestão de resíduos. Esta é uma abordagem sócio-jurídica porque direciona a atenção para a relação entre a base filosófica da lei e os problemas no terreno, desenvolvendo uma base lógica sobre como a estrutura da lei deve ser na prática.

É importante esclarecer que esta tese tem como referencial teórico o ecolaw, adotando uma versão adaptada. Ecolaw é um conceito inovador sobre a relação entre o direito e a natureza

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[1] BRASIL. Lei nº 12.305, de 2 de agosto de 2010.

[2] See IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, Brasília: IPEA, 2010; IPEA, **Relatório de pesquisa: Diagnóstico sobre catadores de resíduos sólidos.**, Brasília: IPEA, 2012; IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, Brasília: IPEA, 2013; IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, Rio de Janeiro: IPEA, 2015.

[3] Ver capítulos 3 e 5.

[4] MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**, Movimento Nacional dos Catadores de Materiais Recicláveis - MNCR, disponível em: <http://www.mncr.org.br/artigos/nota-publica-psau-programa-de-pagamentos-de-servicos-ambientais-urbanos>. acesso em: 31 jul. 2019; MNCR, **Programa Nacional de Luta**, Programa Nacional de Luta, disponível em: <http://www.mncr.org.br/sobre-o-mncr/o-que-e-o-movimento/setores/programa-de-luta>. acesso em: 8 dez. 2019.

desenvolvido por Capra e Mattei.[5] Esta é uma teoria disruptiva ou voltada para a revolução que visa mudar o sistema jurídico. Nesta tese, a teoria do ecolaw é adaptada com base nos ensinamentos da teoria do Direito Ecológico, em especial do autor Bosselmann.[6]

O ecolaw busca a transformação de todo o ordenamento jurídico, e não apenas do direito ambiental. Essa teoria busca um reconhecimento significativo das nuances e complexidades da crise socioambiental, conforme explicado no Capítulo 2. Esta tese se concentra na gestão de resíduos, ao invés de outros exemplos dessa crise, como as mudanças climáticas e a poluição. Essa delimitação é particularmente importante para o Brasil e o resto do Sul Global, devido à sua atual onda de urbanização. A crise se aprofundará com o crescimento populacional nas cidades e, à medida que os problemas socioambientais se tornam urgentes, podem ativar adaptações no ordenamento jurídico. Esta tese aplica alguns dos elementos do ecolaw no espectro da gestão de resíduos no Brasil. O Capítulo 3 investiga os modelos de negócios dos modelos concorrentes de gestão de resíduos de incineração de resíduos com produção energética e os catadores organizados.

A concepção do ecolaw pretende mudar a lei, de um sistema jurídico baseado em capital para um sistema baseado nos bens comuns. Resumindo, o ecolaw é uma revolução no sistema jurídico, apresentando ideias onde a mudança pode começar e caminhos prováveis para o sistema avançar. Embora reconheça a importância das teorias revolucionárias, esta tese propõe uma reforma em uma área do direito ambiental, que é o direito dos resíduos. Esta tese adapta os elementos estratégicos da ecolaw ao contexto dos resíduos no Brasil, em conexão com pesquisas anteriores sobre abordagens ecológicas para o direito ambiental, particularmente as de Bosselmann. Outros pontos críticos de diferença entre esta tese e a teoria ecológica existente são a centralização dos catadores e a abordagem de seus direitos socioeconômicos e humanos, em oposição a considerar apenas os benefícios ecológicos.

No geral, esta tese contribui para a literatura existente de várias maneiras. Em primeiro lugar, demonstrou que o PSA pode ser reconstruído para incluir considerações mais amplas usando a estrutura informada pelo ecolaw. Essas considerações envolvem os aspectos sociais de equidade e justiça, especialmente na vida em comunidade. Em segundo lugar, mostrou o potencial para a gestão de resíduos no Brasil ser configurada de maneira socialmente positiva usando os catadores organizados.

Essa tese produziu resultados importantes. O principal resultado é a proposição de uma nova narrativa de PSA informada pelo ecolaw, sob medida para os catadores brasileiros. Essa ferramenta possibilitou a proposição da proibição de incineradores de resíduos em energia em municípios que têm condições de promover os catadores. A justificativa para tal proibição é outro resultado. Uma investigação da inadequação dos incineradores de transformação de resíduos em energia em comparação com os catadores organizados no Sul Global realizada pelas lentes do ecolaw, conforme conduzida no Capítulo 3, nunca foi conduzida. Outra contribuição são as conexões feitas entre o ecolaw e os esquemas de resíduos criando modelos que valorizam a inclusividade, a soberania e o contexto econômico, social e cultural do Brasil. É significativo que o Brasil não tenha uma legislação federal que reconheça os catadores como agentes ambientais prestadores de serviços essenciais e públicos, como ocorre com o modelo proposto.

Ademais, esses temas examinados nos Capítulos 2, 3 e 4 encontram seu ponto culminante no Capítulo 5, no qual esta pesquisa propôs uma estrutura inovadora para o PSA

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[5] CAPRA, Fritjof; MATTEI, Ugo, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, 1. ed. Oakland, CA: Berrett-Koehler Publishers, 2015.

[6] BOSSELMANN, Klaus, Losing the Forest for the Trees: Environmental Reductionism in the Law, **Sustainability**, v. 2, n. 8, p. 2424–2448, 2010; BOSSELMANN, Klaus, **The Principle of Sustainability: Transforming law and Governance**, 2. ed. New York: Routledge, 2017.

informado pelo ecolaw para catadores. Sob uma investigação situada e legalmente informada – particularmente em programas e projetos com catadores e na PNRS -, este capítulo identificou que o PSA informado pelo ecolaw é capaz de colocar as preocupações sociais no centro do PSA. Ao mesmo tempo que esse PSA está enraizado nos elementos do modelo inicial, ele evita ser uma panacéia ou promover mercantilização da natureza. Essa inovação só é possível por causa das influências do ecolaw no arcabouço jurídico. A pesquisa desenvolvida mostra um caminho para superar as limitações em curso da legislação ambiental e da regulamentação da gestão de resíduos. Como um substituto, criou-se o modelo de PSA com base no ecolaw para os catadores que faz parte da agenda local com base no Sul, focando nos *stakeholders*, os serviços ambientais a serem providos e pagamentos a serem feitos.

Em resumo, esta pesquisa investigou as origens e o desenvolvimento das desigualdades na área de resíduos sólidos. O Capítulo 5 fornece diretrizes para uma política de resíduos que visa facilitar um futuro mais ambientalmente sustentável e socialmente justo. A investigação conduzida nos quatro capítulos de discussão - Capítulos 2 a 5 - discutiu questões distintas e derivadas, e suas respostas são as quatro principais conclusões deste trabalho. As quatro principais conclusões identificadas nos capítulos mencionados são as seguintes: a abordagem informada pelo ecolaw é o melhor enquadramento jurídico; os critérios informados pelo ecolaw mostram que as práticas organizadas dos catadores são superiores à incineração; PES se conecta e amadurece por meio de configurações de ecolaw; e o PSA informado pelo ecolaw pode desafiar a legislação ambiental e melhorar a proteção ambiental e os meios de subsistência dos catadores.

Palavras-chave: Catadores de materiais recicláveis, Direito Ecológico, Pagamentos por Serviços Ambientais.

ABSTRACT

Recycling and waste management are critical environmental matters for the urbanising Global South and Brazil. These services are largely provided by informal workers known as waste pickers. Their work environment is challenging for many reasons—including the precarity of their work, the lack of legal protections and of recognition for their role in providing environmental services and the current threat to their livelihoods from new technologies, mainly waste-to-energy incineration. Greater inclusion of waste pickers in policymaking and implementation is required to engage and support them and provide locally effective solutions. However, the intrinsic shortcomings of the philosophy underpinning contemporary environmental law hinder the development of such policies. In contrast, ecologically informed approaches to environmental and ecolaw emerge as innovative frameworks to guide environmental law. At present, waste pickers in Brazil advocate they should be paid for the environmental services they generate for society through the instrument of Payment for Environmental Services (PES). This instrument has been extensively implemented in Brazil, particularly in rural areas, despite being criticised for its limited socio-environmental effectiveness. Among Global South countries, Brazil has been a fertile ground for discussions about the role of waste pickers because it is the leading country in terms of legislation and enterprises to engage and support these workers. Therefore, this thesis aims to answer how PES can be reconceptualised to support and meet the needs of waste pickers in Brazil. This investigation is particularly important to enable future legislation based on a theory that acknowledges locally oriented solutions, legitimises policymaking processes and creates a socially just, environmentally sustainable regulation. Thus, the design of an effective PES model offers to mitigate the socio-environmental problems (i.e. pollution and livelihood conditions) of waste management in Brazil. To examine concerns with local conditions, challenges and opportunities, this thesis adopts a socio-legal methodology, which entails a case study on Brazil. In addition, ecolaw is deployed as an analytical framework to identify the failings of the law in the different management models. It is also used to devise a solution, namely a new PES model. This thesis is not theoretical in nature; it is primarily an analysis of policy and practice, and it is a reform-oriented study. In this sense, it finds that PES matures through the adapted guidelines of the ecolaw framework, becoming a legitimate mechanism for sustaining waste pickers in Brazil. This research is significant because waste pickers are vital to sustainable waste management in the Global South. Currently, Brazil's systems fail to adequately put the legislation into practice, leaving these workers marginalised from formal waste schemes. The reconceptualised PES model for waste pickers developed in this thesis can serve as a blueprint for other jurisdictions concerned with sustainability, which can use it to develop effective waste management systems that recognise the strengths of the informal sector.

Keywords: waste pickers, ecological approaches to environmental law, Payment for Environmental Services

LISTA DE FIGURAS

Figure 1 - Waste-to-energy plants in the world 124
Figure 2 - The recycling value chain 154

SUMÁRIO

1 INTRODUCTION 24
1.1 RESEARCH JUSTIFICATION, QUESTION AND HYPOTHESES 28
1.2 METHODOLOGY AND THEORETICAL FRAMEWORK 32
1.3 THESIS STRUCTURE 41
1.4 DEFINITIONS 43
1.5 RESEARCH SCOPE: BACKGROUND AND LIMITATIONS 45
1.5.1 The Global South – Global North Divide 46
1.5.2 Waste Management Practices in the Global South 53
1.5.3 The United Nations and Waste Management in the Context of the Global South – Global North Divide 55
1.5.4 New International Constructions: Circular Economy and Zero Waste 61
1.5.5 Limitations 69
1.6 CONCLUSION 71
2 THEORETICAL FRAMEWORK: THE DOMINANT LEGAL REASONING AND THE EMERGENCE OF THE ECOLOGY OF LAW 73
2.1 THE PARALLEL EVOLUTION OF SCIENTIFIC AND LEGAL THOUGHT IN THE WESTERN WORLD 77
2.1.1 Western Scientific Thinking 77
2.1.2 Western Legal Thinking 80
2.1.3 Consequences for the Global South 85
2.2 THE CURRENT STATE OF SCIENCE AND LAW 88
2.2.1 Science, Networks and the Law 88
2.2.2 The Influence of the Mechanistic Legacy on Environmental Law and Waste Management 90
2.3 A NEW PARADIGM IN LAW 94
2.3.1 The United Nations and the Sustainable Development Goals 95
2.3.2 Initiatives Implementing Innovative, Ecologically Oriented Approaches to Environmental Law 99
2.3.3 Elements for Transitioning to Ecological Approaches to Environmental Law 104
2.3.3.1 Sovereign Communities 108
2.3.3.2 Generative Ownership 111

2.3.3.3 Ecodesign *114*
2.4 CONCLUSION 116
3 ECOLAW TRANSITION IN WASTE MANAGEMENT: TESTING THE COMPETING MODELS OF BOTTOM-UP WASTE PICKERS AND TOP-DOWN WASTE-TO-ENERGY INCINERATION **118**
3.1 EXAMINING THE INTERACTION BETWEEN WASTE MANAGEMENT, INCINERATION AND WASTE PICKERS 119
3.1.1 Waste Management in Brazil **120**
3.1.2 Waste-To-Energy Incineration **123**
3.1.3 The Informal Recycling Sector and Waste Pickers **126**
3.2 WASTE-TO-ENERGY INCINERATORS 131
3.2.1 Evaluation of Incineration through the Ecodesign Lens **132**
3.2.1.1 Environmental Impact *132*
3.2.1.2 Services Provided *135*
3.2.2 Evaluation of Incineration through the Sovereign Communities Lens **138**
3.2.2.1 Empowerment *138*
3.2.2.2 Connecting People and Nature *140*
3.2.3 Evaluation of Incineration through the Generative Ownership Lens **142**
3.2.3.1 Generative Ownership in the Business *142*
3.2.3.2 Generative Ownership in the Community *144*
3.2.4 Results **148**
3.3 ORGANISED WASTE PICKERS 148
3.3.1 Evaluation of Waste Pickers through the Ecodesign Lens **149**
3.3.1.1 Environmental Impact *149*
3.3.1.2 Services Provided *151*
3.3.2 Evaluation of Waste Pickers through the Sovereign Communities Lens **154**
3.3.2.1 Empowerment *155*
3.3.2.2 Connecting People and Nature *156*
3.3.3 Evaluation of Waste Pickers through the Generative Ownership Lens **157**
3.3.3.1 Generative Ownership in Business *157*
3.3.3.2 Generative Ownership in the Community *160*
3.3.4 Results **162**
3.4 CONCLUSION 163

4 COMPETING CONCEPTIONS OF THE CONCEPT OF PAYMENT FOR ENVIRONMENTAL SERVICES 164
4.1 COMPETING PES MODELS 167
4.1.1 From the Government to Governance: The Rise of PES 167
4.1.2 The Market-Based PES 170
4.1.3 The Social-Based PES 173
4.2 DOMINANT PES NARRATIVES IN BRAZIL: MARKET-BASED, SOCIAL-BASED OR SOMETHING ELSE? 178
4.2.1 PES in Brazil 179
4.2.2 Rationales for the Structure of PES in Brazil: Mistrust and Mixed Messages? ... 183
4.3 ECOLAW-INFORMED PES IN BRAZIL FOR WASTE PICKERS 186
4.3.1 The Criterion of Making Communities Sovereign for the Ecolaw-Based PES 188
4.3.2 The Criterion of Making Ownership Generative for the Ecolaw-Informed PES 190
4.3.3 The Criterion of Ecodesign for the Ecolaw-Informed PES 193
4.4 CONCLUSION 195
5 THE ECOLAW-INFORMED PES MODEL IN BRAZIL 198
5.1 THE ECOLAW-INFORMED PES OPERATING UNDER THE BRAZILIAN CONSTITUTION 200
5.1.1 The Ecolaw-Informed PES Model within the Brazilian Federation 201
5.1.2 The Ecolaw-Informed PES Model Advancing the Fundamental Right to a Healthy Environment and Socio-Environmental Rights 203
5.2 HOW THE ECOLAW-INFORMED PES MODEL CAN ADVANCE THE SUCCESSES AND ADDRESS THE CHALLENGES OF EXISTING POLICIES AND PROGRAMS 206
5.2.1 The Model Articulating the National Waste Policy 209
5.2.1.1 The Focus on Waste and its Hierarchy 210
5.2.1.2 Integrating Waste Pickers' Organisations 211
5.2.1.3 Sharing Responsibilities 213
5.2.2 The Model and the Lessons from Existing Inclusive Programs 215
5.2.2.1 Federal Programs 216
5.2.2.2 Programs Headed by Municipalities 218
5.3 ARTICULATING THE MODEL: THE ELEMENTS OF THE ECOLAW-INFORMED PES 220
5.3.1 Key Stakeholders 221
5.3.1.1 Waste Pickers' Enterprises 221

5.3.1.2 The Public Power *224*
5.3.1.3 Administrative Body *225*
5.3.2 Targeted Services **227**
5.3.2.1 Offsite Environmental Services *227*
5.3.2.2 Waste Hierarchy and Incineration *228*
5.3.2.3 Non-Compulsory Participation and Information *229*
5.3.2.4 Conditionality *230*
5.3.3 Payment **231**
5.3.3.1 IPEA's Payment Models *233*
5.3.3.2 Waste Pickers' Take on Payments *234*
5.3.3.3 The Ecolaw-Informed PES and Payment *237*
5.3.4 New Risks and Resilience **239**
5.4 CONCLUSION 242
6 CONCLUSION **244**
6.1 BENEFITS OF THE MODEL PROPOSED IN THIS THESIS 248
6.2 RESEARCH LIMITATIONS & FUTURE DIRECTIONS 249
6.3 RECOMMENDATIONS 252

1 INTRODUCTION

The urban scenario worldwide is experiencing its second drastic change, termed the second urbanisation wave. The first urbanisation wave occurred in 1750–1950, causing the urbanisation[7] of 400 million people, predominantly in the Global North. A second urbanisation wave began in 1950 and is still developing, mostly in the Global South.[8] This circumstance causes concern because of the numbers it englobes and the context of the place in which it is transpiring.

The world population is exponentially rising and increased by approximately a billion from 2005 to 2017 to reach 7.6 billion in 2017. It is projected to grow to 9.8 billion by 2050; estimates show that more than half of the growth will occur in Africa and that the second most significant increase will be in Asia.[9]

Population growth is an urban issue, and, in particular, is relevant to the Global South. The main drivers of urban growth are potential employment opportunities and improved living standards.[10] Thus, approximately 80 per cent of the growing population will live in cities, most of which are yet to be built.[11] In 2018, about 55 per cent of the population lived in urban areas, and by 2050, this figure is expected to escalate to 68 per cent.[12] This expansion is predicted to happen predominantly in Africa and Asia—mostly in India, China and Nigeria.[13]

Massive urbanisation has already started in many other countries, such as Brazil. Since the 1970s, Brazil has been the stage of an exponential urban transformation, and currently, more than 80 per cent of its population lives in cities.[14] Brazilians face several environmental health issues because of hazardous living conditions,[15] owing to this urbanisation process.

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[7] The urbanisation process connects with rural out-migration and urban development.
[8] SWILLING, Mark *et al*, **The Weight of Cities: Resource Requirements of Future Urbanization. A Report by the International Resource Panel.**, Nairobi, Kenya: United Nations Environment Programme, 2018, p. 35.
[9] DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, POPULATION DIVISION, United Nations, World Population Prospects: The 2017 Revision, Key Findings and Advance Tables., 2017, p. 1.
[10] GUTBERLET, Jutta, Waste in the City: Challenges and Opportunities for Urban Agglomeration, *in*: **Urban Agglomeration**, London, UK: IntechOpen, 2018, p. 192.
[11] WILSON, David Curran *et al*, **Global waste management outlook.**, Osaka: United Nations Environment Programme, 2015, p. 3.
[12] UNITED NATIONS DEPARTMENT OF PUBLIC INFORMATION, Press Release of the World Urbanization Prospects 2018, 2018, p. 1.
[13] UNITED NATIONS DEPARTMENT OF PUBLIC INFORMATION, World Urbanization Prospects 2018: Key Facts, 2018.
[14] GUTBERLET, Jutta, **Recovering resources-recycling citizenship: Urban poverty reduction in Latin America**, London, UK: Routledge, 2016, p. 5.
[15] *Ibid*.

The massive urban population growth will expand some of the existing Southern problems. Thus, the Global South must address issues related to infrastructure and social services, focusing on the needs of the urban poor and vulnerable groups for housing, education, decent work and a safe environment.[16]

Environmental aspects are particularly relevant since urbanisation can play a crucial role in intensifying environmental problems. Waste is a prominent topic because it is an almost unavoidable consequence of human existence,[17] and the more the number of people, the more the resource use and the waste generated.[18] In 2016, waste generation reached approximately 2.01 billion tonnes.[19] Currently, the world generates 0.74 kilogram of waste per person per day.[20] However, waste generation rates fluctuate widely between nations from 0.11 to 4.54 kilograms per person per day, depending on the levels of national income and urbanisation.[21] Projections show that urban material consumption will increase even faster than the population, reaching about 90 billion tonnes by 2050,[22] and it is estimated that in 2050, the world will generate 3.40 billion tonnes of waste.[23] The impact of this consumption will be further exacerbated by the fact that some 3 billion people in the Global South lack access to waste services.[24] In Brazil, the urban rich and poor have been progressively consuming industrialised goods, increasing waste problems.[25]

Thus, waste will remain a critical global challenge throughout the twenty-first century, in all its stages of generation, collection and disposal. Cities are responsible for managing municipal waste, and waste management is a critical function[26] to ensure a healthy environment for local communities. Waste in Southern cities has other environmental implications, affecting

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[16] UNITED NATIONS DEPARTMENT OF PUBLIC INFORMATION, Press Release of the World Urbanization Prospects 2018.
[17] GUTBERLET, Waste in the City: Challenges and Opportunities for Urban Agglomeration, p. 195.
[18] UNITED NATIONS. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, **World economic and social survey 2013: Sustainable development challenges**, New York, NY: UN, 2013, p. 63.
[19] KAZA, Silpa *et al*, **What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.**, Washington, DC: World Bank, 2018, p. 18.
[20] *Ibid*., p. 17.
[21] *Ibid*.
[22] SWILLING *et al*, **The Weight of Cities: Resource Requirements of Future Urbanization. A Report by the International Resource Panel.**, p. 21.
[23] KAZA *et al*, **What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.**, p. 17.
[24] WILSON *et al*, **Global waste management outlook.**, p. 66.
[25] GUTBERLET, **Recovering resources-recycling citizenship: Urban poverty reduction in Latin America**, p. 2.
[26] CHEN, Martha, Waste Global Challenge, Latin American Lessons, **ReVista Harvard Review of Latin America (Cambridge)**, v. 14, n. 2, p. 2–7, 2015, p. 2.

water quality, causing floods, hosting disease vectors, affecting public space perception (as a place of neglect and a lack of citizenship), which stress the sense of exclusion.[27]

Many features of the final disposal accentuate socio-environmental conflicts and environmental justice. Final disposal involves urban and industrial waste, CO2 emissions, overseas disposal of difficult-to-reuse materials[28] and incinerator pollution.[29] Waste facilities (chiefly landfills, and incinerators) and international waste disposal have forced opposition owing to the not-in-my-backyard (NIMBY)[30] and the locally unwanted land use (LULU)[31] phenomena.[32] Hazardous waste exports from the Global North to the Global South have been referred to as environmental justice cases and waste colonisation.[33]

Waste management includes different techniques, such as organic composting, landfilling, incineration and recycling. Most methods contribute to greenhouse gas emissions, with the notable exception of solid waste recycling.[34] In this scenario, it is crucial to understand the Global South practices regarding waste management, especially recycling.

Issues associated with waste management are manifesting in the Global South because infrastructure for water and sanitation and treatment for waste are the two most complex issues to address in the context of its massive urbanisation.[35] These problems differ from those of the Global North; however, the core of current urban knowledge is marked by research on, and from, the Global North.[36] For instance, the Global North applies waste-to-energy incineration to treat waste and generate energy,[37] which has been challenged, particularly by the zero waste

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[27] GUTBERLET, Waste in the City: Challenges and Opportunities for Urban Agglomeration, p. 195.
[28] MURADIAN, Roldan; WALTER, Mariana; MARTINEZ-ALIER, Joan, Hegemonic transitions and global shifts in social metabolism: Implications for resource-rich countries. Introduction to the special section, **Global Environmental Change**, v. 22, n. 3, p. 559–567, 2012, p. 565.
[29] THE TISHMAN ENVIRONMENT AND DESIGN CENTER AT THE NEW SCHOOL, **U.S. Municipal Solid Waste Incinerators: An Industry in Decline**, New York, NY: The Tishman Environment and Design Center, 2019, p. 9.
[30] RASMUSSEN, Thomas H, Not in My Backyard: The Politics of Siting Prisons, Landfills, and Incinerators, **State & Local Government Review**, v. 24, n. 3, p. 128–134, 1992, p. 132–133.
[31] SCHIVELY, Carissa, Understanding the NIMBY and LULU Phenomena: Reassessing Our Knowledge Base and Informing Future Research, **Journal of Planning Literature**, v. 21, n. 3, p. 255–266, 2007, p. 255.
[32] The NIMBY and LULU phenomena have gained notoriety for opposing the construction of facilities with negative environmental and health effects, such as waste or industrial projects, but they are often linked to opposition to detention facilities, homeless shelters and mental health centres as well.
[33] LIPMAN, Zada, A dirty dilemma: The hazardous waste trade, **Harvard International Review**, v. 23, n. 4, p. 67–71, 2002, p. 71.
[34] CHEN, Waste Global Challenge, Latin American Lessons, p. 2.
[35] NAGENDRA, Harini *et al*, The urban south and the predicament of global sustainability, **Nature Sustainability**, v. 1, n. 7, p. 341–349, 2018, p. 341–342.
[36] *Ibid*., p. 341.
[37] DIAS, Sonia, Waste pickers and cities, **Environment and Urbanization**, v. 28, n. 2, p. 375–390, 2016, p. 376; NAGENDRA *et al*, The urban south and the predicament of global sustainability, p. 341–342.

movement.[38] The use of this technology in the Global South has attracted criticism, given that networks of waste pickers are the main providers of sustainable waste management in this region,[39] and incinerators and waste pickers compete for the same materials because both seek economies of scale to ensure their financial viability.[40] In this context, materials are no longer accessible to waste pickers. For this reason, organised waste pickers in Brazil currently oppose incineration.[41]

As in the rest of the Global South, in Brazil, waste pickers are important providers of sustainable waste management.[42] Brazil is at the forefront of progressive legislation for including waste pickers,[43] most notably the National Waste Policy[44] that supports waste pickers' activities and their integration into formal waste systems managed by municipalities. However, a decade after this legislation entered into force, waste pickers remain ignored by

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[38] Zero waste is an innovative preventive philosophy towards minimising the increasing solid waste problem. It encourages the redesign of resource life cycles, enabling all products to be recycled, promoting optimum recycling and resource recovery and restricting mass incineration and landfilling. Zero waste strategies have aimed to reduce less desired waste solutions, such as landfilling. The attempt to ban landfills and stimulate preferable waste solutions, such as sustainable consumption and recycling, led to an increase of incineration rates in many countries, such as Denmark, Germany, the Netherlands, Sweden, Switzerland, Austria and Norway. Thus, one crucial element of zero waste is its clash with incinerators, because the more the waste incinerated, the higher the cost–benefit ratio; consequently, incineration goes against zero waste, because incineration disrupts the waste hierarchy, negatively affecting waste reduction and recycling, See FRANCO-GARCÍA, María-Laura; CARPIO-AGUILAR, Jorge Carlos; BRESSERS, Hans, Towards Zero Waste, Circular Economy Boost: Waste to Resources, *in*: FRANCO-GARCÍA, María-Laura; CARPIO-AGUILAR, Jorge Carlos; BRESSERS, Hans (orgs.), **Towards Zero Waste: Circular Economy Boost, Waste to Resources**, Cham: Springer International Publishing, 2019, p. 4; GUTBERLET, Jutta, Social aspects of solid waste in the global South., *in*: ISSC & UNESCO (org.), **World social science report 2013, changing global environments.**, Paris, France: OECD Publishing and UNESCO Publishing, 2013, p. 329; SONG, Qingbin; LI, Jinhui; ZENG, Xianlai, Minimizing the increasing solid waste through zero waste strategy, **Journal of Cleaner Production**, v. 104, p. 199–210, 2015, p. 199; ZAMAN, Atiq Uz, A comprehensive review of the development of zero waste management: lessons learned and guidelines, **Journal of Cleaner Production**, v. 91, p. 12–25, 2015, p. 12; ZAMAN, Atiq Uz; LEHMANN, Steffen, Urban growth and waste management optimization towards 'zero waste city', **City, Culture and Society**, v. 2, n. 4, p. 177–187, 2011, p. 177; ZWIA ZERO WASTE INTERNATIONAL ALLIANCE, **Zero Waste Definition.**, Disponível em: http://zwia.org/zero-waste-definition/. acesso em: 8 maio 2018.

[39] DIAS, Waste pickers and cities, p. 376; NAGENDRA *et al*, The urban south and the predicament of global sustainability, p. 341–342.

[40] See Chapter 3, Section 3.2.2.2 'Connecting People and Nature'.

[41] See BRASIL CONTRA A INCINERAÇÃO DO LIXO, Manifesto contra a destruição dos resíduos sólidos urbanos por desperdício zero, 2019, p. 2; GLOBALREC, **Resíduo zero e a luta contra a incineração**, Aliança Global de Catadores, Disponível em: https://globalrec.org/pt-br/2020/07/20/residuo-zero-luta-contra-incineracao/. acesso em: 5 maio 2021; *Ibid*.; MNCR, Diga não à Incineração de Lixo!, 2012; MNCR, **Catadores vão à luta contra incinerador em Mauá – SP**, MNCR, Disponível em: http://www.mncr.org.br/noticias/blog-sudeste/catadores-vao-a-luta-contra-incinerador-em-maua-2013-sp. acesso em: 5 maio 2021.

[42] GUTBERLET, Jutta *et al*, Bridging Weak Links of Solid Waste Management in Informal Settlements, **The Journal of Environment & Development**, v. 26, n. 1, p. 106–131, 2017, p. 106; GUTBERLET, Jutta; BAEDER, Angela M., Informal recycling and occupational health in Santo André, Brazil, **International Journal of Environmental Health Research**, v. 18, n. 1, p. 1–15, 2008, p. 11.

[43] DIAS, Sonia, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, Manchester, UK: WIEGO, 2011, p. 1.

[44] *Ibid*., p. 3.

waste systems. That is, they are paid for what they can trade, but not in recognition of the benefits emerging from the important recycling services that they provide to society. Thus, these workers advocate for payment, in recognition of their significant role in providing environmental services, under a Payment for Environmental Services (PES) scheme.[45] The continued integration of these otherwise informal workers[46] into formal waste management systems will provide them increased stability and safety. It also will advance their lives and enable higher rates of recycling in Brazil.

This thesis responds to these problems by aiming to design an effective PES model that would mitigate Brazil's waste problems. Brazilian legislation has already established the need to include waste pickers. This thesis formulates a strategy to put this inclusion into practice by developing the ecolaw-based PES for waste pickers.

1.1 RESEARCH JUSTIFICATION, QUESTION AND HYPOTHESES

This research was conducted under a Dual Degree Agreement between the University of Newcastle and the Federal University of Santa Catarina. Therefore, this thesis needs to adhere to the rules of two different universities, one each in Australia and Brazil. This agreement provided the PhD Candidate with a unique learning experience through tailored study pathways. Thus, the agreement is governed by the rules, policies and procedures determined by both universities. For this reason, this thesis embraces a hybrid model that complies with the guidelines of both universities. The practical consequence is that the structure, line of argument and word limitation of the thesis had to balance different guidelines, and that some aspects of the approach of the thesis may accord more with Australian practices, and others with Brazilian practices.

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[45] Sonia Maria Dias, 'Livelihood Profile: Waste Pickers' in Sally Roever, Sinha Shalini and Sonia Maria Dias (eds), *AAPS Planning Education Toolkit: The Informal Economy.* (Association of African Planning Schools AAPS, 2011) 26; Sonia Dias, 'Waste and Development – Perspectives from the Ground' [2012] (Special Issue 6) *Field Actions Science Reports [Online]* 1, 4 http://journals.openedition.org/factsreports/1615; Sonia Dias and Melanie Samson, *Informal Economy Monitoring Study Sector Report: Waste Pickers* (Women in Informal Employment Globalizing and Organizing WIEGO, 2016) 60, 43; Jutta Gutberlet, 'More Inclusive and Cleaner Cities with Waste Management Co-Production: Insights from Participatory Epistemologies and Methods' (2015) 46 *Habitat International* 234, 241 https://linkinghub.elsevier.com/retrieve/pii/S0197397514001428 ('More Inclusive and Cleaner Cities with Waste Management Co-Production'); Movimento Nacional dos Catadores de Materiasi Reciclaveis MNCR, 'NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais' (18 May 2011) http://www.mncr.org.br/artigos/nota-publica-psau-programa-de-pagamentos-de-servicos-ambientais-urbanos; Melanie Samson, *Refusing to Be Cast Aside – Waste Pickers Organising Around the World.* (WIEGO Women in informal employment globalizing and organizing, 2009) 95, 88.

[46] Informal workers are workers in the informal sector, without legal or social protection, working in self-employment or for wages in informal or formal enterprises, as discussed in Chapter 1.

As regards the motivation for this thesis, it investigates recycling strategy in Brazil, with a view to respecting environmental and social concerns and with the aim of reducing pollution and increasing the quality of livelihoods. It aims to contribute to the field by developing a context-based PES model tailored for the organised waste pickers in Brazil, matured through ecolaw-informed criteria. This thesis does not investigate other waste management strategies, such as waste reduction or remanufactured waste.

Notably, this thesis develops the ecological and social case for a PES for waste pickers in Brazil. It achieves this by focusing on the social and legal context, and it is outside the disciplinary context and the scope of the thesis to model or to develop a formula to calculate payments. As explained, the recycling industry is the livelihood of millions of people; nevertheless, information about the international and national recycling markets is lacking.[47] There is an ambition to connect waste chains in Latin America, particularly, those of Brazil, Argentina, Colombia, Venezuela, Chile, Ecuador, Guatemala and Costa Rica.[48] Nevertheless, until date, no systematic study has been conducted of Brazil's role, which is one of the biggest markets in the region. Prior studies have emphasised that Brazilian recyclable materials are primarily used in the internal Brazilian market.[49] However, more precise information and the routes of recycled materials remain unidentified.[50] Owing to this lack of information about the value chain, this thesis does not seek to give exact figures about payments, but proposes general guidelines based on legislation and documents of the main stakeholders, as developed in Chapter 5, Section 5.3.3.

For the actual purpose of developing a PES for Brazilian waste pickers, this thesis synthesises multiple perspectives on the issue. It explores the rationale underpinning contemporary environmental law in Chapter 2, the clash between waste pickers and waste-to-energy incinerators in the Global South in Chapter 3 and PES in Chapter 4. Chapter 5 develops the main objective, namely, to design an effective PES model for waste pickers in Brazil, through the ecolaw lenses.

This research is significant because waste pickers are key providers of sustainable waste management in the Global South. For instance, they recycle 90 per cent of all that is

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[47] RUTKOWSKI, Jacqueline; RUTKOWSKI, Emília, Recycling in Brasil: Paper and Plastic Supply Chain, **Resources**, v. 6, n. 3, p. 43, 2017, p. 13.
[48] UN ENVIRONMENT, **Waste management outlook for Latin America and the Caribbean**, Panama City, Panama: United Nations Environment Programme, Latin America and the Caribbean Office, 2018, p. 136.
[49] RUTKOWSKI; RUTKOWSKI, Recycling in Brasil, p. 13.
[50] UN ENVIRONMENT, **Waste management outlook for Latin America and the Caribbean**, p. 201–203.

recycled in Brazil.[51] Dias argued that Brazil has been at the forefront of progressive legislation to integrate waste pickers.[52] Nonetheless, the country's systems fail to put the legislation into practice, leaving these workers marginalised from formal waste schemes, unprotected and unsecured. The enforcement of inclusive legislation and thus the greater inclusion of waste pickers in policies is required to engage and support them and to provide locally effective solutions.

This thesis innovates because it reconceptualises PES. Numerous studies in the broader literature have examined the dichotomy between market-based PES and social-based PES, focusing on rural areas. Other research, including the specialised literature on Brazil, has identified that the social-based PES is more consistent with the Global South's context; however, its one-size-fits-all vision endangers the instrument's effectiveness. The literature on the connections between ecolaw criteria, PES and waste pickers is extremely limited. In short, the literature has not addressed how to overcome the current challenges concerning PES as a means of supporting waste pickers, as historically advocated by these workers themselves.

This thesis's principal research question emerges from analyses of the current state of the literature and the Global South's context. As discussed, there is a need to provide a reconceptualised approach to PES to solve the environmental and social challenges of waste management in Brazil, and there is the possibility of applying that approach to the Global South more generally. This is because waste pickers are leading figures in waste management in the Global South. It is particularly important to have future legislation based on a theory that acknowledges locally oriented solutions, legitimises policymaking processes and creates a socially just and environmentally sustainable regulation. The corpus of literature focuses on PES in rural areas and the clash between the two main narratives, which are the market-based PES and the social-based PES. Although some studies have been conducted about the use of this instrument in urban areas and its application to waste pickers,[53] these topics remain mostly unexplored. This thesis continues the discussions on implementing PES in cities and in the informal recycling sector, and moves to the context of implementing more broad-based social, environmental, economic and legal reforms. The waste pickers' advocacy of PES and the

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[51] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 50.
[52] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 1.
[53] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**; ALTMANN, Alexandre, Pagamento por Serviços Ambientais Urbanos como instrumento de incentivo para os catadores de materiais recicláveis no Brasil, **Revista de Direito Ambiental**, n. 68, p. 22, 2012.

limitation of this instrument demonstrated in the literature review call for a framework to shape a PES scheme for waste pickers. These observations led to a chain of questions and results presented here.

This thesis's central question is how PES might be reconceptualised to better meet the needs of waste pickers in Brazil. Its central hypothesis is that PES policy entrepreneurs must use ecolaw criteria to frame this policy. This approach entails moving beyond the dualistic picture of market-based and social-based approaches, taking PES under the ecolaw criteria to the urban context and, last, integrating the organised waste pickers, in order to accurately represent Brazil's context, located in time and space in lived experiences.

This thesis has four specific objectives, which inform the research questions on which it is based. Combined, they deploy an innovative analytical framework to guide environmental law—namely, an ecological approach to environmental regulatory questions, and ecolaw, which is a new tool for new policies in waste management.

The first objective of the thesis is to analyse the rationale behind contemporary environmental law and the limitations to current practice. The rationale underpinning contemporary environmental law moved from protecting the commons to protecting capital, a vision based on the concepts of private property, state sovereignty and legal inaccessibility. At present, this reasoning limits environmental law owing to anthropocentrism, fragmentation and compartmentalisation. A new perspective has emerged in science, showing that the world is a network of fluid communities and interactions. The ecological approaches to environmental law and the ecolaw framework propose a similar rationale to the law, providing the basic concepts and structure of a legal order consistent with socio-environmental, communal and organisational concerns in the network approach. By incorporating these concepts, environmental law can start overcoming some pressing issues, such as waste management in the Global South.

The second research objective is to examine the waste system operating in the Global South and ascertain whether it suits local needs. In Brazil, waste pickers are the leading providers of recycling. However, waste-to-energy incineration is the main competing narrative. The ecolaw analytical framework champions techniques that support network approaches. Policies predicated upon waste-to-energy incinerators are inconsistent with this vision because this technique is at the bottom of the a priori waste hierarchy and undermines favoured practices and local technologies. The waste pickers have many connections with the new rationale in environmental law because of their positive socio-environmental effects, collective ownership and communal values.

The third research objective is to identify a model of PES that can provide a structured instrument, adequate for the waste pickers in Brazil and the new rationale in environmental law. The ecolaw-informed analytical framework shapes a new model for PES, outside the two central theories. That is, the social-based PES recognises the value of the Brazilian Global South's context, and it matures through conformation with the ecolaw criteria. This enables the creation of the ecolaw-based PES, which retrieves and enhances the market-based elements. This way, PES grows to be a socially inclusive and ecologically sustainable instrument suitable to the Brazilian waste pickers.

The final research objective is to analyse the requirements to design an effective PES model to integrate waste pickers into the formal waste management systems. A fertile ground and alignment with the context are important features. First, it needs to be developed in fertile ground. Brazil is in a unique position to take the lead in this matter. It has many organised waste pickers, with a history of campaigning for inclusive waste management and a tailored PES. Second, the processes require understanding the Brazilian federal system, respecting the ecolaw criteria and recognising the effects of the Global North – Global South divide on waste.

To achieve the research objectives, this thesis has four corresponding research questions. To analyse the rationale behind contemporary environmental law and the limitations to current practice, RQ1 is: what is the rationale and the limitations of contemporary environmental law? To analyse the impact of the Global North ideas about waste management upon waste regulations in the Global South, RQ2 is: what are the impacts of the ideas underpinning waste management in the Global North to the Global South? To examine the limitations of past PES conceptions and theories and the connections with the ecolaw framework, RQ3 is: what are the previous PES conceptions and how they connect to the ecolaw framework? To propose a new conceptualisation of PES to meet the needs of waste pickers in Brazil more effectively, RQ4 is: what are the requirements to design an effective PES model to integrate waste pickers into the formal waste management systems? These four objectives and questions are discussed in turn in chapters 2, 3, 4 and 5.

1.2 METHODOLOGY AND THEORETICAL FRAMEWORK

To understand how the operating waste system in Brazil is expressed and experienced in environmental law and policy, particularly that concerning waste regulation, a socio-legal methodology is adopted to consider issues related to local conditions, challenges and opportunities. This is a valuable contribution because the law is a social institution, or simply

put, the law is not created in a vacuum. Although this thesis primarily focuses on policy and practice rather than the content of formal legal rules, using this methodology is important for this thesis because it assists to expose the complexities of waste management in the Global South and the need for waste management measures that attend to the local context and that the assumptions of the Global North regarding effective waste management should not be transplanted to the Global South.

In the socio-legal approach, the methodology considers the law in seeking to develop a contextual analysis. That is, the study of the law benefits from a contextual analysis, including of social reality.[54] Hence, the decision to explore the thesis' concerns through the case study of the Brazilian waste pickers. This thesis aims to reconceptualise PES through designing a law that is attentive to local concerns.

In the thesis, the study of the reality of waste management and waste pickers in Brazil is of fundamental importance and a guide to achieving its goal. Chapter 3 investigates in depth the two competing models of waste management in the Global South—waste-to-energy incineration and the organised waste pickers—under the ecolaw criteria. Waste management and waste pickers are also briefly discussed in Chapter 2 as examples in the analyses of the current limitations of environmental law. It is important to emphasise that recycling is just one part of waste management, which reintroduces solid waste into production processes. Therefore, even if waster pickers were to be maximally effective in their role, countries would still require other waste management strategies—including for final disposal of non-recyclable materials—and waste prevention policies.

A key aspect of the socio-political vision of the law is the partial or total disassociation with legal formalism. First, the perception of the law as autonomous to society is rejected because it is argued that the law is embedded in society, and it is not self-sufficient. Chapter 2 of this thesis presents the framework by linking Western science and law, and its consequences for the Global South. In addition, Chapter 2 examines the new paradigm in law and the ecological approaches to the links between the shifts in environmental law in Latin America and Brazil. In short, this approach helps to tease out the limitations of the existing law/policy framework that does not meet local needs.

The second critique is of the legal neutrality from political power of formal legal institutions. This criticism is justified through the argument that ultimately, the law should be

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[54] GARCÍA-VILLEGAS, Mauricio, **The powers of law : a comparative analysis of sociopolitical legal studies**, Cambridge: Cambridge University Press, 2018, p. 2.

an expression of the people's will, interpreted and applied by legislators, judges or bureaucrats.[55] The thesis discusses the unequal power relations between the Global South and Global North and the Global South – Global North divide and its effects, particularly concerning waste management, in all the chapters. A common thread links all the thesis chapters based on the vision that waste management policies in the Global South must express the region's context and people. In short, this thesis is situated in the Global South (Chapter 1), where the legacy of the Global North's legal thinking has created limitations for environmental law, which is currently challenged by ecolaw (Chapter 2). Under the criteria of ecolaw, Chapter 3 concludes that organised waste pickers are the best representation and the future of the Global South's waste management approaches, and not waste-to-energy incineration. PES, which is the legal instrument these workers have chosen, is analysed in Chapter 4. Last, Chapter 5 develops an innovative set of guidelines for this instrument to be applied for the organised waste pickers in Brazil.

Socio-legal scholarship is the research that aims to understand the 'practical impacts of law in action'.[56] In this sense, researchers investigate the connections between systems and different interest groups and the community, including their agendas and concerns. This thesis is focused on the importance of the role of waste pickers for socially just and environmentally sustainable targets. Socio-legal studies often focus on these practical implications because the black-letter law tradition overlooks them.[57] This is true for this thesis since Chapter 5 strategises a practical implementation of PES for waste pickers in Brazil, particularly highlighting the potential effects of the ecolaw criteria in praxis.

A sequence of activities was conducted as part of the methodology. This research started with a review of theoretical and practical literature about waste management in the Global South, identifying that waste pickers have a significant role, particularly for collecting and recycling waste.[58] This review revealed that Brazil has the leading role in this region, given

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[55] *Ibid*., p. 5.
[56] SALTER, Michael; MASON, Julie, **Writing Law Dissertations: An Introduction and Guide to the Conduct of Legal Research**, London: Pearson/Longman, 2007, p. 130.
[57] *Ibid*.
[58] BESEN, Gina Rizpah; GUTBERLET, Jutta, Participatory urban solid waste governance in the global South, *in*: **Governance: Past, Present, and Future**, Indiana University Bloomington: WOW6, 2019, p. 23; BINION, Eric Norman Olaf, **The perception of health with informal recyclers in Buenos Aires, Argentina**, University of Victoria, British Columbia, 2007; BINION, Eric; GUTBERLET, Jutta, The effects of handling solid waste on the wellbeing of informal and organized recyclers: a review of the literature, **International Journal of Occupational and Environmental Health**, v. 18, n. 1, p. 43–52, 2012; CHEN, Waste Global Challenge, Latin American Lessons; DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**; DIAS, Livelihood Profile: Waste Pickers; DIAS, Waste and Development – Perspectives from the Ground; DIAS, Waste pickers and cities; DIAS; SAMSON, **Informal Economy**

its progressive and inclusive legislation and the number of Brazilian waste pickers organised in cooperatives and associations. It also indicated the conflicts between waste pickers' activities and waste-to-energy incineration[59] and that the main demand of organised waste pickers in Brazil is to ban incineration.[60]

A review of the relevant Brazilian legislation showed that the National Solid Waste Policy[61] from 2010 aims at integrating organised waste pickers into waste management systems. However, the field research of the Institute for Applied Economic Research (IPEA)[62] and others[63] demonstrated that this integration remains inadequate. The National Waste Pickers'

Monitoring Study Sector Report: Waste Pickers; GUTBERLET; BAEDER, Informal recycling and occupational health in Santo André, Brazil; GUTBERLET, Jutta, Solidarity economy and recycling co-ops in São Paulo: micro-credit to alleviate poverty, **Development in Practice**, v. 19, n. 6, p. 737–751, 2009; GUTBERLET, Jutta, Waste, poverty and recycling, **Waste Management**, v. 30, n. 2, p. 171–173, 2010; GUTBERLET, Social aspects of solid waste in the global South.; GUTBERLET, More inclusive and cleaner cities with waste management co-production; GUTBERLET, **Recovering resources-recycling citizenship: Urban poverty reduction in Latin America**; GUTBERLET *et al*, Bridging Weak Links of Solid Waste Management in Informal Settlements; GUTBERLET, Waste in the City: Challenges and Opportunities for Urban Agglomeration; GUTBERLET, Jutta; BRAMRYD, Torleif; JOHANSSON, Michael, Expansion of the Waste-Based Commodity Frontier: Insights from Sweden and Brazil, **Sustainability**, v. 12, n. 7, p. 2628, 2020; GUTBERLET, Jutta; CARENZO, Sebastián, Waste Pickers at the Heart of the Circular Economy: A Perspective of Inclusive Recycling from the Global South, **Worldwide Waste: Journal of Interdisciplinary Studies**, v. 3, n. 1, 2020; GUTBERLET, Jutta, Grassroots waste picker organizations addressing the UN sustainable development goals, **World Development**, v. 138, p. 105195, 2021; MEDINA, Martin, Scavenger cooperatives in Asia and Latin America, **Resources, Conservation and Recycling**, v. 31, n. 1, p. 51–69, 2000; MEDINA, Martin, Serving the unserved: informal refuse collection in Mexico, **Waste Management & Research**, v. 23, n. 5, p. 390–397, 2005; MEDINA, Martin, The informal recycling sector in developing countries, **Grid Lines**, n. 44, p. 4, 2008; MEDINA, Martin, Solid wastes, poverty and the environment in developing country cities: Challenges and opportunities. No. 2010, 23., **Working paper//World Institute for Development Economics Research**, p. 1–15, 2010; MEDINA, Martin, Living off Trash in Latin America: Debunking the Myths, **ReVista Harvard Review of Latin America (Cambridge)**, v. 14, n. 2, p. 20–24, 2015; SAMSON, **Refusing to be Cast Aside – Waste Pickers Organising Around the World.**; TIRADO-SOTO, Magda Martina; ZAMBERLAN, Fabio Luiz, Networks of recyclable material waste-picker's cooperatives: An alternative for the solid waste management in the city of Rio de Janeiro, **Waste Management**, v. 33, n. 4, p. 1004–1012, 2013; VELIS, Costas, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era., **Waste Management & Research**, v. 35, n. 4, p. 329–331, 2017; WILSON, David C.; VELIS, Costas; CHEESEMAN, Chris, Role of informal sector recycling in waste management in developing countries, **Habitat International**, v. 30, n. 4, p. 797–808, 2006; WILSON *et al*, **Global waste management outlook.**

[59] DIAS; SAMSON, **Informal Economy Monitoring Study Sector Report: Waste Pickers**; GUTBERLET, Jutta, O custo social da incineração de resíduos sólidos: Recuperação de energia em detrimento da sustentabilidade, **Revista Geográfica de América Central Número Especial XIII EGAL, Costa Rica**, v. 2, n. 47E, p. 1–16, 2011.

[60] MNCR, MNCR pede veto à incineração na Política Nacional de Resíduos Sólidos, 2011; MNCR, Diga não à Incineração de Lixo!; MNCR, **Programa Nacional de Luta**, Programa Nacional de Luta, Disponível em: http://www.mncr.org.br/sobre-o-mncr/o-que-e-o-movimento/setores/programa-de-luta. acesso em: 8 dez. 2019.

[61] BRASIL. Lei nº 12.305, de 2 de agosto de 2010.

[62] See IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**; IPEA, **Relatório de pesquisa: Diagnóstico sobre catadores de resíduos sólidos.**; IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**; IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**.

[63] ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2020**, Sao Paulo: Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais - ABRELPE, 2020; ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2018/2019**, Sao Paulo: Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais -

Movement in Brazil advocates for a tailored PES scheme to fill this gap,[64] an approach analysed by IPEA.[65] In this sense, this research conducted a review about PES, in general,[66] and PES in Brazil, in particular.[67]

Another key method is the case study focusing on Brazil. The Brazilian experience shows the context of waste pickers at the optimal legal standard because Brazil is at the forefront of inclusive waste management law and policy. Brazil is a fertile ground because the country has a significant number of waste pickers' enterprises. In short, the case study grounds the

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ABRELPE, 2019; ANCAT, Associação Nacional dos Catadores e Catadoras de Materiais Recicláveis, **Anuário da Reciclagem 2017-2018**, Sao Paulo: ANCAT, 2019; BESEN, Gina Rizpah, **Programas municipais de coleta seletiva em parceria com organizações de catadores na Região Metropolitana de São Paulo: desafios e perspectivas.**, Masters' Dissertation, Universidade de São Paulo, Sao Paulo, 2006; DAGNINO, Ricardo de Sampaio; JOHANSEN, Igor Cavallini, Os catadores no Brasil: características demográficas e socioeconômicas dos coletores de material reciclável, classificadores de resíduos e varredores a partir do censo demográfico de 2010, *in*: **Boletim Mercado de Trabalho**, Brasília, DF: IPEA, 2017, v. 62, p. 115–125; GALON, Tanyse; MARZIALE, Maria Helena Palucci, Condições de Trabalho e Saúde de Catadores de Materiais Recicláveis na América Latina: Uma Revisão de Escopo, *in*: PEREIRA, Bruna Cristina Jaquetto; GOES, Fernanda Lira (orgs.), **Catadores de Materiais Recicláveis: Um Encontro Nacional**, Rio de Janeiro: Instituto De Pesquisa Econômica Aplicada IPEA, 2016, p. 169–200; KNOLL, Alessandra, **O Programa Pró-Catador e a nova Política Nacional de Resíduos Sólidos: uma análise da Associação de Coletores de Materiais Recicláveis**, Masters' Dissertation, Universidade Federal de Santa Catarina - UFSC, Florianópolis, 2014; MEYER, Dagmar; FISCHER, Nilton; STEPHANOU, Maria, **Estudo do Perfil Sócio-Educacional da População de Catadores de Materiais Recicláveis Organizados em Cooperativas, Associações e Grupos de Trabalho - Relatório Parcial**, Brasília, DF: SECAD/MEC-UFRGS, 2009; MNCR, Movimento Nacional dos Catadores de Materiasi Reciclaveis, **Catadores entregam proposta do PRONAREP ao Governo Federal**, MNCR Movimento Nacional dos Catadores de Materiasi Recicláveis, Disponível em: http://www.mncr.org.br/noticias/noticias-regionais/catadores-entregam-proposta-do-pronarep-ao-governo-federal. acesso em: 23 set. 2019.

[64] MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**; MNCR, **Programa Nacional de Luta**.

[65] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**

[66] MURADIAN, Roldan *et al*, Reconciling theory and practice: An alternative conceptual framework for understanding payments for environmental services, **Ecological Economics**, v. 69, n. 6, p. 1202–1208, 2010; MURADIAN, Roldan *et al*, Payments for ecosystem services and the fatal attraction of win-win solutions: PES & fatal attraction of win-win solutions, **Conservation Letters**, v. 6, n. 4, p. 274–279, 2013; PASCUAL, Unai *et al*, Social Equity Matters in Payments for Ecosystem Services, **BioScience**, v. 64, n. 11, p. 1027–1036, 2014; WUNDER, Sven, Payments for Environmental Services: Some Nuts and Bolts, **Occasional Paper No. 42, CIFOR Center for International Forestry Research, Bogor**, p. 32, 2005; WUNDER, Sven, Revisiting the concept of payments for environmental services, **Ecological Economics**, v. 117, p. 234–243, 2015.

[67] DERANI, Cristiane; JODAS, Natália, Pagamento por serviços ambientais (PSA) e racionalidade ambiental: aproximações, **Scientia Iuris**, v. 19, n. 1, p. 9, 2015; JODAS, Natália, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**, PhD Thesis, Universidade de São Paulo - USP, São Paulo, 2019; MAMED, Danielle de Ouro, **Pagamento por Serviços Ambientais e Mercantilização da Natureza na Sociedade Moderna Capitalista.**, PhD Thesis, Pontifícia Universidade Católica do Paraná - PUCPR, Curitiba, 2016; MELO, Melissa Ely, **Pagamento por Serviços Ambientais (PSA): entre a proteção e a mercantilização dos serviços ecossistêmicos no contexto de crise ambiental.**, PhD Thesis, Universidade Federal de Santa Catarina - UFSC, Florianópolis, 2016; NUSDEO, Ana Maria de Oliveira, **Pagamento por Serviços Ambientais. Sustentabilidade e disciplina jurídica.**, 1. ed. São Paulo: Editora Atlas, 2012; NUSDEO, Ana Maria de Oliveira; JODAS, Natália, Pagamento por Serviços Ambientais (PSA) no Brasil e sua governança: Experiências e reflexões, *in*: CARLI, Ana Alice de; AYDOS, Elena; AVZARADEL, Pedro Curvello Saavedra (orgs.), **O Estado Regulador no Cenário Ambiental**, Sao Paulo: Planeta Verde, 2017; PACKER, Larissa Ambrosano, **Novo Código Florestal & Pagamento por Serviços Ambientais. Regime proprietário de bens comuns.**, Curitiba: Juruá, 2015.

debates, philosophies and waste management models in a local context, which helps this thesis to identify the main shortfalls of legislation in order to propose a new design for an effective PES model for waste pickers. Applying the data about waste management in Brazil facilitates in-depth insight into this particular situation. It also demonstrates that the study is situated within the real-world context of waste management in Brazil.

Last, ecolaw is applied as the analytical framework. This tool is used to analyse the law and policy rationale in Chapter 2 and the different waste management models—the waste pickers and waste-to-energy incineration—in Chapter 3. Nonetheless, its main application is in Chapters 4 and 5, in which this thesis develops a reconceptualised version of PES to put the contextual problems into balance, and to include waste pickers into the formal waste management systems. This is a socio-legal approach because it directs attention to the relationship between the law's philosophical underpinning and problems on the ground, developing a rationale about what the law framework should be in practice.

It is important to clarify that this thesis applies ecolaw as its theoretical framework. However, this thesis adopts an adapted version of ecolaw. Ecolaw or ecolegal order is an innovative concept about the relationship between law and nature developed by Capra and Mattei.[68] This is a disruptive or revolution-oriented theory aimed at changing the legal system.

The idea of a critique of the legal system as part of the problem concerning environmental degradation is not new. Since the middle of the twentieth century, scholars have discussed the need for morality to inform public policy, law and individual behaviour alike. Aldo Leopold,[69] Arne Naess[70] and Christopher Stone[71] were the first main authors to address the ethical dimensions to environmental law and policy. Since then, other authors have contributed to these discussions in environmental law, including, but not limited to, Klaus Bosselmann,[72] David Boyd[73] and Geoffrey Garver.[74] In this sense, this stream of literature comprises the so-called ecological approaches to environmental law. These approaches include

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[68] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**
[69] See LEOPOLD, Aldo, The Land Ethic, *in*: **A Sand County Almanac**, 1. ed. New York: Oxford University Press, 1949, p. 201–226.
[70] See NAESS, Arne, The shallow and the deep, long-range ecology movement. A summary, **Inquiry**, v. 1, n. 16, p. 95–100, 1973.
[71] See STONE, Christopher D., Should Trees Have Standing? Toward legal rights for natural objects, **Southern California Law Review**, v. 45, p. 450–501, 1972.
[72] See BOSSELMANN, **The Principle of Sustainability: Transforming law and Governance**.
[73] See BOYD, David R., **The rights of nature: A legal revolution that could save the world**, 1. ed. Toronto: ECW Press, 2017.
[74] See GEOFFREY, Garver, **Ecological Law and the Planetary Crisis: A Legal Guide for Harmony on Earth**, London, UK: Routledge, 2020.

critiques of environmental law and discussions of ethical dimensions, rights and responsibilities, property and the commons; and governance and constitutionalism.[75]

As expressed in this literature, ecolaw seeks the transformation of the entire legal system, and not only environmental law. This theory pursues a significant recognition of the nuances and complexities of the socio-environmental crisis, as further explained in Chapter 2, Section 2.3.3. This thesis focuses on waste management, rather than on other examples of this crisis, such as climate change and pollution. This selection is particularly essential for Brazil and the rest of the Global South, owing to their current urbanisation wave. The crisis will deepen with the population growth in cities, and as socio-environmental problems become urgent, they can activate adaptations in the legal system. This thesis applies some of the ecolaw elements into the Brazilian waste management spectrum. Chapter 3, Sections 3.2.3 and 3.3.3, investigate the business models of the competing waste management models of waste-to-energy incineration and the organised waste pickers and the way they relate with generative property.

Capra and Mattei's ecolaw guides this thesis' conception of ecolaw. Capra and Mattei's ecolaw proposes a profoundly different legal system, aiming at developing a sustainable approach. This utopian vision proposes a new legal system[76] that responds to the changes needed by humans living on a finite planet.[77] Simply put, ecolaw's conception intends to change the law, from a capital-based legal system to a commons-based one. To achieve this goal, the authors proposed three strategic objectives: disconnecting law from power and violence, sovereign communities and regenerative property. In short, ecolaw is a revolution in the legal system, presenting ideas where change can commence and likely ways for the system to go forward. However, the theory does not explain this scenario of major social and political transformations in careful detail.[78]

This thesis adapts ecolaw's strategic elements to the waste context in Brazil, in connection with prior research about ecological approaches to environmental law. Here, the strategic objectives are sovereign communities, generative ownership and ecodesign, as further explained in Chapter 2, Section 2.3.3. This thesis tests these elements' applicability to operationalise them in context-based practice—in other words, promoting change without

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[75] BOSSELMANN, Klaus; TAYLOR, Prue, Introduction, *in*: BOSSELMANN, Klaus; TAYLOR, Prue (orgs.), **Ecological approaches to environmental law**, Cheltenhan: Edward Elgar Publishing, 2017, p. 1.
[76] STRASSER, Kurt A., Visions of "Eco- Law": A Comment on Capra and Mattei, The Ecology of Law: Toward a Legal System in Tune with Nature and Community (Berrett-Kohler Pubs., 2015), **Accounting, Economics, and Law: A Convivium**, v. 7, n. 3, 2017, p. 3.
[77] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, cap. 8.
[78] STRASSER, Visions of "Eco- Law", p. 2.

fundamentally disrupting the legal system. Therefore, this thesis often refers to the developed approach as ecolaw-informed. Ecolaw proposes a revolution, and this thesis proposes a first step of this transition to a new system, with a reform focused on waste management in Brazil.

Other critical points of difference between this thesis and existing ecolaw theory are its centring of waste pickers and its addressing of their socio-economic and human rights as opposed to merely considering ecological benefits. As further explained in Chapter 3, waste picking is an unsafe and unhealthy activity, and a source of livelihood for workers without alternatives. It is a consequence of the inequality and poverty of highly capital-based systems. Possibly, once the transition from capital to commons as per the ecolaw vision is completed, waste picking will no longer exist because these workers will have alternative job opportunities and less waste will be generated. However, for now the focus should be on recognition of the value of the services the waste pickers provide, through the provision of an effective PES framework.

While acknowledging the significance of revolutionary theories, this thesis proposes a reform in one area of environmental law, which is waste law. This thesis focuses on the current context of waste in Brazil, which is connected to its waste pickers. It emphasises that Brazilian environmental law must recognise that waste pickers are still exploited since their integration into waste management systems remains limited. The three-element criteria adapted from ecolaw, and influenced by previous practices of the ecological approaches to environmental law, aim to achieve community-driven sustainability and social justice objectives.

It is also essential to highlight that the ecolaw theory connects to strong sustainability. Winter explained that strong sustainability seeks to protect the rights of future generations through preserving nature, which is essential to economic and social development, and ultimately allows life.[79] The author argued that nature is the fundament or the base of strong sustainability, and not merely one of its three pillars[80] (as are the social and economic aspects). In contrast, weak sustainability is based on the three pillars of environmental, social and economic concerns.

As examined in this thesis,[81] when models conceptualise economic, environmental and social concerns as equally important, the economic side tends to overshadow the other two.

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[79] WINTER, Gerd, **Desenvolvimento sustentável, OGM e responsabilidade civil na União Europeia**, Campinas: Millennium, 2009, p. 1.
[80] WINTER, Gerd, Perspectives for Environmental Law: Struggling for Sustained Humanity, **Journal of Environmental Law**, v. 20, n. 1, p. 11–13, 2007, p. 13.
[81] See chapter 1, section 1.5.3 ‘The United Nations and Waste Management in the context of the Global South-Global North divide’ and chapter 2, section 2.3.1 ‘The United Nations and the Sustainable Development Goals’.

Two examples are the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs) of the United Nations (UN), as investigated in Chapter 2, Section 2.3.1. That is, legal frameworks struggle to put weak sustainability into practice; consequently, a strong sustainability legal framework is not a current reality.

Brazil has enacted important legislation, representing a way forward for national environmental law. The Brazilian Constitution of 1988[82] is unique and world-leading in that it addressed the environment as a fundamental right.[83] It also championed the socio-environmental rights' perspective.[84] Thus, it is a step forward in the direction of an ecolegal order, given that this provision provided that a healthy environment is the right of all individuals, communities and future generations.[85] In a similar socio-environmental approach, the National Solid Waste Policy is an inclusive legislative approach that acknowledges the critical role of organised waste pickers and therefore situates waste management as an opportunity. Since this thesis develops a PES model tailored for Brazilian waste pickers, aiming for reform of waste management, it fits within existing legislative frameworks. Nonetheless, these legislations and the developed model are advances that are still far from a true ecolaw setting.

This thesis understands that to achieve strong sustainability, and consequently ecolaw, a transition is needed. As per Winter's argument, multiple levels of relevant legal institutions are needed to create awareness of their effects and the dependence on nature.[86] This transition should englobe states, transnational organisations, industry networks and international law and organisations.[87] This is an essential transition; however, it is unlikely to occur overnight.

In this sense, this thesis aims to facilitate this transition to strong sustainability and an ecolegal framework. However, this thesis does not embrace all aspects of such theories; for instance, here, social and environmental matters in the Brazilian waste management context are addressed as interconnected and interdependent. In short, an adaptation of the strong sustainability and ecolaw theories is presented in this thesis in order to deal with the urgent problem of waste management in Brazil, which has severe socio-environmental effects as further discussed in Chapter 3.

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[82] BRASIL, Constituição da República Federativa do Brasil de 1988., article 5, § 2º and 225.
[83] LEITE, José Rubens Morato *et al*, Direito e política constitucional ambiental, *in*: LEITE, José Rubens Morato (ed.), **Manual de Direito Ambiental**, 1. ed. São Paulo: Saraiva, 2017, p. 50.
[84] SOUZA FILHO, Carlos Frederico Marés de, **O renascer dos povos indígenas para o direito**, Curitiba: Juruá, 1998, p. 72.
[85] Brasil, 'Constituição Da República Federativa Do Brasil de 1988.' (n 8), article 225.
[86] WINTER, Perspectives for Environmental Law: Struggling for Sustained Humanity, p. 13.
[87] *Ibid*.

1.3 THESIS STRUCTURE

As previously mentioned, this research was developed under a Dual Degree Agreement. This means the PhD Candidate had to comply with the requirements of two combined coursework degree programs, one offered at the University of Newcastle and the other at the Federal University of Santa Catarina. The practical consequence is that the thesis structure is a hybrid that combines the model of each university, a structure developed by the Candidate in agreement with all supervisors.

This first chapter explains later why sustainable waste management is a major topic of legislation and policies, as well as contextualises it within the Global South – Global North divide. It provides an overview of the thesis purpose, research questions, hypothesis, objectives and methodology, introducing the concepts of urbanisation, waste picking and waste in the international debate with the SDGs, and the critics of waste colonisation. These discussions are valuable to the critical legal scholarship to analyse how waste management innovation, such as waste-to-energy incineration, can be shaped to fit a Global North-centric agenda and erase local practices and livelihoods in Brazil, including that of waste pickers. This research is situated in the global legal scholarship that critically examines the international powers involved in that process, aiming to enable informed policies for Brazil and the Global South.

Chapter 2 explicates the philosophy underpinning contemporary environmental law. It explains legal systems' roots, and the reasons it fails to align the social and environmental dimensions. The chapter investigates the evolutionary influence of scientific perception—mechanistic thinking—of the world into the legal system, and the ultimate triumph of economics as the most important science to the law. The chapter provides a critical examination of the law as an instrument of the economic order, bringing the ecology of the law, or ecolaw, as an alternative framework. However, it adapts this theory to the Brazilian waste management context, as further explained in Section 1.2. The chapter analyses this philosophically informed approach and complexity theory, which argues that a paradigm shift in the relationship between humans and nature is in progress, and its influence in the law is imminent. The innovative ecolegal order deposes the modern concept and practice of the law, aiming to create law and policy in tune with nature and community, stimulating sustainable bottom-up, grassroots and local strategies, including reducing waste. This chapter applies an adapted version of ecolaw as an analytical framework to create future context-based, sustainable and inclusive waste management policies. Last, this chapter analyses three selected criteria of an ecolegal system,

which are making communities sovereign, making ownership generative and ecodesign. In short, for this thesis, the ecolaw is an analytical framework, a tool for holistically evaluating reform proposals.

Chapter 3 examines the two central systems in dispute for promoting waste management schemes in Brazil—the local organised waste pickers and the foreign waste-to-energy incineration plants—through the criteria of the ecolaw-informed framework. This chapter discusses organised waste pickers' practices in general; however, it begins by focusing on Brazil and provides specific examples of organised waste pickers in that country. This chapter highlights that the organised waste pickers are more connected with ecodesign than are waste-to-energy incinerators and that a reason for their stronger connection is that waste pickers' systems are less harmful to nature, in terms of energy consumption and air and land pollution. The results of the investigation of the criterion of making communities sovereign also favour the organised waste pickers, as a local technology, as opposed to the risks associated with the large investment required for establishing a safe incineration scheme. Last, the criterion of making ownership generative shows the improved position of the waste pickers who are organised in cooperatives and similar enterprises, for they are one of the prime examples of generative property. In contrast, large international organisations involved with incinerators are often extractive. This chapter concludes that waste-to-energy incinerators are ill-suited to creating an ecolaw vision. The organised waste pickers are a preferred model; however, they face different layers of oppression and exclusion, including from governments.

Chapter 4 investigates PES, which is the instrument that the global and the Brazilian National Waste Pickers' Movement have been advocating for in the past decade. This chapter begins with the analyses of the two dominant narratives of PES, market-based and social-based models, highlighting the scholarship about the Global South that has argued that the social-based model is superior owing to the prominence it gives to social concerns. This chapter examines the literature about PES in Brazil, explaining the harms that the market-based model has produced. It concludes that the social-based model is superior. This model matures through conformation with the ecolaw criteria, which allows it to retrieve some of the market-based model structure without risking becoming an instrument that serves only the economic order.

Chapter 5 proposes an innovative structure for the PES that conforms to the ecolegal order and is tailored for waste pickers. This chapter explains the legal context in which this model would be applied, providing an overview of the evolution of the Brazilian law for the inclusion of the organised waste pickers into official waste management schemes. Further, it

creates a policy model for waste pickers that follows the ecolaw criteria and is part of the local, South-based agenda.

Last, Chapter 6 presents the conclusions of this thesis and discusses opportunities in the field for future research. The research presented in this thesis confirms the innovative hypothesis that PES is a favourable policy towards inclusive waste management and is respectful of environmental and social principles and the Global South's context. However, this is only possible because PES is integrated into the ecolaw framework.

1.4 DEFINITIONS

This section identifies the indispensable definitions for this research. These definitions are important to position the thesis and to define the field, subfield and research issue that are covered by this research. The key definitions are as follows:

1. Urban Environmental Service: In this thesis, this term is used to refer to the environmental benefits that waste pickers' services provide to society, such as the decrease in the risk of infectious diseases, in water and energy consumption, in greenhouse gas emissions and in the need for renewable and non-renewable virgin raw material.[88] The term urban environmental service derives from the general terms of environmental services and ecosystem services, extensively used as synonymous for nature-related services connected to human actions, coupling biophysical and socio-economic processes.[89]

2. Ecolaw: Ecolaw or the Ecology of Law is a term that Capra and Mattei developed to refer to a new legal system in tune with human needs in a finite planet. Prior to this theory, there were certain ecological approaches to an environmental law framework, which means that other authors had been debating the roots of environmental problems and the legal order underpinning them since the middle of the past century.[90] The Capra–Mattei theory aims to update the whole legal system, not only environmental law. In short, it calls for fundamental changes in the structure of the law, based on a set of objectives and tools.[91] This call, particularly considering the delicate relationship between humans and nature, is not new. Ecolaw is a

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[88] Some examples of non-renewable virgin raw materials are pulp, iron ore, bauxite and petroleum.
[89] WUNDER, Revisiting the concept of payments for environmental services, p. 239.
[90] *See* LEOPOLD, The Land Ethic.
[91] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, cap. 3.

framework that this thesis applies to a) identify the limitations of the current system in Brazil, and b) develop a more sustainable, local needs-specific system of PES.

3. Organised waste pickers: Waste pickers are informal waste workers who earn their livelihoods by improving and transforming materials that others have discarded.[92] In Brazil, the term used in the legislation[93] to address these workers is *catadores de materiais reutilizáveis e recicláveis,* which translates to pickers or collectors of recyclable and reusable materials. This thesis applies the term organised waste pickers to refer to workers taking part in waste pickers' cooperatives, associations and other social enterprises that focus on collecting and recycling recyclable materials.

4. Waste: It consists of discarded products and materials. The many types of waste include medical, food, hazardous and construction waste. This thesis focuses on municipal solid waste, also called urban solid waste, applying the Brazilian legal definition of it as waste generated from urban households and urban cleansing.[94]

5. Sustainable waste management: This term refers to waste management concentrating on environmentally adequate waste practices based on pollution reduction and nature conservation to provide a healthy environment.[95]

6. The a priori waste hierarchy: A waste hierarchy and the Rs framework can be composed by different strategies, such as reduce, reuse, remanufacture, recycle and recover.[96] This thesis follows the a priori waste hierarchy, in which the law applies a strategy based on the local context and the specific case. That is, the legal system is not restrained by an abstract, inflexible hierarchy of management objectives.[97] This thesis applies the concepts of ecological integrity and dignified life as criteria to analyse the local context.[98]

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[92] DIAS, Waste pickers and cities, p. 376.
[93] BRASIL. Lei nº 12.305, de 2 de agosto de 2010. Institui a Política Nacional de Resíduos Sólidos; altera a Lei nº 9.605, de 12 de fevereiro de 1998; e dá outras providências., 2010.
[94] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. article 13.I.a.b.c. (2010) http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm.
[95] UNNISA, Syeda Azeem, Introduction, *in*: UNNISA, Syeda Azeem; RAV, S. Bhupatthi (orgs.), **Sustainable Solid Waste Management**, Toronto: Apple Academic Press, 2012, p. xiii.
[96] The most well known is the 3Rs framework (Reduce, Reuse, Recycle); however, some frameworks include more strategies, such as the 9Rs (Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpuse, Recycle, Recover). See KIRCHHERR, Julian; REIKE, Denise; HEKKERT, Marko, Conceptualizing the circular economy: An analysis of 114 definitions, **Resources, Conservation and Recycling**, v. 127, p. 221–232, 2017.
[97] ARAGÃO, Maria Alexandra de Sousa, **O Direito dos Resíduos**, Coimbra: Almedina, 2003, p. 33; ARAGÃO, Maria Alexandra de Sousa, Os resíduos e a sua gestão internacional, **O direito e a cooperação Ibérica**, v. 7, p. 271–311, 2006, p. 300.
[98] POPE, Kamila, **Transferência Transfronteiriça de Resíduos sob a Perspectiva da Justiça Ecológica : Rumo à Gestão Internacional de Resíduos**, Universidade Federal de Santa Catarina - UFSC, Florianópolis, 2018, p. 409.

1.5 RESEARCH SCOPE: BACKGROUND AND LIMITATIONS

This chapter discussed the research questions, hypothesis, justification and methodology. It also provided the structure of the thesis and the main definitions. This section will now provide further background to the topic of this thesis. In short, it will explain the Global South – Global North divide, the waste management practices in the Global South and the UN's take on waste management. A general understanding of these areas helps to orient the chapters that follow.

The Global South and the Global North are discursive categories relating to the historical processes experienced under colonialism[99] and imperialism.[100] These terms, which refer to the power and influence of the Global North on the Global South, help understand the common causes and consequences of unequal power relations, manifested in everyday urban politics with high levels of inequality. The geopolitical spaces of both the Global South and Global North are going through urbanisation; however, currently the bulk of the urban population's rapid growth is occurring in the Global South.[101] Since it lacks the infrastructure of the Global North, waste management has been an environmental issue in the Global South. In response, the informal sector,[102] mainly the waste pickers, began to engage in waste collection and recycling, becoming the main providers of waste management in the area.

In the Global South, waste picking is the largest contributor to resource recovery;[103] however, waste pickers are at the bottom of the waste value chain despite their valuable role.[104]

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[99] Colonialism is characterised by a power country establishing colonies or settlements in another country, nation or territory to pursue political and economic benefits.

[100] Imperialism occurs when a country creates policies to influence other countries, territories or nations by means of power, such as force, military invasion and the language of law. Imperialism and colonialism can be distinguished by ideology and practice, that is, imperialism provides the vision of dominance, whereas colonialism installs a form of imperialism.

[101] SWILLING *et al*, **The Weight of Cities: Resource Requirements of Future Urbanization. A Report by the International Resource Panel.**, p. 35.

[102] The informal sector, also known as the informal economy, is a 'part of the market economy in that it produces (legal) goods and services for sale or other form of remuneration. It covers informal employment both in informal enterprises (small unregistered or unincorporated enterprises), and outside informal enterprises. Informal entrepreneurs and workers share one important characteristic: they are not recognized or protected under existing legal and regulatory frameworks. The informal economy excludes the criminal economy and the reproductive or care economy'; ILO, **ILO Thesaurus**, International Labour Organization - ILO - Promoting Jobs, Protecting People, Disponível em: http://ilo.multites.net/default.asp, acesso em: 28 jun. 2019, (ILO home - About the ILO - How the ILO works - Departments and offices - ILO Library - Information resources - Terminology - ILO Thesaurus).

[103] VELIS, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era., p. 329.

[104] WILSON; VELIS; CHEESEMAN, Role of informal sector recycling in waste management in developing countries, p. 800.

For instance, the most recently available statistics, from 2013, suggest that over 4 million people work as informal waste pickers in Latin America.[105] Waste picking provides work for up to 2 per cent of the population of countries such as Brazil, Mexico, Colombia and Argentina.[106] Waste pickers are of particular significance in Brazil, where they undertake 90 per cent of all recycling.[107]

Simultaneously, the international community and leading economic-environmental theorists have been stressing that waste is among the planet's major problems and have been proposing strategies to overcome it. These discussions face criticism for waste is highly context-specific,[108] and the core of urban research emerges from the Global North, which has a significantly different reality from the Global South.[109] The approaches developed by the Global North are often inadequate for the Global South context, such as the push for waste-to-energy incineration, an unsuitable technology for the Global South where it threatens the waste pickers[110] who are the central providers of sustainable waste management.[111] Nevertheless, the literature has suggested that the Global South will likely continue promoting resource recovery, not only because of environmental concerns but also because of a social necessity. Thus, waste management strategies must consider the Global South's circumstance and work towards ecological sustainability and social equity.

The next topics of this section aim to contextualise the Global South – Global North divide, and the waste management practices in the Global South, briefly contextualising the informal recycling sector. Next, the UN's take on waste management is reviewed to provide background on the issue at the international level. The fact that waste is a main environmental concern of the UN is relevant since it is an international body. Further, it is important to understand how the Global South – Global North divide is replicated at the highest level in discussions on the SDGs. Last, concessive recommendations are considered.

1.5.1 The Global South – Global North Divide

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[105] ACCENTURE, **Caracterización del sector informal del reciclaje informal en América Latina y el Caribe**, Washington, D.C.: Accenture, 2013, p. 4.
[106] MEDINA, Scavenger cooperatives in Asia and Latin America, p. 52.
[107] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 50.
[108] KOPNINA, Helen, Towards Ecological Management: Identifying Barriers and Opportunities in Transition from Linear to Circular Economy, **Philosophy of Management**, p. 1–15, 2019, p. 2.
[109] NAGENDRA *et al*, The urban south and the predicament of global sustainability, p. 341.
[110] For more information about the paradox between waste-to-energy incineration and waste pickers, see Chapter 3.
[111] DIAS, Waste pickers and cities, p. 376; NAGENDRA *et al*, The urban south and the predicament of global sustainability, p. 341–342.

This thesis adopts geopolitics and geopolitical concepts to explore the relationship between law, waste pickers and PES because these perspectives are used to discuss the world through history, power and consequences. Geopolitical concepts assist in challenging assumptions about effective waste management models. This is because they draw attention to the need to consider local contexts and different ways of understanding the environment, rather than to simply assume that because something is done in the Global North it should be transported to the Global South.

Geopolitics is a guide of the global landscape, which employs geographical descriptions, metaphors and templates, such as 'Third World', 'Global South' and 'Global North'.[112] Geopolitical terms are geographical because they identify and label places, creating a vision of the world that assists policymaking processes.[113] This is a widespread concept and is a better perspective than reducing complex contexts to governments and countries,[114] such as 'Washington', 'London', 'São Paulo' and 'New Delhi'.

Geopolitical concepts generate particular understandings of places, communities and identities.[115] However, there is a lack of research about the impact of geopolitics on the social aspects of environmental law.[116] Thus, there is insufficient research acknowledging the connectivity between the elements of places, communities and identities in waste management law and policy, which indicates the reason that the practices of the Global South are invisibilised whereas technologies of the Global North are promoted in international debates. The competing models in waste management are further discussed in Chapter 3.

Global South and Global North are concepts to facilitate the comprehension of the commonalities and differences between countries, and this divide originated in colonialism.[117] The colonial era caused the collapse of the great civilisations of the Global South, devastating the Indigenous peoples of Asia, Africa and the Americas[118] and supporting the exploitation of their land, labour and natural resources by European countries. This process subverted self-

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[112] DODDS, Klaus, **Geopolitics: A Very Short Introduction**, New York: Oxford University Press, 2007, p. 4–5.
[113] *Ibid*., p. 4.
[114] *Ibid*.
[115] *Ibid*., p. 5.
[116] GONZALEZ, Carmen G, Environmental Justice, Human Rights, and the Global South, **Santa Clara Journal of International Law**, v. 13, n. 1, p. 151–195, 2015, p. 152.
[117] GUTBERLET, Waste in the City: Challenges and Opportunities for Urban Agglomeration, p. 193.
[118] For detailed information about the colonisation of Latin America and the consequent damages, see LAS CASAS, Bartolomé de, **Brevísima Relación de la Destruición de Las Indias**, Medellín, Colombia: Editorial Universidad de Antioquia, 2006. Las Casas was a Spanish historian and missionary, who, during the colonial era, denounced the oppression of Indigenous peoples by the Spanish Crown.

reliant subsistence economies into European colonies; exporters of agricultural products, minerals and timber; and importers of manufactured goods.[119] Global Southern peoples were devastated through compelled miscegenation, assimilation and death, and were forced to lose their identity, language, culture and ancestral land to become workers, not always free. In parallel, nature was sacked and substituted, impoverished by losing its biodiversity, species and beauty.[120]

The term Global South was selected in preference to other common terms used to refer to the former colonies. Western social scientists used the terms 'First World', 'Second World' and 'Third World' as early as in the 1950s, in the aftermath of the Korean War (1950–1953) and the global competition of the Cold War (1947–1991), to emphasise the differences between the United States , the Soviet Union and vulnerable nations.[121] The terms were developed at a time of decolonisation of countries in South Asia, Asia and Africa, which therefore created new power dynamics.[122] 'Third World' referred to the people located roughly in southern continents—Africans, Asians and Latin Americans—who shared a history of underdevelopment, colonialism and, often, of multi-ethnicity and multiculturalism.[123] The preferred term of Global South in this thesis similarly encompasses the people of these continents and recognises their shared experiences.

The usage of the term 'Third World' started to fade in the 1970s and more intensely in the 1990s, due to the dismissal of the 'Second World' as an analytical concept for the Soviet Union.[124] Ideas of stagnation, inequality and poverty were also being associated with the 'Third World', causing discontent among these nations.[125] In the 1970s, the term 'developing' became popular in the economic field to replace the belittling idea of 'less developed'.[126]

Ultimately, the term 'South' and later 'Global South' replaced 'Third World' because of the adoption of the terms in UN documents. Thus, the UN's use of South/Global South is a key reason behind the fading of other terms, such as 'Third World' and 'less developed'. In the

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[119] PONTING, Clive, **A New Green History of the World: The Environment and the Collapse of Great Civilizations**, Rev. ed. London, UK: Vintage, 2007, p. 172–198.
[120] SOUZA FILHO, Carlos Frederico Marés de, A Essência Socioambiental do Constitucionalismo Latino-Americano, **Revista Da Faculdade De Direito Da UFG**, v. 41, n. 1, p. 197–215, 2017, p. 197.
[121] DODDS, **Geopolitics: A Very Short Introduction**, p. 5.
[122] DODDS, Klaus, 1.1 The Third World, developing countries, the South, poor countries, *in*: DESAI, Vandana; POTTER, Robert B. (Eds.), **Companion to Development Studies, 2nd Edition**, 2. ed. New York: Routledge, 2013, p. 4.
[123] BRAVEBOY-WAGNER, Jacqueline Anne, **Institutions of the Global South**, London: Routledge, 2009, p. 2.
[124] *Ibid*.
[125] *Ibid*.
[126] *Ibid*.

1980s, the UN sponsored the Brandt Commission to analyse the world's situation, and it reported a divide between the Global South and the economically more affluent Global North. The Commission pointed out that the Global North should attend to the strong interdependency of the many countries and promote a fairer global political economy.[127]

Therefore, a Global South was formed, not only as a geographical concept but also as a geopolitical one. It is not meant to convey either progress or a dismissive connotation. Nonetheless, it captures the socio-economic hierarchy historically present between the Global North and the Global South, the first subordinating the latter, using its power and causing injustice.[128] The Global South is not only a place and a people, but also a metaphor of human suffering caused by unequal power relations at the global level that prompts decolonial or anti-imperial agendas.[129] This thesis contributes to this agenda by developing a PES model in tune with grassroots advocacy and the context of the Global South.

In both the Global North and the Global South, socio-environmental conflicts are a source of suffering, and often, resistance movements appear, frequently characterised as environmental justice[130] movements. These conflicts originate when people unite over a shared perception of environmental degradation caused by economic activities, mobilising and publicly contesting the situation. These hazards can appear at all phases within the productive chain: extraction, transport and infrastructures, processing and final disposal.[131] This thesis focuses on the socio-environmental conflicts experienced by waste pickers at the end of the chain, meaning waste management, and explores PES as a legal alternative to overcome such problems.

Colonisation has a long-lasting effect due to the residual Eurocentric, or North-centric, control and social construction. The Global North continues to dominate the Global South even after the end of colonial times. As an example from Latin American, after the 1959 Cuban

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[127] DODDS, 1.1 The Third World, developing countries, the South, poor countries, p. 5.
[128] SANTOS, Boaventura de Sousa, A crítica da razão indolente: Contra o desperdício da experiência., *in*: **Para um novo senso comum: a ciência, o direito e a política na transição paradigmática.**, 4. ed. São Paulo: Editora Cortez, 2002, v. 1, p. 369.
[129] SANTOS, Boaventura de Sousa, Public Sphere and Epistemologies of the South, **Africa Development**, v. XXXVII, n. 1, p. 43–67, 2012, p. 51.
[130] Environmental justice initially revolved around inequities in the distribution of environmental hazards; thus, some communities, usually low-income and racial minorities, received more risks than others. The current discussions on the topic have evolved to contemplate communities (both human and non-human), vulnerabilities and the condition of nature in which the experiences transpire. For more information, see SCHLOSBERG, David, **Defining environmental justice: theories, movements, and nature**, Oxford ; New York: Oxford University Press, 2007; SCHLOSBERG, David, Theorising environmental justice: the expanding sphere of a discourse, **Environmental Politics**, v. 22, n. 1, p. 37–55, 2013.
[131] MURADIAN; WALTER; MARTINEZ-ALIER, Hegemonic transitions and global shifts in social metabolism, p. 565.

Revolution, the region started to receive massive attention from the government of the United States, which aimed to prevent another socialist movement.[132] Countless efforts were made in 1960–1990 to influence Latin America, including through supporting violent anti-communist military dictatorships and regimes in Brazil, Argentina, Chile and Uruguay.[133] In Brazil, grassroots movements concerned with environmental matters existed during the military dictatorship (1964–1985).[134] Nevertheless, these movements gained significant strength in the 1980s when the process of re-democratisation and political openness started in the country.[135] For instance, in 1985 waste pickers began their process of becoming an expressive group in Brazil.[136]

Thus, the ending of the colonial times, the Cold War and the aforementioned dictatorships certainly enabled changes in the Global South but did not end its unequal socio-political and socio-economic power relations with the Global North. Domination continues with the use of an ideology of 'one natural worldview'[137] and is illustrated by the metaphor of 'monocultures of the mind' or intellectual colonisation.[138] A leading author in the field, Shiva, has indicated that the creed of one legitimate base of knowledge created only in the Global North becomes present in people's minds. Thus, later, the derived practices can easily be put into practice. This strategy is aimed at sabotaging a social group and at the higher end—controlling the hegemonic model.

Technologies and ideas conceived in the Global South were portrayed as a social archaism of subservient status, and the Global North's proposals became the only source of lawfulness. That is, the knowledge created by the Global North's elite was rendered as the only objective truth. This universality of knowledge was essential to expand and maintain colonial expansion and domination by the conception of superior and inferior knowledge, worldview,

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[132] CHOMSKY, Noam, **Quem manda no mundo?**, 1. ed. São Paulo: Planeta, 2017, p. 21; DODDS, 1.1 The Third World, developing countries, the South, poor countries, p. 4.
[133] CHOMSKY, **Quem manda no mundo?**, p. 20–22; DODDS, 1.1 The Third World, developing countries, the South, poor countries, p. 4.
[134] CARVALHO, Isabel Cristina de Moura, A questão ambiental e a emergência de um campo de ação político-pedagógica, *in*: LOUREIRO, Carlos Frederico Bernardo; LAYRARGUES, Philippe Pomier; CASTRO, Ronaldo Souza de (orgs.), **Sociedade e Meio Ambiente: a educação ambiental em debate**, 4. ed. São Paulo: Cortez, 2006, p. 49–50.
[135] *Ibid*.
[136] BOSI, Antônio de Pádua, A organização capitalista do trabalho "informal": o caso dos catadores de recicláveis, **Revista Brasileira de Ciências Sociais**, v. 23, n. 67, p. 101–116, 2008, p. 105.
[137] CHIMNI, Bhupinder S., Third World Approaches to International Law: A Manifesto, **International Community Law Review**, v. 8, n. 3, p. 3–27, 2006, p. 15.
[138] SHIVA, Vandana, **Monoculturas da mente: perspectivas da biodiversidade e biotecnologia**, São Paulo: Editora Gaia, 2003, p. 20.

lifestyle and people.[139] This cultural and social project of hierarchies is known as coloniality,[140] and it maintains itself through legal, political and philosophical interactions of domination and subordination.[141]

This approach led to the misleading notion that popular or traditional Southern practices are outdated due to the canon's lack of recognition. Southern traditions were discredited, considered invisible, non-intelligible and dispensable until finally deemed as non-existent.[142] These traditions were classified as belonging to the past, at the infancy of human history, and now invalidated by the Northern scientific knowledge.[143] This view reflects in various systems, including in the waste practices, since the Global North's mechanisation and intensive technologies are portrayed as advanced. In contrast, the informal waste sector typical of the Global South is rendered as pre-modern.[144] This thesis contributes to this topic as it aims to disrupt the assumption that Global North practices should be transplanted to the Global South, meaning the assumption that knowledge from Global North is superior to that from the Global South and would actually achieve the best outcomes for local people and the environment in countries such as Brazil.

The intellectual colonisation and the Global North's dominance through scientific knowledge generated practical outcomes. The controlling scientific knowledge is widely implemented, and as argued throughout this thesis, this approach devalues local knowledge; further, a valuable opportunity to develop sustainable, context-specific waste management solutions is lost. Unsurprisingly, the modern system neglects nature, as it does traditional peoples and groups.[145]

The relationship between production and nature deteriorated severely under colonisation. The modern model isolated nature from culture, hindering the transversal[146]

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[139] GROSFOGUEL, Ramón, Decolonizing Post-Colonial Studies and Paradigms of Political-Economy: Transmodernity, Decolonial Thinking, and Global Coloniality, **TRANSMODERNITY: Journal of Peripheral Cultural Production of the Luso-Hispanic World**, v. 1, n. 1, p. 1–38, 2011, p. 6.
[140] Coloniality is a phenomenon particularly studied by the Latin American decolonial theorists.
[141] GROSFOGUEL, Decolonizing Post-Colonial Studies and Paradigms of Political-Economy: Transmodernity, Decolonial Thinking, and Global Coloniality, p. 13; TULLY, James, Modern Constitutional Democracy and Imperialism, **Osgoode Hall Law Journal**, v. 46, n. 3, p. 461–494, 2008, p. 480.
[142] SANTOS, Public Sphere and Epistemologies of the South, p. 52.
[143] BAUMANN, Zygmunt, **Legisladores e Interpretes: Sobre modernidade, pós-modernidade e intelectuais**, 1. ed. Rio de Janeiro: Editora Zahar, 2010, p. 87.
[144] DIAS; SAMSON, **Informal Economy Monitoring Study Sector Report: Waste Pickers**, p. 6.
[145] SOUZA FILHO, Carlos Frederico Marés de; PRIOSTE, Fernando, Quilombos no Brasil e direitos socioambientais na América Latina, **Revista Direito e Práxis**, v. 8, n. 4, p. 2903–2926, 2017, p. 2921.
[146] Transversal reasoning is the intersection of different forms of discourses, practices, actions, thoughts, beliefs and disciplines over a shared vision.

vision.[147] This fragmentation allowed people to be ever more distant from nature. Thus, the methods that arose came from this union between the modernisation project and the new standpoint of social structure.

Southern practices and the connection with nature were belittled by science, such as through replacing sustainable agriculture by large monocultures.[148] Yet, it is debated whether the current environmental crisis is a product mainly created by the Global North.[149] The Global South has advocated the Global North's admission of responsibility and massive participation in developing environmental hazards (such as climate change),[150] and the Global North has accepted the principle of the commons. However, differentiated responsibilities were formalised in the United Nations Framework Convention on Climate Change.[151] Despite its significance to environmental law in general, this issue is outside the scope of this thesis, which takes as its main focus the unpacking of strategies for waste management in the Global South.

At present, the Global South is at the centrestage of the world's changes and faces the same Global South – Global North paradox. As previously discussed, the core of the urban population growth is currently transpiring in the Global South, whereas leading theories about cities and urbanisation problems remain rooted in the Global North.[152] This presents a situation in which the Global South is facing local challenges, and Global North constructs are

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[147] GUATTARI, Félix, **As três ecologias**, Campinas: Editora Papirus, 2011, p. 25.
[148] The term monoculture means cultivating a single agricultural product at a time, usually on large properties. It is generally practiced for economic exploitation and leads to the reduction of various ecosystem functions. This type of production system is selected because it enables easier cultivation and harvesting. The uniform cultivation of just one product on a large scale is simple because its growth will be the same across the land. The expansion of monocultures brings instability to agro-ecosystems, which typically harms diversity owing to recurrent pest outbreaks.
[149] In fact, the Southern Peoples Ecological Debt Creditors Alliance argued that the Southern peoples are creditors of an ecological debt. This debt includes 'the historical debt from plundering, destruction, devastation, slave labour and cultural annihilation in the South during the colonial era; debt from the social, environmental, economic and cultural impact of the extraction of natural resources (oil, gas, minerals, marine and forest life); debt from the intellectual appropriation and use of traditional knowledge through biotechnology by agro-business, first in the Green and now in the Genetically Modified Organisms revolution; debt from the degradation of land, water and air through monocultures, putting the food and cultural sovereignty of communities at risk; debt through pollution of the atmosphere and the appropriation of carbon absorption capacity of oceans, vegetation and forests; debt for the damage caused by chemical, nuclear and biological arms production and depositing of toxic substances' (Gert Goeminne and Erik Paredis), 'The Concept of Ecological Debt: Some Steps towards an Enriched Sustainability Paradigm' (2010) 12(5) *Environment, Development and Sustainability* 691 ('The Concept of Ecological Debt').
[150] GONZALEZ, Carmem G., Environmental Justice and International Environmental Law, *in*: SHAWKAT, Alam *et al* (orgs.), **Routledge Handbook of International Environmental Law**, 1. ed. London, UK: Routledge Taylor & Francis Group, 2012, p. 89.
[151] United Nations Framework Convention on Climate Change (UNFCCC), *General Assembly* (United Nations, 1992), article 3.
[152] NAGENDRA *et al*, The urban south and the predicament of global sustainability, p. 147; ROY, Ananya, Urban Informality: Toward an Epistemology of Planning, **Journal of the American Planning Association**, v. 71, n. 2, p. 147–158, 2005, p. 147.

insufficiently flexible to tackle the socio-environmental issues of the Global South. For instance, the Global North applies waste-to-energy incineration to treat waste and produce energy. [153] This technology is divisive in the Global South because it challenges the networks of waste pickers, who are the main providers of sustainable waste management, given that incinerators would compete over the same materials.[154]

This thesis argues that to overcome past shortcomings, the Global North and the Global South need to decolonise their relationship. This process requires attention to the development of legal instruments, such as PES, to create an appropriate model for the context of the Global South. Different contexts call for different strategies.[155] Therefore, it is crucial to understand the Southern urbanisation context and its cardinal problems, which will now be considered.

1.5.2 Waste Management Practices in the Global South

Waste management is a critical component of the environmental aspect of the second urbanisation wave. Unlike other environmental issues, such as air pollution, it has received less attention from policymakers and academics in the Global South.[156] Arguably, this lack can be attributed to insufficient socio-economic development levels in the Global South, leading decision-makers to prioritise the 'brown agenda',[157] while long ignoring waste management.[158] This oversight does not mean that improper waste management is not a serious problem: It contributes to the high morbidity and mortality rates in many cities.[159]

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[153] DIAS, Waste pickers and cities, p. 376; NAGENDRA *et al*, The urban south and the predicament of global sustainability, p. 341–342.
[154] See Chapter 3, Section 3.2.2.2 'Connecting People and Nature'.
[155] In examining environmental law and particularly PES as powerful tools to overcome the Global North's dominance over the Global South's waste management systems, this thesis uses the understandings gained by scholars associated with the Third World Approaches to International Law (TWAIL) movement. For more information, see Chimni (n 39); Makau Mutua and Antony Anghie, 'What Is TWAIL? Proceedings of the Annual Meeting.' (2000) 94(1) *American Society of International Law* 31: http://www.jstor.com/stable/25659346?seq=1&cid=pdfreference#references_tab_contents; Obiora Chinedu Okafor, 'Critical Third World Approaches to International Law (TWAIL): Theory, Methodology, or Both?' [2008] *International Community Law Review* 9.
[156] MEDINA, Solid wastes, poverty and the environment in developing country cities: Challenges and opportunities. No. 2010, 23., p. 1.
[157] The term 'brown agenda' describes actions prioritising environmental health issues and opposes the 'green agenda', which prioritises ecological sustainability.
[158] CAVÉ, Jérémie, Urban solid waste in southern countries: from a blurred object to common pool resources, *in*: , Florence, Italy: [s.n.], 2012, p. 2.
[159] MEDINA, Solid wastes, poverty and the environment in developing country cities: Challenges and opportunities. No. 2010, 23., p. 1.

Waste management is context-specific, and responsible governance must address real-life conditions.[160] In respect to the Global South, rapid urbanisation is developing in a time of insufficient governance structures and technical and financial resources. Waste collection services are rarely provided in an equitable, consistent way. The informal sector has filled the gap in cities with no or irregular waste collection, resulting in significant waste management performance.[161]

The informal and the formal sectors together form the urban economy's foundation. The formal urban sector is modern and industrial, and it includes public and private enterprises regulated by the State. In contrast, the urban informal sector is a traditional or subsistence sector forged outside State control.[162] Informal workers work without legal and social protection, in self-employment or for wages in formal or informal enterprises.[163] Informal entrepreneurs and workers produce legal goods and services for remuneration and are unprotected under the law, in a concept that does not include a criminal economy or care economy.[164] Formal and informal sectors are often dynamically linked over production, distribution or consumption.[165]

The informal sector has vastly expanded, and 2 billion workers worldwide are in informal employment, with 93 per cent of them in the Global South.[166] In other words, almost 70 per cent of the Global South's working population is in the informal sector.[167] Waste management is no exception, being among the main informal activities, offering income for millions of the world most impoverished people.[168]

In the waste sector, the most significant development has been the informal recycling sector, in which 0.5 per cent of the urban people are involved.[169] This sector is organised in a hierarchical value order by manufacturing industries; brokers, wholesalers and other

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[160] KOPNINA, Towards Ecological Management, p. 2.
[161] DIAS, Waste pickers and cities, p. 375.
[162] ZIA, H.; DEVADAS, V.; SHUKLA, S., Assessing informal waste recycling in Kanpur City, India, **Management of Environmental Quality: An International Journal**, v. 19, n. 5, p. 597–612, 2008, p. 597.
[163] EATON, Adrianne E.; SCHURMAN, Susan J.; CHEN, Martha A., Introduction, *in*: EATON, Adrianne E.; SCHURMAN, Susan J.; CHEN, Martha A. (orgs.), **Informal workers and collective action: A global perspective**, New York: Cornell University Press, 2017, p. 1.
[164] ILO, **ILO Thesaurus**, p. 1.
[165] KATUSIIMEH, Mesharch W.; BURGER, Kees; MOL, Arthur P.J., Informal waste collection and its co-existence with the formal waste sector: The case of Kampala, Uganda, **Habitat International**, v. 38, p. 1–9, 2013, p. 2.
[166] ILO, **Women and men in the informal economy: a statistical picture (third edition)**, Geneva, Switzerland: International Labour Office - ILO, 2018, p. 13–15.
[167] NAVARRETE-HERNANDEZ, Pablo; NAVARRETE-HERNANDEZ, Nicolas, Unleashing Waste-Pickers' Potential: Supporting Recycling Cooperatives in Santiago de Chile, **World Development**, v. 101, p. 293–310, 2018, p. 293.
[168] *Ibid*.
[169] VELIS, Costas, Circular economy and global secondary material supply chains, **Waste Management & Research**, v. 33, n. 5, p. 389–391, 2015, p. 391.

processors; intermediaries; micro or small enterprises and cooperatives; and individual[170] waste pickers.[171] Although data are scarce, it is estimated that 24 million people work in the global recycling supply chain,[172] of which 80 per cent[173] are waste pickers. Data have revealed that in the Global South alone, nearly 20 million people work as waste pickers in the informal recycling sector,[174] making waste a social issue. In short, the informal recycling sector is a fundamental provider of resource recovery in the Global South.[175]

The informal recycling sector's lack of formal support creates limitations. The lack of external/state financial support causes it to capture and process a fraction of recyclable products that offer sufficient profit margins.[176] Moreover, the chemical composition of waste is complex, and the sector needs proper training.[177] Despite these limitations, the waste pickers' activities are still a large part of waste management in the Global South, representing a social side of waste that cannot be neglected.

Recycling is an essential component of the international debate as well. It is crucial to understand the international take on waste management. The UN's position is an excellent barometer to analyse whether waste and recycling play a substantial role in international environmental strategies because it is an intergovernmental organisation that has nearly 200 Member States from the Global South and the Global North.[178]

1.5.3 The United Nations and Waste Management in the Context of the Global South – Global North Divide

The UN is a key actor in environmental protection and agreements. There are numerous relevant international agreements,[179] but this chapter will, in line with the thesis

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[170] WILSON; VELIS; CHEESEMAN, Role of informal sector recycling in waste management in developing countries, p. 800.
[171] Waste pickers are people who make their livelihood by collecting, sorting, recycling and selling materials that others have discarded. These workers will be discussed in detail in Chapter 3.
[172] ILO, *Working towards Sustainable Development: Opportunities for Decent Work and Social Inclusion in a Green Economy: [A Report by the Green Jobs Initiative]* (ILO, 2012) 185, 12 ('*Working towards Sustainable Development*').
[173] *Ibid*., p. 111.
[174] VELIS, Circular economy and global secondary material supply chains, p. 391.
[175] VELIS, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era., p. 329.
[176] *Ibid*.
[177] *Ibid*., p. 331.
[178] For the complete list of the Member States, see UNITED NATIONS, **List of UN Member States**, Disponível em: https://www.un.org/en/member-states/index.html, acesso em: 20 maio 2019.
[179] The UN's meetings and resolutions include the Stockholm Conference, also known as the United Nations Conference on the Human Environment, in 1972; Our Common Future, also called the Brundtland Report, published in 1987; the Kyoto Protocol to the Climate Change Convention in 1997; the Millennium Meeting of

scope, more narrowly focus on the UN's engagement with waste. Agenda 21 had a meaningful projection as the UN's resolution on how to tackle the twenty-first century's social, economic and environmental problems altogether. It fixed waste management among the set of plans of action to be taken globally, nationally and locally by the UN's organisations in every area in which humans affect the environment. Over 175 governments adopted Agenda 21 at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, in 1992.[180]

The UN was instrumental in showing waste as a significant global issue. After Agenda 21, waste became a common concern of governments, industry, households and the public. Recycling[181] emerged as a prominent strategy towards the reduction of waste generation and problems.[182]

In 2012, the UN declared that the entire planet is facing a waste crisis. The organisation highlighted how waste causes severe environmental and human health threats, noting the need for urgent action. The solutions proposed included waste reduction, reuse and recycling.[183]

The current strategy fomented by the UN is the 2030 Agenda for Sustainable Development. This approach was conceived as a 'comprehensive, far-reaching and people-centred set of universal and transformative Goals and targets'.[184] It was adopted by the UN's member states at the 70th Session UN General Assembly in 2015, in New York City.[185]

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the General Assembly and the Millennium Declaration in 2000, which designated eight progressive objectives known as the Millennium Development Goals (MDGs) or just Millennium Goals; the World Summit on Sustainable Development (WSSD) in 2002; the United Nations Conference on Sustainable Development, commonly referred to as Rio+20 Earth Summit, in 2012, that produced the report 'The Future We Want'; and the Paris Agreement signed in 2016. For compiled information about the UN's meetings and reports, see UNITED NATIONS, **Sustainable Development Goals Outcomes and Frameworks**, Disponível em: https://sustainabledevelopment.un.org/frameworks, acesso em: 21 maio 2019. SCHRIJVER, Nico, **The Evolution of Sustainable Development in International Law: Inception, Meaning and Status**, Leiden: Brill Publishers, 2008.

[180] UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT (UNCED), **Agenda 21: Action Plan for the Next Century United Nations Conference on Environment and Development.**, Rio de Janeiro: United Nations, 1992, p. 21.

[181] It is important to note that recycling alone cannot address the global waste crisis, and other initiatives are also needed to support reduction and reuse of waste.

[182] UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT (UNCED), **Agenda 21: Action Plan for the Next Century United Nations Conference on Environment and Development.**, p. 21.

[183] UNITED NATIONS, **The Global Garbage Crisis: No Time to Waste**, United Nations' Press Release - Chemicals and Waste, Disponível em: https://www.unenvironment.org/news-and-stories/press-release/global-garbage-crisis-no-time-waste, acesso em: 28 maio 2019.

[184] UN GENERAL ASSEMBLY, **Transforming our world : the 2030 Agenda for Sustainable Development**, New York, NY: United Nations, 2015, p. 3.

[185] *Ibid*.

The 2030 Agenda introduced the SDGs as the UN's strategy to address social, economic and environmental problems, that is, to facilitate sustainable development. The 2030 Agenda and all the 17 SDGs relate to good governance and waste management,[186] making waste an essential component for achieving the SDGs,[187] recognising that waste reduction and recycling are crucial for sustainable urban development.[188]

Another UN agreement of relevance to cities, waste and waste pickers is the New Urban Agenda. It brought a set of global standards for achieving sustainable urban development, and it was adopted in Quito, Ecuador, in 2016. The whole agreement sheds light on the main challenges faced by urban areas—cities, towns and villages—and contributes to the implementation of the SDGs, particularly Goal 11 of making cities and human settlements inclusive, safe, resilient and sustainable.[189] The New Urban Agenda's item 45 is closely related to sustainable waste management and waste pickers because it promotes the development of vibrant, sustainable and inclusive urban economies, fostering an enabling environment for livelihoods.[190]

In 2019, the UN's sixth Global Environment Outlook (GEO-6) identified waste management as a global concern, especially relating to urbanisation.[191] In fact, it was noted as a problem with many features, such as social inclusion and basic services, food waste, marine litter and plastic waste.[192] The report pointed out disparities, stressing the low investment in the Global South.[193] The increasing demand for resources makes waste an opportunity with an estimated value of approximately USD410 billion a year, from collection to recycling.[194] Waste management is fundamental to achieving the SDGs,[195] englobing recycling.[196]

Although these are historic achievements, the UN and its agreements exist in the context of the unjust relationship between the Global South and the Global North. It is not the

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[186] BESEN; GUTBERLET, Participatory urban solid waste governance in the global South, p. 3.
[187] More specifically, SDG 11 'Make cities and human settlements inclusive, safe, resilient and sustainable' and SDG 12 'Ensure sustainable consumption and production patterns' are intrinsically related to waste strategies. SDG 12, target 12.5 'By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse', highlights recycling as a relevant component of the SDGs.
[188] UN GENERAL ASSEMBLY, **Transforming Our World**.
[189] UNITED NATIONS, **New Urban Agenda**, Quito: United Nations, 2017, p. 3–4.
[190] *Ibid*., p. 14.
[191] UN ENVIRONMENT, **Global Environment Outlook - GEO-6: Healthy Planet Healthy People**, New York, NY: Cambridge University Press, 2019, p. 33, 67, 84.
[192] *Ibid*., p. 84, 488.
[193] *Ibid*., p. 76.
[194] *Ibid*., p. 90.
[195] *Ibid*., p. 488.
[196] *Ibid*., p. 93.

only challenge international environmental law faces;[197] however, the Global South – Global North divide is one of the biggest. In short, historically, the Global South is regarded as a 'grudging participant' in environmental agreements and soft law,[198] and not as a relevant partner in understanding the essence and solutions of environmental issues.[199]

The exclusion of the Global South in the international sphere is not a problem of the past,[200] and occurs at the latest UN deliberations. However, at this stage, the Global South is silenced not only by the Global North, namely, the United States and European countries, but also by UN private sector 'partners' and major donors, such as the World Bank,[201] and key international bodies, such as the International Monetary Fund.[202]

The latest global environmental law agreement, the SDGs, emerged with an active discourse of business engagement being the missing link between sustainable development and policymaking. This oversight was anticipated since the negotiations regarding the SDGs included global business conglomerates.[203] Businesses can make a significant contribution, yet this inclusion came without acknowledging their role in creating at least some problems.[204] Meanwhile, the Global South did not have a privileged seat and saw some of its prime concerns, such as trade liberalisation, kept away from genuine deliberation.[205] Trade liberalisation affects

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[197] Disputes among rising Southern countries, such as China and India, and more vulnerable nations, such as the small island states, have also jeopardised international environmental negotiations. Likewise, the acquisition of agricultural lands in Asia, Africa and Latin America by middle-income Southern nations for food and biofuels production is an example of the Global South – Global South conflict. In parallel, the clash between the United States and the European Union over the regulation of climate policy, toxic chemicals and the cultivation of genetically modified organisms and products is a Global North – Global North tension.

[198] The concept of sustainability that is widely used at present and consolidated by the UN as the main idea for environmental protection is itself a European brand. The European Union defends its position as the creator and enhancer of this concept, using the European treaties to exemplify and display its commitment to sustainable development. This concept aligns with the views of European democratic societies, which have high levels of economic development and social cohesion. For more information, see EUROPEAN COMMISSION, Fact Sheet: Towards a renewed partnership with African, Caribbean and Pacific countries after 2020., *in*: , Brussels: [s.n.], 2006.

[199] MICKELSON, Karin, South, North, International Environmental Law, and International Environmental Lawyers, **Yearbook of International Environmental Law**, v. 11, n. 1, p. 52–81, 2000, p. 54.

[200] The colonial encounter and the subordination of non-European peoples are perceived as a central base in the evolution of international law; see ANGHIE, Antony, **Imperialism, Sovereignty and the Making of International Law.**, 1. ed. Cambridge, UK: Cambridge University Press, 2007.

[201] LANGAN, Mark, **Neo-colonialism and the Poverty of'development'in Africa.**, New York, NY: Springer Berlin Heidelberg, 2017, p. 66.

[202] DODDS, 1.1 The Third World, developing countries, the South, poor countries, p. 6.

[203] LANGAN, **Neo-colonialism and the Poverty of'development'in Africa.**, p. 180–182.

[204] SCHEYVENS, Regina; BANKS, Glenn; HUGHES, Emma, The Private Sector and the SDGs: The Need to Move Beyond "Business as Usual", **Sustainable Development**, v. 24, p. 371–382, 2016, p. 380.

[205] LANGAN, **Neo-colonialism and the Poverty of'development'in Africa.**, p. 180–182.

the SDGs, such as the objectives defended in SDG 8[206] and SDG 13,[207] and can aggravate inequalities between and within states. The SDGs' vagueness on this matter resulted in a lost opportunity to state that sustainability demands prices to internalise the harm that production processes cause to people and nature.[208]

As a result, activists, civil society groups and scholars have expressed concern about the UN SDGs' role for the Global South. Essentially, the critique is the possibility of having a new branding, satisfying consumer's moral conscience, while maintaining limited scope for socially and environmentally sustainable practices. Alternatively, and even worse, will be the legitimisation of exploitation by free-market systems.[209] Some authors have also suggested that the SDGs' singular focus on neoliberal approaches force them as the only possible framework for global development.[210]

The market's influence on the SDGs is problematised in the Global South because of its history. Studies have suggested that traditional neoliberal approaches have aggravated inequality issues in the Global South, because a very small portion of its people accumulated most of the capital[211] generated by these initiatives, causing wealth inequality.[212] Socio-economic and environmental concerns are inherently interlinked. In this context, the SDGs can impair the Global South's capacity to achieve sustainable development due to the emphasis on promoting economic growth and productivity, which are the principles of market competition, in detriment to social equity goals and environmental concerns.[213]

Concerning waste, the literature has suggested that the SDGs[214] can have an influential predictive role in promoting the implementation of waste-to-energy technologies, such as

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[206] ANSONG, Alex, SDG 8 and Elimination of Child Labour in the Cocoa Industry in Ghana: Can WTO Law and Private Sector Responsible Business Initiatives Help?, **Forum for Development Studies**, v. 47, n. 2, p. 261–281, 2020, p. 261–263.
[207] PRAG, Andrew, **Trade and SDG 13 – Action on Climate Change. ABI Working Paper 735.**, Tokyo: Asian Development Bank Institute, 2017, p. 1.
[208] SCHMIEG, Evita, **External Trade Policy and the Sustainable Development Goals. Implementing the SDGs Will Meet Justified Criticisms of Globalisation**, Berlin: Stiftung Wissenschaft und Politik -SWP-Deutsches Institut für Internationale Politik und Sicherheit, 2017, p. 3.
[209] LANGAN, **Neo-colonialism and the Poverty of'development'in Africa.**, p. 188.
[210] WEBER, Heloise, Politics of 'Leaving No One Behind': Contesting the 2030 Sustainable Development Goals Agenda, **Globalizations**, v. 14, n. 3, p. 399–414, 2017, p. 409–410.
[211] The capital is the money, wealth or goods applied to the production of other goods and services. Chapter 2 will discuss the connection between law and capital.
[212] KUMI, Emmanuel; ARHIN, Albert A.; YEBOAH, Thomas, Can post-2015 sustainable development goals survive neoliberalism? A critical examination of the sustainable development–neoliberalism nexus in developing countries., **Environment, Development and Sustainability**, v. 16, n. 3, p. 539–554, 2014, p. 545.
[213] *Ibid*., p. 544.
[214] More specifically, Goal 7 "Ensure access to affordable, reliable, sustainable and modern energy for all", targets 7.1 "By 2030, ensure universal access to affordable, reliable and modern energy services", 7.2 "By 2030, increase substantially the share of renewable energy in the global energy mix", 7.3 "By 2030, double the global rate of improvement in energy efficiency", 7.4 "By 2030, enhance international cooperation to facilitate access

incineration, in the Global South.[215] The World Bank has promoted these practices.[216] This fact drew significant attention in the critical scholarship, which denounced this influence as a type of neo-colonisation that will ultimately give the Global North access to land and power in the Global South to pursue the Global North's agenda. That is, the long-term follow-up effect of the export of the Global North's expertise, which will change the Global South's waste practices, benefits the Global North, which adds new markets, profiting from long-term, exclusive contracts.[217]

Therefore, in applying the SDGs, the Global South should have a holistic approach. The market and its mechanisms cannot be the only system, and the SDGs must move on from the mere recognition of the interdependency between social, environmental and economic goals. In other words, sustainable development must seek a safe and just space for humanity, and promote inclusive economic development, bound by nature and its limits.[218] This thesis takes the position that a sustainable future through waste management practices requires policies, here argued to be PES, and should promote waste pickers, applying ecological approaches to environmental law, based on social and environmental sustainability.

Vagueness is another problem of the SDGs. The SDGs are not concrete, do not explicitly name vulnerable groups and are not expressly connected to existing human rights obligations.[219] Many targets do not have objective measures to follow and bring proposals, such as pay 'special attention' to challenging problems, namely waste management.[220] The 2030 Agenda does not determine a clear set of institutions responsible for ensuring that the SDGs achieve their targets and nor does it define decision-makers' accountability. This situation

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to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology", 7.5 "By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support"; and Goal 11 "Make cities and human settlements inclusive, safe, resilient and sustainable", target 11.6 "By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management".

[215] ALQATTAN, Nael *et al*, Reviewing the potential of Waste-to-Energy (WTE) technologies for Sustainable Development Goal (SDG) numbers seven and eleven, **Renewable Energy Focus**, v. 27, p. 97–110, 2018, p. 98.

[216] HILL, Sarah, Privatizing Latin American Garbage? It's Complicated…., **ReVista Harvard Review of Latin America (Cambridge)**, v. 14, n. 2, p. 56–59, 2015, p. 59.

[217] *Ibid*.

[218] RAWORTH, Kate, A Safe and Just Space for Humanity: Can We Live Within the Doughnut., p. 4–5.

[219] KNOX, John, Human Rights, Environmental Protection, and the Sustainable Development Goals, **Washington International Law Journal**, v. 24, n. 3, p. 517–536, 2015, p. 528.

[220] *Ibid*., p. 531.

leaves the SDGs, mainly the more social-oriented goals, at risk of falling short of international and national development priorities.[221]

The criticisms are significant, the SDGs have limitations and the connection with Northern standpoints is a legitimate cause for concern in the Global South. Nonetheless, the UN remains an important actor in environmental matters. Moreover, the Global South is not powerless to confront neo-colonisation systems as supposedly practised in the UN SDGs' era.[222]

This approach is a point to consider when the Southern approach requires careful thought on how to proceed. It is not a duality of blindly following or opposing the UN or the SDGs. It is a resistance connecting the struggles of people against oppressive international laws and policies without extremisms. This resistance cannot fall prey to the polarisation between liberal optimism (e.g. the world is getting a just world order based on more laws, institutions and enforcement) and left-wing pessimism (e.g. the world only creates domination, and its rules are empty and violent).[223] There is room for a third, in-between vision, which dialogues with old and new social movements, paying particular attention to the growing working poor.[224] In terms of waste, the main point is under which approach can more benefits be gained by the informal recycling sector. Hence, this thesis investigates whether the PES can engage and support waste pickers, who are both part of the working poor and a social movement.

The case is that the UN has highlighted that waste is a significant environmental problem, especially relevant in the urban scenario, and recycling is among the desirable strategies. Although there are other tactics to confront waste, recycling by waste pickers is a method already extensively used in the Global South. Thus, through recycling, the Global South can further achieve sustainable development while remaining related to its traditions. However, a supportive regulatory framework is also needed, particularly one that recognises and supports the waste pickers, the local context and the overall socio-environmental concerns.

1.5.4 New International Constructions: Circular Economy and Zero Waste

As explained in the previous subsection, recycling is a growing global ambition, supported by the UN's 2030 Agenda. This fact has increased its presence in international constructions as well. Among the waste-related arguments debated at present, the strategies of

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[221] SAIZ, Ignacio; DONALD, Kate, Tackling inequality through the Sustainable Development Goals: human rights in practice, **The International Journal of Human Rights**, v. 21, n. 8, p. 1029–1049, 2017, p. 1030.
[222] LANGAN, **Neo-colonialism and the Poverty of'development'in Africa.**, p. 200.
[223] CHIMNI, Third World Approaches to International Law: A Manifesto, p. 19.
[224] *Ibid*., p. 20.

zero waste[225] and circular economy[226] stand out because of the momentum they have gained with scholars and practitioners. Zero waste and circular economy are interactive terms,[227] since the transition to a circular economy initiates with waste prevention, and product design and development aimed at sustainability.[228] That is, circular economy strategies often target zero waste;[229] however, in other cases, only an improvement in efficiency and waste reduction is targeted.[230] As the literature has reported, the circular economy frequently serves as an umbrella concept and an articulator of the debates and strategies regarding waste and resources.[231]

Zero waste is an innovative preventive philosophy towards minimising the increasing solid waste problem.[232] It encourages the redesign of resource life cycles, enabling all products to be recycled, promoting optimum recycling and resource recovery and restricting mass incineration and landfilling.[233] In fact, zero waste works for recycling 100 per cent of waste or for recovering all possible resources from waste streams, producing no harmful waste.[234]

The concept of zero waste is growing with policymakers and civil societies because it addresses and promotes sustainable production and consumption.[235] Zero waste strategies have aimed to reduce less-desired waste solutions, such as landfilling. The attempt to ban landfills and stimulate preferable waste solutions, such as sustainable consumption and recycling, led to an increase of incineration rates in many countries, such as Denmark, Germany, the Netherlands, Sweden, Switzerland, Austria and Norway.[236] Thus, one crucial element of zero waste is its clash with incinerators, because the more the waste incinerated, the higher the cost–benefit ratio;[237] consequently, incineration goes against zero waste.[238] This is because

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[225] ZAMAN, A comprehensive review of the development of zero waste management, p. 12.
[226] KIRCHHERR; REIKE; HEKKERT, Conceptualizing the circular economy, p. 221.
[227] Piero Morseletto, 'Targets for a Circular Economy' (2020) 153 *Resources, Conservation and Recycling* 104553, 3, 8 https://linkinghub.elsevier.com/retrieve/pii/S0921344919304598.
[228] KOSZEWSKA, Małgorzata, Circular Economy — Challenges for the Textile and Clothing Industry, **Autex Research Journal**, v. 18, n. 4, p. 337–347, 2018, p. 346.
[229] MORSELETTO, Targets for a circular economy, p. 3.
[230] GEISENDORF, Sylvie; PIETRULLA, Felicitas, The circular economy and circular economic concepts-a literature analysis and redefinition, **Thunderbird International Business Review**, v. 60, n. 5, p. 771–782, 2018, p. 776.
[231] BLOMSMA, Fenna; BRENNAN, Geraldine, The Emergence of Circular Economy: A New Framing Around Prolonging Resource Productivity: The Emergence of Circular Economy, **Journal of Industrial Ecology**, v. 21, n. 3, p. 603–614, 2017, p. 611.
[232] SONG; LI; ZENG, Minimizing the increasing solid waste through zero waste strategy, p. 199.
[233] ZAMAN, A comprehensive review of the development of zero waste management, p. 12.
[234] ZAMAN; LEHMANN, Urban growth and waste management optimization towards 'zero waste city', p. 177.
[235] ZAMAN, A comprehensive review of the development of zero waste management, p. 12.
[236] FRANCO-GARCÍA; CARPIO-AGUILAR; BRESSERS, Towards Zero Waste, Circular Economy Boost: Waste to Resources, p. 4.
[237] GUTBERLET, Social aspects of solid waste in the global South., p. 329.
[238] ZWIA ZERO WASTE INTERNATIONAL ALLIANCE, **Zero Waste Definition.**, Disponível em: http://zwia.org/zero-waste-definition/, acesso em: 8 maio 2018.

incineration disrupts the a priori waste hierarchy, negatively affecting waste reduction and recycling, as further discussed in Section 3.2.2.2 'Connecting People and Nature.'

As explained above, waste prevention and recycling are part of the move to a circular economy.[239] The circular economy concept is increasingly popular and is considered vital by the UN to achieve sustainable development.[240] It has an optimistic projection in the Global South because it is connected with the informal recycling sector's operations.[241] The circular economy and the informal recycling sector both use waste as a resource.[242]

The circular economy advocates for a cyclical closed-loop system[243] complying with the same principles that sustain the natural world.[244] Literature shows that its main concerns are resource input, waste and emission output, materialised through recycling, reuse, waste management and eco-efficiency measures.[245]

The Ellen MacArthur Foundation[246] became renowned for establishing a well-accepted circular economy concept as an industrial system planned to be restorative or regenerative. In this definition, there is no waste or 'end-of-life'; instead, a circular economy provokes 'restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models'.[247] The circular economy primarily follows the ideals of designing out waste, maintaining materials in long-term use and regenerating nature.[248]

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[239] KOSZEWSKA, Circular Economy — Challenges for the Textile and Clothing Industry, p. 346.
[240] UN ENVIRONMENT, **Global Environment Outlook - GEO-6**, p. 439.
[241] VELIS, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era., p. 330.
[242] UN ENVIRONMENT, **Global Environment Outlook - GEO-6**, p. 442.
[243] MURRAY, Alan; SKENE, Keith; HAYNES, Kathryn, The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context, **Journal of Business Ethics**, v. 140, n. 3, p. 369–380, 2017, p. 372.
[244] EMF (ELLEN MACARTHUR FOUNDATION**). Towards the Circular Economy: Economic and Business Rationale for an Accelerated Transition**. Cowes, UK: EMF (Ellen MacArthur Foundation), 2013. Disponível em: http://circularfoundation.org/sites/default/files/tce_report1_2012.pdf. Acesso em: 28 ago. 2019.
[245] GEISSDOERFER, Martin *et al*, The Circular Economy – A new sustainability paradigm?, **Journal of Cleaner Production**, v. 143, p. 757–768, 2017, p. 760.
[246] The Ellen MacArthur Foundation is notorious for publishing numerous articles about different aspects surrounding the circular economy, often in collaboration with business and academia. The Foundation's concepts and definitions have gained the attention of policymakers, influencing governments and intergovernmental agencies at the local, regional, national and international levels.
[247] EMF (ELLEN MACARTHUR FOUNDATION**). Towards the Circular Economy: Economic and Business Rationale for an Accelerated Transition**. Cowes, UK: EMF (Ellen MacArthur Foundation), 2013. Disponível em: http://circularfoundation.org/sites/default/files/tce_report1_2012.pdf. Acesso em: 28 ago. 2019, p. 7.
[248] EMF. *Towards the Circular Economy: Accelerating the Scale-up Across Global Supply Chains.* (EMF - Ellen MacArthur Foundation, 2014) 56, 15 http://reports.weforum.org/toward-the-circular-economy-accelerating-thescale- up-across-global-supply-chains/.

The term circular economy has both linguistic and descriptive meanings. Linguistically, it is opposed to the linear economy,[249] which is how the global economy currently operates,[250] in a take–make–dispose chain, dependent on vast amounts of easily accessible resources and energy,[251] generating environmental degradation.[252] By being circular, an economy is painted as having no net effect on nature; instead, it restores the damages done in resource acquisition, concurrently securing little waste generation across the production process and the life of the product.[253] This process helps optimise natural resource use through efficiency.[254]

The descriptive meaning revolves around cycles. It refers to the biochemical cycles, which are the cycles that molecules and atoms undertake,[255] and have been altered by human activity. In this sense, a circular economy is positioned to manage fluxes, restore fluxes to their natural levels, reduce the excessive removal of materials from a cycle and release materials into a cycle.[256]

Recycling represents a significant portion of a circular economy, a settled tool for resource efficiency. It increases the supply security of primary materials, closing the resource loops. Consequently, recycling reduces the pressure of resource exploitation, climate change,

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[249] The linear economy is a traditional economic conception based on a closed mechanical economic system, independent from the biosphere. This unsustainable idea is founded on an ethic that aims to maximise the current welfare of society, disregarding the limits and wellbeing of future generations. In this sense, economic growth has a cost that can exceed its benefit, thus generating uneconomic growth. For more information, see CHECHIN, Andrei, **A natureza como limite da economia: a contribuição de Nicholas Georgescu-Roegen.**, São Paulo: Editora SENAC / EDUSP, 2010. VEIGA, José Eli da, Indicadores de sustentabilidade., **Estudos Avançados**, v. 24, n. 68, p. 39–52, 2010.

[250] UN ENVIRONMENT, **Global Environment Outlook - GEO-6**, p. 426.

[251] EMF (ELLEN MACARTHUR FOUNDATION**). Towards the Circular Economy: Economic and Business Rationale for an Accelerated Transition**. Cowes, UK: EMF (Ellen MacArthur Foundation), 2013. Disponível em: http://circularfoundation.org/sites/default/files/tce_report1_2012.pdf. Acesso em: 28 ago. 2019, p. 14.

[252] The linear economy is a one-way system that converts natural resources into waste through production processes, resulting in environmental degradation by eliminating natural capital from the environment (via mining or/and unsustainable harvesting), and by decreasing the value of natural capital through waste pollution. Pollution can also be caused during the production phase. For more information on the hazards of the linear economy and its opposition to circular economy, see MURRAY; SKENE; HAYNES, The Circular Economy.

[253] EMF (ELLEN MACARTHUR FOUNDATION**). Towards the Circular Economy: Economic and Business Rationale for an Accelerated Transition**. Cowes, UK: EMF (Ellen MacArthur Foundation), 2013. Disponível em: http://circularfoundation.org/sites/default/files/tce_report1_2012.pdf. Acesso em: 28 ago. 2019, p. 371.

[254] GHISELLINI, Patrizia; CIALANI, Catia; ULGIATI, Sergio, A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems, **Journal of Cleaner Production**, v. 114, p. 11–32, 2016, p. 26.

[255] The cycle of water is a simple yet proper illustration of biogeochemical cycles: Water evaporates from the oceans, forms rain clouds, returns to land as rain and later runs into rivers, which flow back to the ocean. Every cycle and every part of each cycle has its length. In this case, it takes nine days for water to complete the atmospheric cycle and 37,000 years for the oceans to complete a cycle.

[256] MURRAY; SKENE; HAYNES, The Circular Economy, p. 371.

accumulation of toxic substances in ecosystems and biodiversity loss.[257] It can also lead to gains in employment quantity and quality in comparison to landfills or incineration.[258]

Moreover, the UN asserts that a circular economy transition will be required to achieve the SDGs.[259] In theory, the SDGs and the circular economy are associated with technology, industrial production and consumption, emphasising the need to improve the alliance between social circumstances and economic progress through system-level changes.[260] In this sense, studies have established that the circular economy needs to be even closer to sustainable development, interiorising its theoretical horizontal alliance of environment, society and economic factors,[261] leaving its hierarchical economic-centric vision behind.[262]

Notably, the UN's approaches face severe criticism. Much like the UN's SDGs, the circular economy is criticised for vagueness and over-simplistic goals, leading to unwanted consequences. For instance, the designing of much longer-lasting products seems to be positive. However, designs can be compromised, and long-lasting products can consume more energy and release more entropy than other products created to have a more natural outcome,[263] but with shorter lives.[264]

Thus, the circular economy is a recognised concept, but it is not without challenges. The problems of over-simplistic goals and waste-to-energy are practical and can be solved through an in-depth analysis of its long-lasting effects and the context where they will be applied. For example, the UN suggested that eco-designs must understand the potential effects on health, and gender, particularly in the Global South where women and children are more likely to be exposed to toxins in the informal recycling sector of electronic waste.[265] The Global South has also developed its waste management techniques that must be enhanced; consequently, incinerators are unsuitable and must be avoided.

The bulk of more vigorous criticisms of the circular economy relate to problems in the concept's essence, which are more difficult to overcome. They concern its association with conventional economic thought, also known as neoclassical economics, and its subfield,

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[257] UN ENVIRONMENT, **Global Environment Outlook - GEO-6**, p. 426.
[258] ILO, 'Working towards Sustainable Development' (n 112) 111.
[259] UN ENVIRONMENT, **Global Environment Outlook - GEO-6**, p. 444.
[260] GEISSDOERFER *et al*, The Circular Economy – A new sustainability paradigm?, p. 759–760.
[261] MURRAY; SKENE; HAYNES, The Circular Economy, p. 376–377.
[262] GEISSDOERFER *et al*, The Circular Economy – A new sustainability paradigm?, p. 765.
[263] The bamboo chopstick and highly specialised plastic forks are suitable examples. The first uses natural nutrients, making it possible for its re-assimilation into nature and recycling. In contrast, the latter have technical nutrients that take more effort to be recycled.
[264] MURRAY; SKENE; HAYNES, The Circular Economy, p. 376.
[265] UN ENVIRONMENT, **Global Environment Outlook - GEO-6**, p. 444.

environmental economics.[266] Significantly, environmental economics influences decisions on the circular economy chiefly in European literature.[267]

The circular economy connects to environmental economics in many ways, as in the aim for optimisation and eco-efficiency. More importantly, the central role of the commodification of natural resources and the attempt towards infinite growth undeniably relate to environmental economics.[268] In other words, it is not an alternative discourse to economic growth; it is an alternative growth discourse.[269] Ironically, circles cannot deliver growth, for that, ever-increasing spirals are required.[270]

Neoclassical economics[271] considers the economy as a closed system,[272] and the circular economy seeks to close-loops and follow the natural world's order. That is misleading because the economy is an open system,[273] and nature is not a closed, zero waste,[274] circular system. Instead, it is also an open system that depends on a vast river of energy flowing through it,[275] having no similarity with circularity.[276]

Similarly to the SDGs, the circular economy is criticised for focusing on economic aspects at the expense of environmental and particularly social goals. The influence of environmental economics induces the circular economy to prioritise economic features, such as

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[266] Neoclassical economics and environmental economics will be discussed further in Chapter 4. In short, the former argues that the economy is an independent entity, emphasising that supply and demand are the main forces behind the production, pricing and consumption of goods and services. The latter focuses on the financial effects of environmental policies.
[267] GHISELLINI; CIALANI; ULGIATI, A review on circular economy, p. 25.
[268] CHARONIS, George-Konstantinos, Degrowth, steady state economics and the circular economy: three distinct yet increasingly converging alternative discourses to economic growth for achieving environmental sustainability and social equity., **World Economic Association Sustainability Conference**, 2012, p. 5; SKENE, Keith Ronald, Circles, spirals, pyramids and cubes: why the circular economy cannot work, **Sustainability Science**, v. 13, n. 2, p. 479–492, 2018, p. 483.
[269] CHARONIS, Degrowth, steady state economics and the circular economy: three distinct yet increasingly converging alternative discourses to economic growth for achieving environmental sustainability and social equity., p. 5.
[270] SKENE, Circles, spirals, pyramids and cubes: why the circular economy cannot work, p. 488.
[271] See chapter 4.
[272] MUNDA, Giuseppe, Environmental Economics, Ecological Economics, and the Concept of Sustainable Development, **Environmental Values**, v. 6, n. 2, p. 213–233, 1997, p. 213.
[273] DALY, Herman E.; FARLEY, Joshua, **Ecological Economics: Principles and Applications**, 2. ed. Washington, DC: Island Press, 2010, p. 490.
[274] Zero waste is a preventive philosophy encouraging the redesign of resource's life cycles enabling all products to be recycled. In fact, zero waste works for recycling 100 per cent of waste or recover all possible resources from waste streams, producing no harmful waste. It is gaining force with policymakers because it stimulates sustainable production and consumption, optimum recycling and resource recovery, and restricts mass incineration and landfilling. For more information, see ZAMAN, A comprehensive review of the development of zero waste management.
[275] SKENE, Circles, spirals, pyramids and cubes: why the circular economy cannot work, p. 482–483.
[276] *Ibid*., p. 486.

the redesign of manufacturing and service systems[277] that bring primary benefits for the environment.[278] This choice attracts policymakers with the promise of a win–win solution for economic and environmental issues, but mainly excludes social issues.[279]

In fact, the circular economy is problematised for being virtually silent on the social dimension.[280] That dimension is only present as a side effect of the protection of the physical conditions allowing human life. The lack of a social dimension may cause problems, for the rejection of the holistic strategy can jeopardise all three elements, hindering the achievement of sustainable development.[281]

The critics do not imply that the circular economy should vanish, given that it has shown its unique power to attract various sectors and organisations to become involved in sustainable practices.[282] A circular economy that dictates production processes that are not only oriented to be profitable but also emphasise environmental sustainability and social desirability[283] offers an appropriate lens through which initiatives can be assessed.[284]

Regarding social problems, a circular economy and the SDGs need context and perspective in dealing with existing societal issues. Discussions around labour conditions, wealth distribution and governance systems are ongoing.[285] The circular economy must reconsider labour as an essential element for tackling the large share of dissipated material and energy flows that cannot be recovered economically. With this perspective, it should aspire to promote labour-intensive activities and enhance the quality and diversity of human work involved in remanufacturing and recycling. This vision calls for more cooperation to ensure a more suitable environment for cultivating both biophysical resources and human labour. That is, the circular economy must be more equitable.[286]

In the Global South, the circular economy should work with the informal recycling sector, as a mechanism for formalisation. The formalisation and organisation of workers can turn waste management into an opportunity for ecological sustainability and social inclusion.

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[277] MURRAY; SKENE; HAYNES, The Circular Economy, p. 376.
[278] GEISSDOERFER *et al*, The Circular Economy – A new sustainability paradigm?, p. 764.
[279] *Ibid*., p. 766.
[280] MURRAY; SKENE; HAYNES, The Circular Economy, p. 376.
[281] GEISSDOERFER *et al*, The Circular Economy – A new sustainability paradigm?, p. 766.
[282] KORHONEN, Jouni *et al*, Circular economy as an essentially contested concept, **Journal of Cleaner Production**, v. 175, p. 544–552, 2018, p. 551.
[283] KOPNINA, Towards Ecological Management, p. 2.
[284] *Ibid*., p. 19.
[285] MOREAU, Vincent *et al*, Coming Full Circle: Why Social and Institutional Dimensions Matter for the Circular Economy: Why Social and Institutional Dimensions Matter, **Journal of Industrial Ecology**, v. 21, n. 3, p. 497–506, 2017, p. 498.
[286] *Ibid*., p. 503–504.

For instance, the recognition of informal sector enterprises by municipal authorities[287] as waste stewards[288] can boost environmental outcomes. This way, the circular economy can promote traditional Southern practices.

Moreover, ecological management that aims to learn from nature, which extends beyond regarding it as a mere resource, is the best method for all practices,[289] including the circular economy. The engineering concepts and frameworks previously discussed will inevitably contribute to this debate as long as they are bound by ecology.[290]

Therefore, the circular economy must be a source of re-engagement with nature, for which some ideas have already been suggested. New technologies developed towards enhancing environmental outcomes should adopt ecological intelligence, meaning that suboptimality is preferred over task-oriented optimisation.[291] Recycling processes remain crucial; however, they must respect the natural world's rate and tempo. This theme is taken up in Chapter 3, which argues that recycling conducted by waste pickers produces environmental services and positive social change. Last, technologies should reintegrate humans with nature through participation, which must be the overarching reasoning, where context is critical.[292]

These proposals provide a new foundation for the circular economy everywhere; still, decision-makers need to reflect on context particularities. Thus far, the discussion about the circular economy in the Global South has received little attention;[293] paradoxically, resource recovery will continue and likely expand. Unlike in the Northern perspective, in the Global South resource recovery is driven not only by ideology or the need for environmental preservation but also by social and market necessities.[294] There is a call to adjust the circular economy to Southern realities; in waste management, it means building on the existing informal recycling sector's practices, as a prospect to avoid waste-related environmental and health problems, respect nature and create decent work.

Fundamentally, the circular economy, as well as the SDGs and other environmental management concepts, must attend to local contexts and start prioritising ecological

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[287] ILO, 'Working towards Sustainable Development' (n 112) 111.
[288] The recognition by municipal authorities of enterprises in informal sectors is slowly being introduced in Latin America and India, with Brazil being the most notable example. Chapter 3 will further discuss this issue.
[289] DALY; FARLEY, **Ecological Economics: Principles and Applications**, p. 479.
[290] RAMMELT, Crelis F; CRISP, Phillip, A systems and thermodynamics perspective on technology in the circular economy, **Real-world Economics Review**, n. 68, p. 25–40, 2014, p. 37.
[291] SKENE, Circles, spirals, pyramids and cubes: why the circular economy cannot work, p. 488.
[292] *Ibid*.
[293] PRESTON, Felix; LEHNE, Johanna; WELLESLEY, Laura, **An Inclusive Circular Economy: Priorities for Developing Countries**, London, UK: The Royal Institute of International Affairs, Chatham House, 2019, p. 2.
[294] VELIS, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era., p. 329.

sustainability. Simultaneously, socially equitability should be the ambition,[295] especially when the Southern perspective is considered, given its massive urbanisation, informal employment and environmental problems, particularly those concerning waste management.

1.5.5 Limitations

This thesis investigates strategies for waste management regulation in Brazil, with a view to respecting environmental and social concerns, namely, decreasing pollution and promoting healthy working conditions. It is distinct from extant literature, because pays attention to social justice and the grassroots mobilisation of key actors—the waste pickers. Using the waste pickers in Brazil as a case study, the thesis explores the implications of the Global South – Global North divide in policy and legal development and puts forward suggestions for change. The thesis seeks to develop a PES model that is appropriate for the Brazilian waste management context, and in particular, for supporting the informal recycling sector.

Thus, the primary aim is the proposition of a PES[296] model tailored for the Global South's waste management context, which is the central claim of the informal recycling sector, also known as waste pickers. Although PES is a proposition developed in the Global North, whose leading researchers are economists,[297] this thesis seeks to reframe the model using Global South perspectives.

To achieve this type of analyses, this thesis uses the concept of ecolaw to analyse the failings of the Western rationalist legal thought that underpins environmental law, to provide a yardstick against which the suitability of waste management measures in the Global South can be measured, and to develop an appropriate PES model that is inclusive of the waste pickers and mindful of environmental concerns. The concept of ecolaw will be developed more fully in Chapter 2, Section 2.3.3, entitled 'Elements for Transitioning to Ecological Approaches to Environmental Law'. In short, this reorientation is a part of a broader movement within law and economics. The ecological approaches to environmental law and theory ecolaw are argued as

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[295] CHARONIS, Degrowth, steady state economics and the circular economy: three distinct yet increasingly converging alternative discourses to economic growth for achieving environmental sustainability and social equity., p. 3.
[296] Payment for Environmental Services, also called Payment for Ecosystem Services, is a commonly applied instrument in the Global South and will be analysed in Chapters 4 and 5.
[297] MURADIAN *et al*, Reconciling theory and practice; WUNDER, Payments for Environmental Services: Some Nuts and Bolts.

the best framework for future sustainable regulations. This is important because regulations and policies bring theoretical socio and economic visions to real life, and they are the key to recognise inequalities and improve livelihoods.

This thesis cannot simplify the waste context of Brazil and the Global South, but it can unveil some of its complexities and dynamics, towards improving the current legal and policy framework to be inclusive of the informal waste management sector. The intention is to provide a socio-legal analysis focused on the legal treatment of waste in Brazil and the way it operates in society. This thesis concludes by proposing a new model of PES policy for including waste pickers into the formal waste management system, with Brazil serving as the case study. Therefore, the scope of research is limited to the central socio-legal dynamics in Brazil.

Of note, this thesis applies the a priori waste hierarchy, which is a context-based legal analysis of waste management strategies.[298] This thesis focuses on recycling and recovering, which are the activities promoted by waste pickers and waste-to-energy incinerators. Ultimately, neither of these waste strategies can address the global waste crisis alone. Other initiatives must be implemented to support waste reduction and reuse. However, until that cultural change is embedded, recycling and recovery remain critical.

This research does not provide further in-depth discussions about the circular economy and zero waste. Although the circular economy is a topical approach to economic development progressively translated into legislation, it is not a unanimous economic concept. It is not the model currently chosen by waste pickers.[299] Some of the main topics in the research on the circular economy and zero waste that are relevant to the Global South, such as sustainable waste strategies and their hierarchies, are discussed in Chapter 3. Additional debates connecting the circular economy are outside the immediate concerns of this thesis and the topics of this literature are left for future research.

This thesis's scope is limited to organised waste pickers, that is, waste pickers organised in cooperatives, associations or similar enterprises. It acknowledges that most waste pickers do not take part in formal organisations. This choice of scope is primarily based on the Brazilian legislation, particularly the Brazilian National Waste Policy that only addresses

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[298] ARAGÃO, Os resíduos e a sua gestão internacional, p. 300; ARAGÃO, **O Direito dos Resíduos**, p. 33.
[299] The waste pickers advocate for PES. See MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**.

organised waste pickers. The National Waste Pickers' Movement,[300] when advocating for a PES policy, also highlights organisations.

Last, because this thesis aims to propose a policy for including waste pickers into official waste management systems, it was essential to select one jurisdiction. The case study of Brazil is analysed from Chapter 2 onwards, in which the dominant narratives in environmental law are exemplified in Brazil. Chapters 3 and 4 also highlight the Brazilian case, since they examine the organised waste pickers and PES, respectively, both in general, but analysing the discussions in the Brazilian context. Next, Chapter 5 is solely based on Brazil, because it proposes an innovative policy model, which needs to be in tune with the local legislation.

1.6 CONCLUSION

Developing law and policy that promote sustainable waste management is fundamental to achieving sustainable development. This need is embedded in deep social and environmental issues in the Global South, where waste pickers primarily provide sustainable waste management under precarious conditions. Such law and policy are to be developed under the field of environmental law, which is transforming from a Global North legacy to ecological approaches into environmental law and ecolaw, coupling socio and environmental aspects in a context-based perspective.

Applying the socio-legal approach as its methodology, this thesis investigates whether the PES can fill this gap. It seeks to solve the policy puzzle of whether PES can be an effective instrument for Brazilian waste pickers, creating the basis of a context-based, sustainable and inclusive waste management policy. To fulfil this objective, it considers other overlapping discussions, such as those on the Global South – Global North divide, the Global North legacy to environmental law, the new approaches shaping environmental law and PES and the Global North legacy in waste management systems, and their connection to the new environmental law.

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[300] In Portuguese: *Movimento Nacional De Catadores De Recicláveis No Brasil (MNCR)*. *See* SANTOS, Maria Cecília Loschiavo dos *et al*, Frames De Ação Coletiva: Uma Análise Da Organização Do Movimento Nacional De Catadores De Recicláveis No Brasil (MNCR), *in*: SCHERER-WARREN, Ilse; LÜCHMANN, Lígia Helena Hahn (orgs.), **Movimentos sociais e participação : abordagens e experiências no Brasil e na América Latina**, Florianópolis: Editora da UFSC, 2011, p. 59–93.

The next chapter, Chapter 2, will continue discussing the Global South – Global North divide and the human–nature relationship, addressing them in connection to the law. It will argue that the Global North legacy and mindset has influenced this divide; the perspective of nature and people in economics; and the legal system. This context legitimised the implementation of regulations limited in terms of scope; however, the ecological approaches to environmental law and ecolaw propose a change of legal paradigms to make the law serve socio-environmental dynamics. Although often debating the Global South in general terms, the following chapter also starts to shape this thesis with Brazil as a case study, identifying the leading role of Latin America in the ecological approaches to environmental law.

2 THEORETICAL FRAMEWORK: THE DOMINANT LEGAL REASONING AND THE EMERGENCE OF THE ECOLOGY OF LAW

This thesis investigates strategies for waste management in the Global South that can respect socio and environmental concerns. In doing so, it creates an effective PES model to put the existing problems into balance. The current plight of waste pickers is due in part to a preference for 'modern' waste management solutions, such as incineration, which are promoted and encouraged by companies and corporations from the Global North.[301] As this chapter and Chapter 3 explain, this is a trend grounded in an imported, Northern conception that privileges technological solutions. However, there is another strong narrative within the Global South that favours a more holistic ecological approach, one that incorporates social, economic and environmental concerns. This chapter unpacks the concept of an 'ecology of law', also called ecolaw. This concept is settled in the ecological approaches to the environmental law framework, seeking to bring a practical legal application of ecological and social values to environmental legislation and decision-making processes.

The emergence of an ecolaw deriving from the ecological approaches to environmental law requires an analysis of the dominant legal system's current state that favours technological solutions, such as incineration, and the way it reached this state. This chapter focuses on exploring the evolution of the worldview led by scientists and lawyers from the Global North and its incorporation into the Global South's legal systems. To this end, the Global South must adopt innovative ecological approaches to the environmental law movement,[302] a more holistic replacement for the dominant thinking and an alternative pathway for the law.

Chapter 1 provided an overview of the Global South's urbanisation and the associated waste management problems. It also provided background on the Global South – Global North

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[301] See chapter 3, section 3.2 "Waste-to-Energy Incinerators."

[302] BOSSELMANN; TAYLOR, Introduction; BOSSELMANN, **The Principle of Sustainability: Transforming law and Governance**; BOYD, **The rights of nature: A legal revolution that could save the world**; CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**; CULLINAN, Cormac, **Wild Law: A Manifesto for Earth Justice**, 2. ed. Vermont: Chelsea Green Publishing, 2011; KIM, Rakhyun E; KOTZÉ, Louis J, Planetary boundaries at the intersection of Earth system law, science and governance: A state-of-the-art review, **Review of European, Comparative & International Environmental Law**, p. 1–13, 2020; KOTZÉ, Louis J., Fragmentation Revisited in the Context of Global Environmental Law and Governance, **South African Law Journal**, v. 131, n. 3, p. 548–582, 2014; KOTZÉ, Louis J., Sustainable development and the rule of law for nature: a constitutional reading., *in*: VOIGT, Christina (org.), **A Rule of Law for Nature: New Dimensions and Ideas in Environmental Law.**, Cambridge, UK: Cambridge University Press, 2013, p. 130–145; VOIGT, Christina (org.), **Rule of Law for Nature: New Dimensions and Ideas in Environmental Law**, 1. ed. Cambridge: Cambridge University Press, 2013; WINTER, **Desenvolvimento sustentável, OGM e responsabilidade civil na União Europeia**.

divide as a socio-economic and political division in the world, suggesting that it creates practical consequences, such as in the discussions for the UN's SDGs, and continues to have lasting effects for waste management. This divide was facilitated by colonisation and continued due to the lasting effects of the unbalanced power relationships between the Global South and the Global North.[303] In the waste context, these effects manifest through support for approaches originating in the Global North, giving limited attention to the waste pickers of the Global South. This chapter builds upon these insights by identifying their implications from the legal perspective, particularly to environmental law and waste management.

At present, the Global South's rapid urbanisation is regarded as a process that will worsen the relationship between people and nature.[304] As explained in Chapter 1, the Global South has difficulty dealing with socio-environmental issues, particularly waste, which is the topic of this thesis. This has led to the emergence of waste pickers as the key actors of sustainable waste management.[305] Although they are responsible for managing a significant part of the world's waste, waste pickers receive inadequate attention in the most critical international debate on sustainable development, which is the UN's SDGs, as Chapter 1, Section 1.5.3 'The United Nations and Waste Management in the context of the Global South – Global North divide' explains. At present, mainstream and international approaches to the regulation of waste often privilege technological solutions and neglect informal waste workers.[306]

Despite tracing the early roots of the evolution of science and law, this chapter does not seek to provide a detailed summary of the history of both and its consequences. Instead, the main aim of this chapter is to present the theoretical framework upon which the analysis in the remaining chapters is built. A brief description of the history of legal thinking and its present state helps to explain why current waste management systems and policies have taken their current forms. In contrast, it is argued in this chapter that an ecological approach to environmental law is the next step for environmental law and policy, including waste management.

Many studies have examined the Global South – Global North concept and the establishment of scientific reasoning and the resulting effects on nature.[307] Nevertheless, the

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[303] See Section 2.1.3 'Consequences for the Global South'.
[304] UNITED NATIONS DEPARTMENT OF PUBLIC INFORMATION, Press Release of the World Urbanization Prospects 2018.
[305] See Chapter 3.
[306] See Chapter 3.
[307] See e.g. HOLTON, Gerald James, **Thematic origins of scientific thought: Kepler to Einstein**, Rev. ed. Cambridge, Mass: Harvard University Press, 1988; KUHN, Thomas S., **The structure of scientific revolutions**, 3rd ed. Chicago, IL: University of Chicago Press, 1996; MAGDOFF, Fred; FOSTER, John Bellamy, **What**

research about their philosophical mindset, scientific reasoning and, most importantly, the law's connection is less consistent. Previous studies have demonstrated that European science created the dominant scientific thought, a scientific–rationalist conception, which influenced the Global North's worldview and fostered its expansion.[308] These studies also emphasised that science did not influence the law, but actually, both areas underwent similar shifts at about the same time. This chapter follows the parallel evolution of science and law and the innovative movement of ecological approaches to environmental law to guide the future of law and policy.

The choice for the ecological approaches to environmental law approach and ecolaw[309] is based on theoretical and practical reasons. The theoretical reason is that the law, and in general terms, the State, is continuously informed by the dynamics and power relationships between States,[310] and hence, it is crucial to follow a theoretical framework that considers this interaction. Ecolaw does so by advocating for a legal system in tune with nature and community, reconceptualising law itself and recognising the need to acknowledge marginalised people and communities to address environmental problems. In addition, it is crucial to situate

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Every Environmentalist Needs to Know About Capitalism: A Citizen's Guide to Capitalism and the Environment, New York: Monthly Review Press, 2011; MANUEL, Frank Edward; MANUEL, Fritzie Prigohzy, **Utopian thought in the Western World**, Cambridge, Mass: Belknap Press, 1979; MORIN, Edgar; KERN, Anne-Brigitte, **Terra-Pátria**, Porto Alegre: Sulina, 2011; SANTOS, Milton, A questão do meio ambiente: desafios para a construção de uma perspectiva transdisciplinar, *in*: **Anales de Geografia**, Madrid: Universidade Complutense de Madrid, 1995, v. 15, p. 695–705; OST, François, **A natureza à margem da lei: a ecologia à prova do direito**, Lisboa: Instituto Piaget, 1997; POLANYI, Karl, **The Great Transformation: The Political and Economic Origins of Our Time**, 2. ed. Boston, MA: Beacon Press, 2001.

[308] *See* BOSSELMANN, Klaus, Losing the Forest for the Trees: Environmental Reductionism in the Law, **Sustainability**, v. 2, n. 8, p. 2424–2448, 2010; BOSSELMANN, Klaus, Chapter 2 Property Rights and Sustainability: Can They be Reconciled?, *in*: GRINLINTON, David P.; TAYLOR, Prue (orgs.), **Property Rights and Sustainability : The Evolution of Property Rights to Meet Ecological Challenges**, Leiden, Netherlands: Brill Publishers, 2011; BOSSELMANN, Klaus, A vulnerable environment: contextualising law with sustainability, **Journal of Human Rights and the Environment**, v. 2, n. 1, p. 45–63, 2011; CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**; LEFF, Enrique, **Racionalidade ambiental: a reapropriação social da natureza**, 1. ed. Rio de Janeiro: Civilização Brasileira, 2006; MOUSOURAKIS, George, **A Legal History of Rome**, 1. ed. London, UK: Routledge, 2007; PARDO, José Esteve, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, São Paulo: Planeta Verde, 2015; POPE, **Transferência Transfronteiriça de Resíduos sob a Perspectiva da Justiça Ecológica : Rumo à Gestão Internacional de Resíduos**; ROSILLO MARTÍNEZ, Alejandro, Presupuestos para recuperar la tradición hispanoamericana de derechos humanos, **Crítica Jurídica. Revista Latinoamericana de Política, Filosofía y Derecho**, v. 29, p. 27–57, ; SOUZA FILHO, Carlos Frederico Marés de, **A liberdade e outros direitos: ensaios socioambientais.**, Curitiba: Editora Letra da Lei, 2011; SOUZA FILHO, Carlos Frederico Marés de, De como a Natureza foi Expulsa da Modernidade, **Revista Crítica do Direito**, v. 66, n. 5, p. 88–105, 2015; OST, **A natureza à margem da lei: a ecologia à prova do direito**; ZAFFARONI, Eugenio Raúl, **La Pachamama y el humano**, Buenos Aires: Ediciones Madres de Plaza de Mayo, 2011; ZAFFARONI, Eugenio Raúl, O direito latinoamericano na fase superior do colonialismo, **Passagens: Revista Internacional de História Política e Cultura Jurídica**, v. 7, n. 2, p. 182–243, 2015.

[309] See Chapter 1, Section 1.4 'Definitions'.

[310] DEZALAY, Yves; GARTH, Bryant G., **The Internationalization of Palace Wars: Lawyers, Economists, and the Contest to Transform Latin American States**, 1. ed. Chicago, IL: University of Chicago Press, 2002, p. 7.

this research in the context of policymaking towards attending to human needs on a finite planet. The practical reason is the vital need to explore international relations when studying matters concerning the State's transformation and, most significantly for this research, the redesign of legal systems.[311] Ecolaw does this by proposing significant changes to the legal order, reclaiming and rewriting the law. Both reasons are even more relevant when studying law and policy in Brazil and the Global South, and proposing new lenses, as this thesis aims to do in Chapter 5 with a PES model for waste pickers, based on the ecological approaches to environmental law.

This chapter is organised to describe the origins of the dominant worldview that currently operates simultaneously in the Global North and the Global South, due to the influence of the Global North as discussed in Chapter 1, and in science and law. Thus, it discusses the origins of the dominant worldview, but it is not intended to provide a detailed historical analysis. Rather, it aims to elucidate the central argument of this evolution's ongoing influence on the Global South's legal system and the perceived upcoming transformation—the ecological approaches to environmental law, which constitute ecolaw.

The chapter starts by investigating the parallel evolution of scientific and legal thoughts on the relationship between humans and nature, which portray the world as a machine—in service of humans, where the pieces are more relevant than the whole— and its consequences. A brief diagnosis of the current state of the law is presented next in Section 2.2, demonstrating its incompetence in dealing with environmental matters. In Section 2.3, this chapter explores the gap that has arisen between science and law, as science began to deal with the world as a network—an interactive organism. This chapter argues that a new approach in law has also begun; however, it is unassertive, and flawed in the international scene with the UN's SDGs. Further, initiatives implementing ecological approaches to environmental law are explored, focusing on Brazil. Last, this section turns to the Ecology of Law framework as a model to bring the network vision to the law, mainly using this framework for the waste context. Section 2.4 concludes the chapter.

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[311] *Ibid*.

2.1 THE PARALLEL EVOLUTION OF SCIENTIFIC AND LEGAL THOUGHT IN THE WESTERN WORLD

Some of the current, most significant environmental, economic and social issues originate from a legal system founded on a now outdated philosophy and scientific position. Previous studies have investigated the coevolution from antiquity to modern times of law and science.[312] This interconnection is consistent with the fact that scholars, such as Leonardo da Vinci, Francis Bacon, René Descartes and John Locke, have often studied and worked in more than one area.[313] These fields of knowledge had consistently interacted, until recent times, when science started to change its position towards nature—from a machine to a network—unaccompanied by law.[314] The results presented in this thesis subscribe to this argument, suggesting that environmental law, and particularly waste management, remain in the machine perspective, examining the effects of the parallel development of the broad, dominant paradigms.

2.1.1 Western Scientific Thinking

Scientific thought and legal thought began to co-evolve with the perception of the world as a *kósmos*,[315] as often explained by Aristotle, which was an innovation.[316] Thereafter, scholars started to analyse the world as an ordered and harmonious structure in which all parts follow an intrinsic purpose or *telos*.[317] At that time, organisation and rules were provided in the

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[312] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 21–25; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 48–64; RUHL, J B, Reconstructing the Wall of Virtue: Maxims for the Co-Evolution of Environmental Law and Environmental Science, **Environmental Law**, v. 37, p. 1063–1082, 2007, p. 1063.
[313] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 35–42; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 155.
[314] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 101.
[315] The term *kósmos* represents the Universe; in this sense, the perception was of the world as a complex and orderly system or entity.
[316] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 31–34.
[317] *Ibid*., p. 31; KORAB-KARPOWICZ, W. Julian, **On the History of Political Philosophy : Great Political Thinkers from Thucydides to Locke**, 1. ed. London: Routledge, 2015, p. 44–45.

search to explain what something is, trying to discover definitions,[318] discussing perception, smell[319] and colour.[320]

The *kósmos* belief became the basis of European philosophy and science during the Middle Ages and the Renaissance.[321] The passage from the Middle Ages to the modern world is characterised by humanism, which pivots on the human individual's capabilities, contrasting with the previous perspective that positioned the Christian God at the centre of existence.[322] This intellectual change paved the way for the Scientific Revolution.[323]

Over time, from the Greeks to Newton, and ultimately with the Scientific Revolution's advancement, science moved from analysing the world as a *kósmos* to analysing it as a machine.[324] In the new understanding, the world was best understood by examining its parts and subparts in a hyper-specialised manner. To enhance knowledge, science developed the mechanistic model, later also referred to as the mechanistic trap.[325] The mechanistic model determines one fixed natural order of the world, developed and applied by specialised professionals.[326] This vision was useful and fruitful, leading to Newton's confirmation of nature's laws[327] in the world's picture as a machine.[328] The Scientific Revolution was initiated with changes in physics, but it soon extended to metaphysics, astronomy, astrology, geometry and theology.[329]

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[318] FALCON, Andrea, Aristotle, Speusippus, and the method of division, **The Classical Quarterly**, v. 50, n. 2, p. 402–414, 2000, p. 402.
[319] JOHANSEN, Thomas, Aristotle on the Sense of Smell, **Phronesis**, v. 41, n. 1, p. 1–19, 1996, p. 1.
[320] SORABJI, Richard, Aristotle, Mathematics, and Colour, **The Classical Quarterly**, v. 22, n. 2, p. 293–308, 1972, p. 308.
[321] The Renaissance, in French, 'Rebirth', is an era that bridged the time between the Middle Ages and modern times, covering the fifteenth and sixteenth centuries.
[322] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 34; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 15; KORAB-KARPOWICZ, **On the History of Political Philosophy : Great Political Thinkers from Thucydides to Locke**, p. 95; WARBURTON, Nigel, **Philosophy : The Classics**, 4. ed. London: Routledge, 2014, p. 390.
[323] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 35.
[324] *Ibid*., p. 37–42; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 92; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 23.
[325] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 111.
[326] *Ibid*., p. 101–102.
[327] The term 'laws of nature' is considered important to demonstrate the empirical or informative content of a theory, in the words of Karl Popper: "Not for nothing do we call the laws of nature 'laws': the more they prohibit the more they say.", see POPPER, Karl, **Logic of scientific discovery**, London: Routledge, 2005.
[328] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 38–42; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 46.
[329] HOLTON, **Thematic origins of scientific thought**, p. 53–55.

The Scientific Revolution helped advance science, and its division into many disciplines introduced many technological and scientific improvements. However, it also generated an extreme division of knowledge into specialisations, ultimately compromising the holistic understanding of the world.[330] At first, scholars understood nature as a harmonious, living whole, and after the Scientific Revolution, as a mere compilation of pieces that could be separated, studied and quantified.[331] The world as a mechanistic system expanded until this vision remained the sole criterion of truth.[332]

An unintended consequence of this model is that it becomes a trap through which humans gradually face risks[333] amplified by the loss of control of institutions.[334] There is a chain of events, where the risks grow and the regulatory institutions are revealed to be unable to address them, leading to public distrust in expert systems.[335] For example, in terms of waste in Brazil, the risks attached to improper waste management are more visible, such as soil and water pollution. In 2010, the National Waste Policy entered into force,[336] addressing sustainable waste management and encouraging partnerships between local governments and waste pickers' organisations. Nonetheless, these partnerships remain uncommon, the provision of sustainable waste management is inconsistent and waste pickers continue to be excluded.

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[330] BECK, Ulrich, **The Metamorphosis of the World: How Climate Change Is Transforming Our Concept of the World**, Cambridge, UK: Polity, 2016, p. 72; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 77; MARTÍNEZ ALIER, Juan, Prólogo a la edición española, *in*: FUNTOWICZ, Silvio O.; RAVETZ, Jerome R. (orgs.), **La ciencia posnormal: ciencia con la gente.**, Barcelona: Icaria, 2000, p. 13; SANTOS, A questão do meio ambiente: desafios para a construção de uma perspectiva transdisciplinar, p. 695; OST, **A natureza à margem da lei: a ecologia à prova do direito**, p. 72.

[331] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 42; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 19.

[332] SANTOS, Public Sphere and Epistemologies of the South, p. 52.

[333] Ulrich Beck conceptualised the risks of modernity as a conceptual arrangement in which violations and destructions of nature inherent to civilisation are socially conceived. These risks are reflexive because they are self-induced, typically resulting from technological creations, such as nuclear power and genetically modified organisms. These risks stand out because they are not personal, and their consequences can be global. Modern risks can lead to global-level inequalities; for instance, the use of the Global South as dumping grounds for toxic waste. See BECK, Ulrich, **Sociedade de risco: rumo a uma outra modernidade**, São Paulo: Editora 34, 2011; BECK, **The Metamorphosis of the World: How Climate Change Is Transforming Our Concept of the World**; POPE, **Transferência Transfronteiriça de Resíduos sob a Perspectiva da Justiça Ecológica : Rumo à Gestão Internacional de Resíduos**.

[334] BECK, **The Metamorphosis of the World: How Climate Change Is Transforming Our Concept of the World**, p. 4; CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 111; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 55.

[335] POWER, Michael, **Organized Uncertainty: Designing a World of Risk Management**, Oxford: Oxford University Press, 2007, p. 21.

[336] See Chapter 5, Section 5.2.1, 'The Model Articulating the National Waste Policy'.

2.1.2 Western Legal Thinking

Along with the scientific transition to modernity, Western legal thought moved from having inclusion and community ownership as core values, to focus on the protection of private property rights[337] and on individualisation.[338] The new paradigm marked the transition[339] from the protection of the commons[340] to the protection of capital.[341] Further, legal scholars started to conceptualise the law as a conglomerate of several single parts, governed by the rationalist natural law, in a 'mechanical legal vision',[342] based on humanism and individual reason.[343] This consolidated the shift from commons to capital.

The reconceptualisation of the worldview reshaped the relationship between the law and nature.[344] Legal scholars began to conceive nature as unsuitable,[345] violent and imperfect.[346] This perception allowed scholars to transform their understandings of nature and natural order. England, home of the influential scholars Thomas Hobbes[347] and John Locke,[348] headed the

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[337] MARTINEZ-ALIER, Juan, **The Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation**, Cheltenhan: Edward Elgar Publishing, 2002, p. 45; OST, **A natureza à margem da lei: a ecologia à prova do direito**, p. 58; WARBURTON, **Philosophy : The Classics**, p. 165.

[338] Individualisation or individualism is a political idea, in which the individual is the prime focus of social life, or organisation.

[339] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 45; KORAB-KARPOWICZ, **On the History of Political Philosophy : Great Political Thinkers from Thucydides to Locke**, p. 162; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 119.

[340] The commons is a concept referring to all shared natural resources, such as the land, the forests, the water, the minerals and the air. Some authors have argued that it also refers to the cultural institutions that previous generations have granted to posteriority and the knowledge constructed over time by society as a whole, including the rule of law. For more information, see STANDING, Guy, **Plunder of the commons: A Manifesto for sharing Public wealth**, London, UK: Penguin Press, 2019.

[341] Capital refers to human-created, financial assets used by individuals or businesses to fund operations and generate income, such as cash, machinery, equipment, production facilities and other resources. It can also mean accumulated wealth.

[342] CAPRA; MATTEI, **The Ecology of Law: Toward a Legal System in Tune with Nature and Community.**, p. 45.

[343] *Ibid*.; COHEN, Joshua, Structure, choice, and legitimacy: Locke's theory of the State, *in*: MORRIS, Christopher W (org.), **The Social Contract Theorists: Critical Essays on Hobbes, Locke, and Rousseau**, New York: Rowman & Littlefield Publishers, 2000, p. 161; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 139; OST, **A natureza à margem da lei: a ecologia à prova do direito**, p. 58.

[344] OST, **A natureza à margem da lei: a ecologia à prova do direito**, p. 72.

[345] *Ibid*., p. 9–10.

[346] RAPACZYNSKI, Andrzej, **Nature and politics: Liberalism in the philosophies of Hobbes, Locke, and Rousseau**, 2. ed. New York: Cornell University Press, 2019, p. 180, 235; SOUZA FILHO, De como a Natureza foi Expulsa da Modernidade, p. 91.

[347] *See* HOBBES, Thomas, The Elements of Law Natural and Politic, **Cambridge University Press**, p. 107, 1928; HOBBES, Thomas, **Leviathan**, Baltimore: Penguin Books, 1968.

[348] *See* LOCKE, John, **Locke: political essays**, Cambridge: Cambridge University Press, 1997.

reframing of nature as a 'production factor', a 'resource' or merely an 'improvement',[349] in an instrumental view where nature is for the use of humans.[350] The shift also affected power; the law moved from a tradition that promoted diffusion, responsibility and social duties, to the accumulation of wealth and power concentration.[351]

In one generation, natural law was subverted by rationalism and expanded throughout Europe, and human domination of nature through private property was normalised.[352] The European legal scholars and philosophers of the sixteenth century onwards[353] developed reasoning focused on property, imposed order through violence, aiming to dominate nature.[354] For them, establishing this homogeneous mindset provided satisfaction to all, erasing different necessities, cultures and perspectives in an individualistic reason.[355]

The transformation of legal thinking, changing its emphasis from the protection of the commons to the protection of capital, had practical outcomes.[356] First, common institutions, such as vast communal land, including water resources on the land, became private property and capital, having private ownership as the central jurisprudential concept.[357] Second, state[358]

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[349] RAPACZYNSKI, **Nature and politics: Liberalism in the philosophies of Hobbes, Locke, and Rousseau**, p. 180; SOUZA FILHO, De como a Natureza foi Expulsa da Modernidade, p. 91; OST, **A natureza à margem da lei: a ecologia à prova do direito**, p. 9–10.

[350] CULLINAN, Cornac, Earth jurisprudence: from colonization to participation, **State of the World**, p. 143–148, 2010, p. 144; SÆTRA, Henrik Skaug, The limits of a Lockean Environmentalism: God, Human Beings, and Nature in Locke's philosophy, **Barataria. Revista Castellano-Manchega de Ciencias Sociales**, n. 27, p. 1–17, 2020, p. 4.

[351] CAPRA; MATTEI, **The Ecology of Law: Toward a Legal System in Tune with Nature and Community.**, p. 58; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 8–9, 17.

[352] CAPRA; MATTEI, **The Ecology of Law: Toward a Legal System in Tune with Nature and Community.**, p. 64.

[353] Although Hobbes and Locke are central figures of modern legal thinking, there were other relevant authors, such as Edward Coke, Jean Domat and Francis Bacon. *See* CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**

[354] KORAB-KARPOWICZ, **On the History of Political Philosophy: Great Political Thinkers from Thucydides to Locke**, p. 191; HORSLEY, Peter, Property rights viewed from emerging relational perspectives, *in*: GRINLINTON, David P.; TAYLOR, Prue (orgs.), **Property Rights and Sustainability: The Evolution of Property Rights to Meet Ecological Challenges**, Leiden: Brill Publishers, 2011, p. 95.

[355] GAUTHIER, David, Why Ought One Obay God? Reflections on Hobbes and Locke, *in*: MORRIS, Christopher W (org.), **The Social Contract Theorists: Critical Essays on Hobbes, Locke, and Rousseau**, New York: Rowman & Littlefield Publishers, 2000, p. 75–76; SOUZA FILHO, De como a Natureza foi Expulsa da Modernidade, p. 92; OST, **A natureza à margem da lei: a ecologia à prova do direito**, p. 58.

[356] The literature has asserted that domination and oppression affect justice, because visions disassociated from local context are significantly abstract. In short, justice must recognise and support the many differences among people, and not oppress them. See YOUNG, Iris Marion, **Justice and the politics of difference**, Princeton: Princeton University Press, 1990.

[357] CAPRA; MATTEI, **The Ecology of Law: Toward a Legal System in Tune with Nature and Community.**, p. 47–50; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 145.

[358] José Esteve Pardo revealed that Thomas Hobbes' work intended to configure a State, a Leviathan, as an artificial organism, subject to the physical laws of motion that Galileo, Kepler and others were discovering and enunciating. On these scientific bases, Hobbes intended to endow the modern state with legitimacy, thus freeing

sovereignty became the mechanism to control the people and govern their general welfare, compelling service and obedience.[359] To be clear, ownership and state sovereignty were the guiding principles[360] of legal modernity, also called legal absolutism.[361] The third outcome was the rise of legal professionalism to defend state sovereignty and protect individual rights.[362]

Individualistic legal reasoning is noticeably reflected in waste management. Brazil is a leading country in terms of waste pickers' organisations. Nevertheless, the experts of sustainable waste management, the waste pickers, still struggle to participate in important legal decision-making processes, having to resort to massive social mobilisation and favourable political moments[363] to be heard. This context suggests there is a 'mechanical legal vision' in Brazil, since waste pickers, who are the key actors in recycling and selective waste collection, are consistently ignored by regulatory institutions.

This 'mechanical legal vision' has made the legal system individualistic and centralised. It hinders the sense of community because the destruction of the commons disrupts the construction of a community.[364] A top-down approach was one of the primary features of the new reasoning. At the top of power was the state's institutions and the courts of law, and at the bottom were the individualised citizens. The legal profession grew in the machinery of law, and legal actions became the only authorised questioning method.[365] The state's restriction to access justice,[366] combined with imposed silence, generated institutionalised disinformation and obscurity.[367]

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it from the traditional theological grounds. See PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**

[359] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 139.

[360] David Armitage, *Foundations of Modern International Thought* (Cambridge University Press, 2013) 51, 59; Cohen (n 36) 160.

[361] Perry Anderson, *Lineages of the Absolutist State* (Verso Books, 2013) 15, 25, 50, 226, 398.

[362] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 50.

[363] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 5.

[364] STANDING, **Plunder of the commons: A Manifesto for sharing Public wealth**, p. 28.

[365] BECK, **The Metamorphosis of the World: How Climate Change Is Transforming Our Concept of the World**, p. 61–63; CAPRA; MATTEI, **The Ecology of Law: Toward a Legal System in Tune with Nature and Community.**, p. 73.

[366] The United Nations Commission on Legal Empowerment estimated that in 2008, 4 billion people did not have any legal protection, in a context where the law is an abstraction or a threat. In contrast, the legal empowerment approach aims to empower people by preparing them to use the law. COMMISSION ON LEGAL EMPOWERMENT OF THE POOR, **Making the Law Work for everyone**, New York: United Nations, 2008, p. 19.

[367] LEITE, José Rubens Morato; AYALA, Patryck de Araújo, **Direito ambiental na sociedade de risco**, 2. ed. Rio de Janeiro: Forense Universitária, 2004, p. 21–23.

The rational, scientific worldview disseminated not only to Western legal thinking but also to the new discipline of economics.[368] As explained, the Western legal tradition focused on the individual right of property, which is essential to the economic system. Throughout modernity, legal and economic systems changed and were increasingly focused on maintaining and protecting ownership and facilitating economic growth. To this day, the success of the Western capital-based system depends on legal systems.[369]

A significant event in this history is the First Industrial Revolution (1760–1840), which has affected economics, society and nature. For the first time, fossil fuels and non-renewable resources were extensively used and became the centre of the production process. This led to unprecedented exploitation of nature to produce consumer goods, for example, through using resources from abroad, and the drive for new markets boosted the exploitation of colonised countries.[370] The aftermath of the Scientific Revolution, the Industrial Revolution, the deficiencies of classical economics and the potentially negative social consequences of unrestrained market capitalism are known as 'the great transformation'.[371]

Currently, the capital-based Western economic system generates significant effects on nature. Human discarded materials are a significant threat to nature but inconsequential to the economic system. In the current system, waste is an almost unavoidable consequence of industrial production processes, such as bottled water, packaging, wrappers and plastic boxes. The system operates in a loop, an ever-greater production of merchandise, to be sold to quickly become waste, to be substituted by another merchandise reproducing capital.[372]

This context fosters capital-based semantics. In other words, nature is a 'commodity', homes are 'private properties', people are 'human resources' within a 'workforce' and the parts of ecosystems are 'raw materials'. This economic system focused on the capital favours the individual capitalist or private riches at the expense of marginalised people and nature.[373] The ever-greater pursuit of accumulation creates an inherent problem in the relationship of individuals with capital: the refusal to accept boundaries, which includes nature.[374] For this

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[368] See HARVEY, David, **A Brief History of Neoliberalism**, Oxford: Oxford University Press, 2007; HARVEY, David, **The Limits to Capital**, London: Verso, 2007; SOARES, Laura Tavares Ribeiro, **Ajuste Neoliberal e Desajuste Social na America Latina**, Petrópolis: Vozes, 2001.
[369] DEAKIN, Simon *et al*, Legal institutionalism: Capitalism and the constitutive role of law, **Journal of Comparative Economics**, v. 45, n. 1, p. 188–200, 2017, p. 189.
[370] DALY; FARLEY, **Ecological Economics: Principles and Applications**, p. 10.
[371] See POLANYI, **The Great Transformation: The Political and Economic Origins of Our Time**.
[372] SOUZA FILHO, De como a Natureza foi Expulsa da Modernidade, p. 100–101.
[373] SWYNGEDOUW, Erik; HEYNEN, Nikolas C, Urban Political Ecology, Justice and the Politics of Scale, **Antipode**, v. 35, n. 5, p. 898–918, 2003, p. 902.
[374] FOSTER, John Bellamy, The ecology of Marxian political economy, **Monthly Review**, v. 63, n. 4, p. 1–16, 2011, p. 3–4.

reason, critics in academia discuss the current economic system that focuses on individual rights to patrimony and property and hinders all commons as capitalistic, contractualised and liberal.[375]

In this context, waste management has been affected. There is a push towards the trend of waste-to-energy incineration with an allure of incineration as 'modern' and efficient, particularly in the Global South.[376] However, the promotion of waste-to-energy incineration in the Global South has the utility to advance corporate interests. As explained in Chapter 3, Section 3.2, waste-to-energy incinerators disrupt the continuity of more environmentally adequate techniques, such as the recycling by waste pickers. Corporate interests in the transition from small and social waste pickers' enterprises to large international companies as the central players in the waste-to-energy industry include Veolia Environment S.A., SUEZ Environment, Babcock & Wilcox Enterprises Inc., Everbright Environment, CNIM, Covanta Energy, Hitachi Zosen Inova AG (formerly Von Roll Inova), Keppel Seghers and Viridor.[377]

Therefore, waste management is a multibillion-dollar industry, and the industry is focusing on waste-to-energy. The main activity of a leading waste technology corporation, the French group Veolia, is waste-to-energy, which generates billions of dollars of revenue every year.[378] Veolia has been involved with waste collection and disposal; nonetheless, its current focus is to increase the lucrative business of waste-to-energy.[379] Currently, the company strategically targets the Global South, particularly Latin America.[380] Veolia is known for being accused by the GMB trade union of diverting recyclable waste to its waste-to-energy incinerators.[381]

The transition of the legal system from protecting the commons to protecting capital affects the waste management sector in the Global South. Waste pickers lead the sustainable waste management sector, yet they are often excluded from strategic decision-making

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[375] SOUZA FILHO, **A liberdade e outros direitos: ensaios socioambientais.**, p. 171.
[376] See Chapter 3, Sections 3.1.2 and 3.2.
[377] VISIONGAIN. **Top 20 Companies in The Waste to Energy (WtE) Market 2018: Market Share Analysis by Municipal Solid Waste Processing Capacity of Leading Companies including Financial Data & Analysis of Existing Waste to Energy Facilities & Upcoming Projects.** London: Visiongain Ltd, 2018. Disponível em: https://www.giiresearch.com/report/kt342301-25-leading-companies-waste-energy-wte-competitive.html. Acesso em: 15 mar. 2020.
[378] GUTBERLET, Waste in the City: Challenges and Opportunities for Urban Agglomeration, p. 198.
[379] WEGHMANN, Vera, **Waste Management in Europe. Good Jobs in the Circular Economy?**, London, UK: European Public Service Union EPSU, 2017, p. 31.
[380] VEOLIA, **Registration Document 2016, Annual Financial Report: Resourcing the World**, Paris, France: Veolia, 2016, p. 36.
[381] WEGHMANN, **Waste Management in Europe. Good Jobs in the Circular Economy?**, p. 11.

processes. Simultaneously, the Global South is the target of international waste-to-energy companies, which threatens the existence of the waste pickers.

2.1.3 Consequences for the Global South

Although the parallel development of Western scientific thought and legal thought described above was primarily based in Europe,[382] it vastly influenced the rest of the world.[383] The European worldview was imposed upon most,[384] if not nearly all, of the Global South.[385] This process was enabled by colonisation,[386] which often involved a significant transfer of laws and legal institutions,[387] and the long-lasting effects of intellectual colonialism. In Chapter 3, it is argued that this legacy continues to affect waste management in the Global South until date.

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[382] Non-Western traditions also have developed distinctive scientific and technological knowledge, including, but not limited to, China, Korea and India. See DM Bose, Samarendra Nath Sen and BV Subbarayappa (eds), *A Concise History of Science in India* (Indian National Science Academy, 3rd ed, 2009); Ki-Baik Lee, *A New History of Korea*, tr Edward W Wagner and Edward J Shultz. (Harvard University Press, 1988), chapter IX. The Creation of a Yangban Society; Joseph Needham, *Science and Civilisation in China: The History of Scientific Thought*, vol 2 (Cambridge University Press, 1st ed, 1956).

[383] MORIN; KERN, **Terra-Pátria**, p. 24.

[384] The influence was primarily focused on the Global South, as explained in Chapter 1; it refers to Latin America, Africa and parts of Asia. For instance, all legal systems of Latin American countries were influenced by the European modernity, and their Nation States were constructed based on European Constitutions. Similarly, the British colonisation process influenced the legal system of some African countries, such as South Africa, Ghana, Kenya and Malawi, and Asian countries, such as India and Malaysia.

[385] CHANOCK, Zambia Martin *et al*, Law and Colonialism, **Law & Society Review**, v. 25, n. 4, p. 889–922, 1991, p. 890; DU BOIS, Francois; VISSER, Daniel, The Influence of Foreign Law in South Africa, **Transnational Law & Contemporary Problems**, v. 13, p. 593–658, 2003, p. 583; LANGE, Matthew; MAHONEY, James; VOM HAU, Matthias, Colonialism and Development: A Comparative Analysis of Spanish and British Colonies, **American Journal of Sociology**, v. 111, n. 5, p. 1412–1462, 2006, p. 1424; MILLER, Robert J, The International Law of Colonialism: A Comparative Analysis., **Lewis & Clark Law Review**, v. 15, n. 4, p. 847–922, 2011, p. 848–850; SHARAFI, Mitra, A New History of Colonial Lawyering: Likhovski and Legal Identities in the British Empire, **Law & Social Inquiry**, v. 32, n. 4, p. 1059–1094, 2007, p. 1060–1062; SOUZA FILHO, Carlos Frederico Marés de, Os Povos Indígenas e o Direito Brasileiro, *in*: SOUZA FILHO, Carlos Frederico Marés de; BERGOLD, Raul Cezar (orgs.), **Os Direitos dos Povos Indígenas no Brasil: Desafios no Século XXI**, Curitiba: Letra da Lei, 2013, p. 13.

[386] During colonial times, the 'Doctrine of Discovery', an international law term, was used to legally support the occupation of land populated by people who were not subjects of a European Christian monarch, thus endorsing the invasion of colonial powers. The justification was the alleged superiority of Europeans in terms of racial, ethnocentric and religious features. Spain, Portugal and England applied this doctrine in many of their colonies, such as Australia, Brazil, Canada, Chile, New Zealand and the United States. These former colonies continue to use the Doctrine of Discovery against Indigenous peoples. For more information, see MILLER, The International Law of Colonialism: A Comparative Analysis.

[387] CHANOCK *et al*, Law and Colonialism, p. 890.

In this context, non-European societies were considered subalterns because they were too connected with nature.[388] The naturally organised communities found in the colonies[389] were classified as belonging to the realm of the laws of nature; that is, they were perceived in savagery, violence and disorder. These societies were portrayed as dangerous for they did not have a control system as per Europe's models, such as social brakes, industry, culture, knowledge, arts, society, science and law.[390] The European perception of the colonies' organisations legitimised racial discrimination, allowing, justifying, forgiving and promoting forced and slave work.[391] Free work was an entitlement available only to considered civil societies.[392]

The modern legal systems originated in Europe focused on rights for European men, members of the elite. It erased the rest of the world, perceived as at the 'lower stages of historical development and in need of Western imperial aid', and progressively adapted the world to Constitutional democracy (in its various styles).[393] This process was passed on to the Global South, as constitutionalism and precedents in the colonies and former colonies, aligning their societies with their European counterparts and maintaining the previous power relations.[394]

As the colonies were forced to follow their colonisers, and surpass their natural status, the notion of State was created as the new order and as the guardian of freedom—that is, European men being free to own the natural world.[395] By limiting others' freedom—traditional peoples, animals and biodiversity—modernity transformed them into private property, traded

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[388] MORIN; KERN, **Terra-Pátria**, p. 80; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 152; QUIJANO, Aníbal, Colonialidad y modernidad/racionalidad, **Perú indígena**, v. 13, n. 29, p. 11–20, 1992, p. 12.

[389] Most of the colonies are part of what is now the Global South, with exceptions, such as Australia, Canada, New Zealand and the United States. See Chapter 1.

[390] ARMITAGE, **Foundations of modern international thought**, p. 78; BOSSELMANN, Chapter 2 Property Rights and Sustainability: Can They be Reconciled?, p. 31; VISVANATHAN, Shiv, On the annals of the laboratory state, *in*: NANDY, Ashis (org.), **Science, hegemony and violence: A requiem for modernity**, Oxford: Oxford University Press, 1988, p. 99; SIMMONS, A. John, Locke's State of Nature, *in*: MORRIS, Christopher W (org.), **The Social Contract Theorists: Critical Essays on Hobbes, Locke, and Rousseau**, New York: Rowman & Littlefield Publishers, 2000, p. 99; SOUZA FILHO, De como a Natureza foi Expulsa da Modernidade, p. 91; POLANYI, **The Great Transformation: The Political and Economic Origins of Our Time**, p. 136–137.

[391] BOSSELMANN, Chapter 2 Property Rights and Sustainability: Can They be Reconciled?, p. 31; POLANYI, **The Great Transformation: The Political and Economic Origins of Our Time**, p. 136.

[392] SOUZA FILHO, De como a Natureza foi Expulsa da Modernidade, p. 91.

[393] TULLY, Modern Constitutional Democracy and Imperialism, p. 478.

[394] CLAVERO, Bartolomé, Original Latin American Constitutionalism, **Rechtsgeschichte - Legal History**, v. 2010, n. 16, p. 025–028, 2010, p. 26–27.

[395] BOSSELMANN, Chapter 2 Property Rights and Sustainability: Can They be Reconciled?, p. 31; CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 56–57; POLANYI, **The Great Transformation: The Political and Economic Origins of Our Time**, p. 137.

in the business market or the labour market.[396] For instance, nature has been positioned merely as a 'resource' since the early days of capitalism.[397] For example, the oil removed from the environment was significant only for its capacity to be traded in markets. Currently, environmental services are a key example of this trading system, as further explained in Chapter 4, Section 4.1.2 'The Market-Based PES'.

To summarise, the success of the mechanistic paradigm induced the fragmentation of knowledge, creating specialisations.[398] This process enabled expanding the rational worldview to transcend science and law to the new political economy discipline, modern economics. The mainstream economic thought has been consistently rooted in the mechanistic paradigm, resulting in the current fragmented and reductionist modern economics.[399] The prominent criticism of this process is that economics became a self-contained field,[400] which fails to reference the broader picture and understand that it is just one aspect of the environmental and social structure.[401] The dominant reasoning negatively affected nature and people from the Global South, considered essentially as inferior.

The fragmentation of knowledge separates waste management from other relevant areas, such as health law and labour law, as explained later in Section 2.2.2 'The Influence of the Mechanistic Legacy on Environmental Law and Waste Management'. The self-contained status of modern economics affects the development of economic instruments, such as PES. Chapter 4 investigates how this instrument is currently failing in the Global South as it struggles to promote positive social and environmental practices, focusing on economic matters.

This section examined the parallel evolution of science and law. It discussed the Western scientific and legal thinking, and their consequences upon the Global South. The next section will investigate the dominant reasoning behind science and law today.

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[396] JONAS, Hans, **El principio de responsabilidad: Ensayo de una ética para la civilización tecnológica**, 2. ed. Barcelona: Herder, 2004, p. 28; SOUZA FILHO, **A liberdade e outros direitos: ensaios socioambientais.**, p. 16.

[397] PELUSO, Nancy Lee, What's Nature Got To Do With It? A Situated Historical Perspective on Socio-natural Commodities: Socio-natural Commodities: Situated Histories, **Development and Change**, v. 43, n. 1, p. 79–104, 2012, p. 79.

[398] OST, **A natureza à margem da lei: a ecologia à prova do direito**, p. 72.

[399] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 79; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 149.

[400] Chapter 4 will provide further explanation about economics, and neoclassical, environmental and ecological economics.

[401] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 81.

2.2 THE CURRENT STATE OF SCIENCE AND LAW

In the nineteenth century, there was a gradual paradigm shift in scientific thought, from machine to networks.[402] Scientific advancements, such as theories of evolution and thermodynamics, exposed the limitations of the mechanistic model, replacing it with the concept of networks and the understanding of the world as integrated living systems, whose fundamental properties develop from the interactions and relationships between its parts.[403] This shift in science shows the importance of referencing the broader picture of knowledge, which includes the practices in waste management law and policy. In other words, without a vision that comprehends how the integrated system works with waste, workers and health, waste management will remain limited, as further discussed in Section 2.2.2 'The Influence of the Mechanistic Legacy on Environmental Law and Waste Management'.

2.2.1 Science, Networks and the Law

The network movement and perception grew significantly during the last three decades of the twentieth century, directly confronting the machine analogy. Developments in physics regarding the subatomic level demonstrated that the world is not merely the union of independent elementary units.[404] This systemic thinking paved the way for the new discipline of ecology, which studies living networks.[405] Recent scientific studies about animal intelligence and consciousness similarly challenge the idea that humans are above nature.[406]

Perhaps the most prominent example of network thinking is climate change, which reveals that humans cannot control the world.[407] Simply put, network structures are means to understand the complexities of the world, the interconnections in nature and the way that environmental hazards can have a global effect. At the same time, climate change as a global risk should be tackled from an inclusive, network cooperation between countries.

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[402] *Ibid*., p. 87–88.
[403] *Ibid*., p. 87; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 85–87.
[404] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 89–92; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 77.
[405] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 93–94; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 280.
[406] BOYD, **The rights of nature: A legal revolution that could save the world**, p. 20; SINGER, Peter, **Ética prática**, 3. ed. São Paulo: Martins Fontes, 2012, p. 335.
[407] BECK, **The Metamorphosis of the World: How Climate Change Is Transforming Our Concept of the World**, p. 5.

Numerous authors have suggested that the shift in science provides a new way to study social systems and their networks.[408] Thus, this shift can represent a systemic vision of life's social aspect, particularly legal systems.[409] The argument is that the law's capital-based model fails to foster communication, social networks and self-generation.[410] That is, the legal system is limited because it is stuck in the old mechanistic paradigm, or the mechanistic trap, where people have lost control over legal institutions, such as government bureaucracies, including to prevent adverse actions against communities and nature.[411]

The persistence of the short-sighted mechanistic vision in the legal system is related to the prominence given to people and corporations' private property and individual rights. The limitation is also characterised by the unimportance of life's communal aspects. The hyper-specialisation of the law and the legal professionals, both controlled by the state, distance and insulate people from the rules that regulate their actions, minimising criticism.[412]

The resilience of the mechanistic model in law is disconnected from the advances in science. It is attributed to the domination of economics and the indispensable contribution that the law has to capitalism.[413] The perception of the mechanistic legal paradigm as natural and not cultural is another critical point.[414] That is, the mechanistic model created the idea that the

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[408] BECK, **Sociedade de risco: rumo a uma outra modernidade**, p. 80; BRIDGEWATER, Peter; KIM, Rakhyun E.; BOSSELMANN, Klaus, Ecological Integrity: A Relevant Concept for International Environmental Law in the Anthropocene?, **Yearbook of International Environmental Law**, v. 25, n. 1, p. 61–78, 2014, p. 62; CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 87; KIM, Rakhyun E, Is Global Governance Fragmented, Polycentric, or Complex? The State of the Art of the Network Approach, **International Studies Review**, v. 22, n. 4, p. 903–931, 2020, p. 909; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 280; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 123.

[409] BIBER, Eric, Which Science? Whose Science? How Scientific Disciplines Can Shape Environmental Law, **The University of Chicago Law Review**, v. 79, n. 2, p. 471–552, 2012, p. 475; BROSNAN, Deborah M, Science, Law, and the Environment: The Making of a Modern Discipline, **Environmental Law**, v. 37, n. 4, p. 987–1006, 2007, p. 988.

[410] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 111–128; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 149.

[411] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 111; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 254.

[412] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 99–100; RHODE, Deborah L.; CUMMINGS, Scott L., Access to justice: Looking back, thinking ahead, **Georgetown Journal of Legal Ethics**, v. 30, p. 485–500, 2017, p. 485–490.

[413] BECK, **The Metamorphosis of the World: How Climate Change Is Transforming Our Concept of the World**, p. 5–6; CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 101–102; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 117; POPE, **Transferência Transfronteiriça de Resíduos sob a Perspectiva da Justiça Ecológica : Rumo à Gestão Internacional de Resíduos**, p. 101.

[414] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 102; LACEY, Hugh, **Valores e atividade científica 1**, 2. ed. São Paulo: Editora 34, 2008, p. 181; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 191–197.

oppressive legal system of today is natural, and not a product of social institutions. This vision is dominant, making it difficult to reclaim and rewrite the law.

The persistent influence of the mechanistic model in law results in many negative consequences in the environmental law sphere. The most significant of all is the attraction to unsustainable practices, which is particularly problematic to environmental law. There is a structural relationship between private property and unsustainable activities. Aldo Leopold discussed how private property can cause negative environmental outcomes, highlighting that the dominant concept of land, and in consequence private property, produces privileges while not imposing countervailing obligations. In this sense, he argued that private property frequently is a leading cause of environmental destruction.[415] In short, the law limits the consideration of the impact on the community and future generations.[416]

2.2.2 The Influence of the Mechanistic Legacy on Environmental Law and Waste Management

The law has been instrumental in facilitating the dominant mindset through international rules and norms. Its language and discourse aim to forge a perception of rationality, neutrality, objectivity and, therefore, justice.[417] For this reason, the legal system embodies a culture that declares the way to analyse, approach and resolve[418] problems. At present, as previously explained, this culture revolves around state sovereignty, property rights and legal professionalism.

This context distances people from the law, including those who are benefiting society. For instance, the inaccessibility of the law hinders waste pickers,[419] whose activities benefit society, from being properly recognised by the legal system. This is problematic not only

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[415] *See* LEOPOLD, Aldo, **A Sand County Almanac**, 1. ed. New York: Oxford University Press, 1949. Therefore, property regimes must have inherent responsibilities covering environmental concerns, as per BOSSELMANN, Chapter 2 Property Rights and Sustainability: Can They be Reconciled?, p. 27.
[416] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 124; BUTLER, Lynda L, The Pathology of Property Norms: Living Within Nature's Boundaries, **Southern California Law Review**, v. 73, n. 5, p. 927–1015, 2000, p. 928; FREYFOGLE, Eric T., Ownership and Ecology, **Case Western Reserve Law Review**, v. 43, n. 4, p. 1269–1297, 1993, p. 1269–1270; TAYLOR, Prue; GRINLINTON, David, Chapter 1. Property Rights And Sustainability: Toward A New Vision Of Property, *in*: GRINLINTON, David; TAYLOR, Prue (orgs.), **Property Rights and Sustainability**, Leiden: Brill Publishers, 2011, p. 6.
[417] CHIMNI, Third World Approaches to International Law: A Manifesto, p. 15; LACEY, **Valores e atividade científica 1**, p. 181–182.
[418] PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 70.
[419] See Chapter 3, Section 3.3 'Organised Waste Pickers'.

because of their lack of acknowledgement but also because their expertise, as the main providers of sustainable waste management in the Global South, is ignored.

A chief feature of the mechanistic legacy is the distancing between the law and the people, as explained in Section 2.1.2 'Western Legal Thinking'. Bottom-up and community-based legal customs are predominantly silenced and marginalised, when the law should be an expression of the people's will, as discussed in Section 1.2, the methodology section of Chapter 1. The mechanistic conceptions created during the sixteenth and seventeenth centuries remain the dominant influence on environmental law in the Global North and Global South,[420] marginalising traditional and non-hegemonic[421] groups.[422] There is a failure to address their needs and desires.

The mechanistic legacy manifests itself in environmental law, resulting in environmental reductionisms,[423] namely anthropocentrism,[424] compartmentalisation[425] and fragmentation.[426] These features often generate economically charged and flawed laws[427] and policies.[428] In short, they represent the dominant reductionist approach to human–nature relationships.[429]

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[420] BOSSELMANN, Losing the Forest for the Trees, p. 2430.
[421] There are many marginalised groups, communities and peoples. Some examples are the Indigenous and other traditional peoples; further, the intersectional layers of oppression based on gender, race and social class also characterise marginalised groups. In terms of waste management, the waste pickers are a prominent example of social and legal exclusion, for they have a significant number of financially vulnerable black and pardo women. See DIAS, Sonia; OGANDO, Ana Carolina, Engendering Waste Pickers Cooperatives in Brazil, *in*: **Cooperatives and the World of Work**, Antalya, Turkey: ILO, 2015, p. 27.
[422] COMMISSION ON LEGAL EMPOWERMENT OF THE POOR, **Making the Law Work for everyone**, p. 1; SOUZA FILHO, **A liberdade e outros direitos: ensaios socioambientais.**, p. 4.
[423] Reductionism, also called atomism, is the idea that reality as a whole can be analysed and understood as the algebraic sum of its parts.
[424] Anthropocentrism is a vision in which the world is human-centred and nature and the natural world, including animals, are means to human ends. Anthropocentrism is challenged by biocentrism and ecocentrism. The biocentric vision underlines the value of particular organisms, whereas the ecocentric approach has a more holistic and systemic perspective, recognising the importance of species, ecosystems or the earth. The first essay supporting non-anthropocentric visions in law was: STONE, Should Trees Have Standing? Toward legal rights for natural objects.
[425] Compartmentalisation separates subjects, in terms of the law, and nature is dealt with separately and even considered unrelated to other policy arenas.
[426] Fragmentation is a result of hyper-specialisation, creating an emphasis on specific features of the environment, rather than its value as an integrated network. See BOSSELMANN, Losing the Forest for the Trees; BOSSELMANN, Klaus, Grounding the rule of law, *in*: VOIGT, Christina (org.), **Rule of Law for Nature: New Dimensions and Ideas in Environmental Law**, Cambridge, UK: Cambridge University Press, 2013, p. 83.
[427] For more information, Chapter 4, Section 4.1 'Competing PES Models' discusses the shortfalls of PES, and Section 4.2 'Dominant PES Narrative in Brazil' discusses the limitations of PES in Brazil.
[428] BOSSELMANN, Losing the Forest for the Trees, p. 2429.
[429] *Ibid*., p. 2424, 2425.

Anthropocentrism portrays people as independent and above nature.[430] It is interconnected with the vision that nature and its elements are property, and owners have the right to use them.[431] Thus, nature is a peripheral concern in the reign of property and state sovereignty.[432]

In environmental law, anthropocentrism has 'othered' nature, putting it at the 'bottom of powerful juridical constructed, reinforced, and legitimised hierarchies'.[433] In this sense, nature becomes a series of 'natural resources', and the natural world's complexity translates into economic terms.[434] This feature affected traditional peoples and non-hegemonic groups, especially those in Brazil and in the Global South who make their living out of sustainable practices, which lack acknowledgement by the system.[435]

Anthropocentrism materialises in different aspects of waste management and regulation. An anthropocentric waste management scenario is one of significant lack of segregation, causing ineffective waste management at the site.[436] For instance, in Brazil, approximately 44 per cent of solid waste[437] is not collected selectively. Moreover, waste is perceived as an inevitable and unremarkable product of humanity, which can be solved by human domination of nature.[438] Meanwhile, disposal sites such as landfills are often fenced,[439] limiting the entrance of waste pickers[440] who make their livelihood out of recycling waste, suggesting the link with private property rights and the exclusion of minorities.

A picture of the second feature, compartmentalisation, is visible in the way policymakers and government structures address environmental issues—separated from other

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[430] BOYD, **The rights of nature: A legal revolution that could save the world**, p. 13.
[431] *Ibid*.
[432] KOTZÉ, Louis J.; FRENCH, Duncan, The Anthropocentric Ontology of International Environmental Law and the Sustainable Development Goals: Towards an Ecocentric Rule of Law in the Anthropocene, **Global Journal of Comparative Law**, v. 7, n. 1, p. 5–36, 2018, p. 14.
[433] *Ibid*.; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 17.
[434] Some authors have contended that the connection between anthropocentrism and economic growth leads towards 'industrocentrism' or a system focused on capitalistic development. For more information, see KIDNER, David W., Why 'anthropocentrism' is not anthropocentric, **Dialectical Anthropology**, v. 38, n. 4, p. 465–480, 2014.
[435] KRENAK, Ailton, Paisagens, Territórios e Pressão Colonial, **Espaço Ameríndio**, v. 9, n. 3, p. 327, 2015, p. 330; LEFF, **Racionalidade ambiental: a reapropriação social da natureza**, p. 152.
[436] SOBOTKA, Anna; SAGAN, Joanna, Cost-saving Environmental Activities on Construction Site – Cost Efficiency of Waste Management: Case Study, **Procedia Engineering**, v. 161, p. 388–393, 2016, p. 390.
[437] ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2020**, p. 19.
[438] RENO, Joshua, Waste and Waste Management, **Annual Review of Anthropology**, v. 44, p. 557–572, 2015, p. 566–567.
[439] DIAS, Sonia Maria; FERNANDEZ, Lucia, Waste Pickers - A gendered perspective, *in*: **Powerful Synergies: Gender Equality, Economic Development and Environmental Sustainability**, New York: United Nations Development Programme -UNDP, 2012, p. 153.
[440] For more information about waste pickers, see Chapter 3.

topics, particularly finance and development.[441] Environmental law and policy are distanced from other areas. The link that emerges is restricted to environmental protection costs in the relationship between environmental law and economics.[442] For instance, when a policy implements an economic instrument, such as PES, solely focusing on the financial gains that the scheme can produce, disregarding socio-environmental aspects. This misses the network approach.

Compartmentalisation is at the core of waste management. Worldwide, waste is usually managed as disconnected from ecological sustainability, emissions, soil degradation, poverty alleviation, health and safety concerns, working hours, cooperativism, small enterprises and urban planning. In the Global South, waste pickers significantly conduct waste management;[443] however, they are widely excluded from waste management systems and regulations.[444] This exclusion occurs because environmental and waste laws fail to connect with labour law, civil rights law, business/corporate law and health law.

Fragmentation contrasts with a compartmentalised approach, emphasising one particular characteristic of nature and ignoring the web of interactions. It is rooted in the dominance of state sovereignty[445] and private property.[446] Lawmakers consider nature only inside the anthropocentric vision, and the fragmentation of nature into individual items is a prominent environmental law aspect. The isolation of topics often creates inconsistent and incoherent environmental policy and regulations in a process that allows legislators to weigh and balance other concerns, mainly economics, above environmental protection and social justice.[447]

To some extent, fragmentation is necessary as a way to have enforceable regulations. To attain sustainability, concrete legal requirements must address various international, national

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[441] BOSSELMANN, Losing the Forest for the Trees, p. 2432; BOSSELMANN, Klaus, From Reductionist Environmental Law to Sustainability Law, *in*: BURDON, Peter (org.), **Exploring Wild Law: The Philosophy of Earth Jurisprudence**, Adelaide: Wakefield Press, 2011, p. 205.
[442] BOSSELMANN, Losing the Forest for the Trees, p. 2432.
[443] DIAS, Waste pickers and cities, p. 372; VELIS, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era., p. 329.
[444] One particular exception is the waste pickers' inclusion in the National Waste Policy in Brazil, as discussed in in Chapter 5 in Section 5.2.1 'The Model Articulating the National Waste Policy'.
[445] VERSCHUUREN, Jonathan, The Role of Sustainable Development and the Associated Principles of Environmental Law and Governance in the Anthropocene, *in*: KOTZÉ, Louis J. (org.), **Environmental Law and Governance for the Anthropocene**, 1. ed. London: Bloomsbury Publishing, 2017, p. 23.
[446] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 124.
[447] PLATJOUW, Froukje Maria, **Environmental Law and the Ecosystem Approach: Maintaining ecological integrity through consistency in law**, New York: Routledge, 2016, p. 99.

and local contexts.[448] The critical point is the lack of clear foundation in law, assuring that nature, as the basis of life, and communities, are non-negotiable. In other words, environmental law should address the right to use nature sustainably and promote human wellbeing and not the right to use and alter nature just until the point that pollution is 'too often and too much'.[449]

Many authors have recognised that fragmentation has impaired the effectiveness of environmental law.[450] The argument is that environmental law has failed to address the connection between human and environmental systems.[451] In terms of waste management, fragmentation appears when regulations focus on one strategy, ignoring other vital practices that take preference in the waste hierarchy,[452] particularly under the a priori hierarchy, such as waste prevention through education.

2.3 A NEW PARADIGM IN LAW

A main reason behind the current global socio-environmental crisis is the philosophy, ontology and methodology foundations of environmental law,[453] as identified in Sections 2.1 and 2.2. The dominant reasoning previously analysed hinders the success of environmental law and is limited, given that science demonstrates that the world is a network of fluid communities and interactions. The law must have a similar shift and reverse the vision of human supremacy over nature, overcoming the anthropocentric approach. The failure to do so results in missing the nuances of complex environmental management problems and their potential solutions. Only with this shift will the law decouple from the prominence of property rights, individualism

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[448] KOTZÉ, Fragmentation Revisited in the Context of Global Environmental Law and Governance, p. 548.
[449] BOSSELMANN, Losing the Forest for the Trees, p. 2432–2433.
[450] BAAKMAN, Karin, **Testing times: the effectiveness of five international biodiversity-related conventions**, Nijmegen: Wolf Legal Publishers, 2011, p. 309; BOSSELMANN, **The Principle of Sustainability: Transforming law and Governance**, p. 141; BRATSPIES, Rebecca M., The green economy will not build the rule of law for nature, *in*: VOIGT, Christina (org.), **Rule of Law for Nature: New Dimensions and Ideas in Environmental Law**, Cambridge, UK: Cambridge University Press, 2013, p. 300; BUGGE, Hans Christian, Twelve fundamental challenges in environmental law: an introduction to the concept of rule of law for nature, *in*: VOIGT, Christina (org.), **Rule of Law for Nature: New Dimensions and Ideas in Environmental Law**, Cambridge, UK: Cambridge University Press, 2013, p. 18; PLATJOUW, Froukje Maria, The need to recognize a coherent legal system as an important element of the ecosystem approach, *in*: VOIGT, Christina (org.), **Rule of Law for Nature: New Dimensions and Ideas in Environmental Law**, Cambridge, UK: Cambridge University Press, 2013, p. 164; SAND, Peter H. (org.), **The effectiveness of international environmental agreements: a survey of existing legal instruments.**, Cambridge, UK: Cambridge University Press, 1992; VERSCHUUREN, The Role of Sustainable Development and the Associated Principles of Environmental Law and Governance in the Anthropocene, p. 22.
[451] GALAZ, Victor, **Global Environmental Governance, Technology and Politics: The Anthropocene Gap**, Cheltenham, UK: Edward Elgar Publishing, 2015, p. 128.
[452] See Chapter 3, Section 3.2.2 'Evaluation of Incineration through the Sovereign Communities Lens'.
[453] Klaus Bosselmann and Prue Taylor, 'Introduction' in Klaus Bosselmann and Prue Taylor (eds), *Ecological Approaches to Environmental Law* (Edward Elgar Publishing, 2017) 1, 1.

and the law's inaccessibility and distance from the people, and thus create a network and ecological approach to environmental law. The law cannot overlook this need since its duty is to decide and resolve issues, such as the complex human–nature relationship.[454]

Ecological approaches to environmental protection are not new. The protection of nature has guided Indigenous peoples worldwide[455] and was the basis of the Aristotelian vision. In contemporary legal discussions, the UN has contributed to the international debate.[456] Although the UN has initiatives challenging some of the flaws of environmental law, it still promotes anthropocentric ideas.[457] Chapter 1 referred to the example of the UN's aim to have a network approach, describing how it connected several nations to discuss waste as a global issue. However, it has been criticised for highlighting the concerns and interests of the Global North over the Global South.

In terms of theoretical conceptions, arguably the Ecology of Law emerges as the best-suited framework for reclaiming and rewriting the law, particularly waste management. It proposes a reformulation of the law as a whole, so that socio-environmental concerns are addressed in a systemic way. However, the Ecology of Law differs from the ecological approaches to environmental law by dealing with law in its entirety as a system, not restricting itself to environmental law. It provides the basic concepts and structure of a legal order consistent with the ecological principles that sustain life, promoting a network approach. By incorporating these concepts, environmental law can overcome some pressing issues, such as waste management in the Global South, and understand the solutions, such as PES for waste pickers, as argued by this thesis.

2.3.1 The United Nations and the Sustainable Development Goals

Environmental law, as an academic discipline, is the area responsible for environmental protection.[458] Nonetheless, its international, national, regional and local dimensions have made little difference against environmental pollution and degradation.[459] In

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[454] PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 17.
[455] BATES, Gerry, **Environmental Law in Australia**, 10. ed. Australia: Lexis Nexis Australia, 2019, p. 9; MAGALLANES, Catherine J. Iorns, Nature as an Ancestor: Two Examples of Legal Personality for Nature in New Zealand, **VertigO-la revue électronique en sciences de l'environnement**, n. hors-série 22, 2015, p. 1.
[456] See Chapter 1.
[457] ADELMAN, Sam, The sustainable development goals, Anthropocentrism and Neoliberalism, *in*: FRENCH, Duncan; KOTZÉ, Louis J. (orgs.), **Global goals : law, theory and implementation**, Cheltenham: Edward Elgar Publishing, 2018, p. 44.
[458] BATES, **Environmental Law in Australia**, p. 17, 24.
[459] BOSSELMANN; TAYLOR, Introduction, p. 1.

support, since 1972, with the Stockholm Conference and the Club of Rome, and the 1980s, with the World Commission on Environment and Development, also known as the Brundtland Commission, there has been an international push to have a new sustainable paradigm.[460]

However, the main change began in 1992 with the UN's Conference on Environmental Development, also known as Rio 92, bringing a new core debate for environmental law, under the rubric of 'sustainable development'.[461] Agenda 21 states that there were many inequalities between and within nations, including critical problems regarding poverty and environmental degradation, and that 'no nation can achieve this on its own; but together we can - in a global partnership for sustainable development'.[462] Thus, with this integrative approach Rio 92 marked the start of a new era for environmental law.[463]

The introduction of sustainable development in environmental discussions added an economic *and* social agenda to environmental law. In 2000, the UN drafted the Millennium declaration, announcing values indispensable to international relations in the new millennium, including freedom, equality, solidarity, tolerance, shared responsibility as well as respect for nature.[464] The declaration designated eight progressive objectives known as the Millennium Development Goals[465] (MDGs) to interpret these values into actions.[466]

Although there have been some positive outcomes, particularly in improving sanitation and drinking water resources,[467] the MDGs had significant shortfalls. Some of the most prominent critics focus on its development-oriented nature[468] and social shortcomings. While

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[460] POPE, **Understanding Planned Obsolescence: Unsustainability through production, consumption and waste generation**, 1. ed. London: Kogan Page, 2017, p. 155; SCHRIJVER, **The Evolution of Sustainable Development in International Law: Inception, Meaning and Status**, p. 72; STRANGE, Tracey; BAYLEY, Anne, **Sustainable development: linking economy, society, environment**, Paris: OECD, 2008, p. 3, 24; WESTERLUND, Staffan, Theory for Sustainable Development: For or Against, *in*: BUGGE, Hans Christian; VOIGT, Christina (orgs.), **Sustainable Development in International and National Law**, Groningen: Europa Law Publishing, 2008, p. 52.

[461] WESTERLUND, Theory for Sustainable Development: For or Against, p. 52.

[462] UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT (UNCED), **Agenda 21: Action Plan for the Next Century United Nations Conference on Environment and Development.**, p. 3.

[463] WESTERLUND, Theory for Sustainable Development: For or Against, p. 52.

[464] UN, **United Nations Millennium Declaration**, Geneva, Switzerland: United Nations, 2000, p. 2.

[465] The MDGs were as follows: (1) Eradicate extreme poverty and hunger; (2) Achieve universal primary education; (3) Promote gender equality and empower women; (4) Reduce child mortality; (5) Improve maternal health; (6) Combat HIV/AIDS, malaria and other diseases; (7) Ensure environmental sustainability; and (8) Develop a global partnership for development.

[466] UN, 'Millennium Development Goals' (United Nations, 2000) 1 www.un.org/millenniumgoals; UN, *The Millennium Development Goals Report 2015* (2015) 4–7 http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf.

[467] United Nations, *The Millennium Development Goals Report 2015* (2015) 7 http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf.

[468] KIM, Rakhyun E.; BOSSELMANN, Klaus, Operationalizing Sustainable Development: Ecological Integrity as a *Grundnorm* of International Law: Operationalizing Sustainable Development, **Review of European, Comparative & International Environmental Law**, v. 24, n. 2, p. 194–208, 2015, p. 194.

emphasising income poverty, the MDGs ignored the concepts of gender, marginalised populations and race,[469] which are layers of oppression. In short, the MDGs failed to address society's most vulnerable members. Simultaneously, the MDGs' few victories came with massive ecologic destruction, species extinctions and growing injustices, especially climate change.[470]

It was only in 2015 that the UN officially adopted a new strategy for sustainable development. The UN General Assembly adopted a resolution, agreeing to the Sustainable Development Goals (SDGs) as the successor to the MDGs. The SDGs consist of 17 goals[471] and 169 targets, categorised into six essential themes: people, planet, prosperity, dignity, justice and partnership.[472]

All of the goals are interconnected and can be associated with good governance and waste management.[473] In fact, sustainable waste management is an indispensable factor for SDGs and sustainable urban development.[474] Five goals significantly intersect with the waste sector of the Global South: (1) No Poverty, (5) Gender Equality, (8) Decent Work and Economic Growth, (11) Sustainable Cities and Communities and (12) Responsible Consumption and Production.[475]

As informed in Chapter 1, the SDGs remain subject to criticism, especially from the Global South.[476] The SDGs are influenced by the unequal power relationship of international politics and are thus rooted in a political approach inclined to benefit the Global North. Therefore, the SDGs follow the dominant reasoning and are technocratic, top-down, oblivious to communal values and fail to include the most marginalised groups.[477] As explored in Chapter

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[469] NANDA, Ved P., The Journey from the Millennium Development Goals to the Sustainable Development Goals, **Denver Journal of International Law and Policy**, v. 44, n. 3, p. 389–412, 2016, p. 401.
[470] ADELMAN, The sustainable development goals, Anthropocentrism and Neoliberalism, p. 45.
[471] The 17 SDGs are: (1) No Poverty, (2) Zero Hunger, (3) Good Health and Well-being, (4) Quality Education, (5) Gender Equality, (6) Clean Water and Sanitation, (7) Affordable and Clean Energy, (8) Decent Work and Economic Growth, (9) Industry, Innovation and Infrastructure, (10) Reducing Inequality, (11) Sustainable Cities and Communities, (12) Responsible Consumption and Production, (13) Climate Action, (14) Life Below Water, (15) Life On Land, (16) Peace, Justice, and Strong Institutions, (17) Partnerships for the Goals.
[472] UN, **The Road to Dignity by 2030: Ending Poverty, Transforming All Lives and Protecting the Planet, Synthesis Report of the Secretary-General on the Post-2015 Agenda.**, New York: United Nations, 2014, p. 45.
[473] BESEN; GUTBERLET, Participatory urban solid waste governance in the global South, p. 3.
[474] UN GENERAL ASSEMBLY, **Transforming Our World**.
[475] GUTBERLET, Grassroots waste picker organizations addressing the UN sustainable development goals, p. 9.
[476] KUMI; ARHIN; YEBOAH, Can post-2015 sustainable development goals survive neoliberalism? A critical examination of the sustainable development–neoliberalism nexus in developing countries., p. 539; LANGAN, **Neo-colonialism and the Poverty of'development'in Africa.**, p. 180–182; MICKELSON, South, North, International Environmental Law, and International Environmental Lawyers, p. 54; WEBER, Politics of 'Leaving No One Behind', p. 409.
[477] WEBER, Politics of 'Leaving No One Behind', p. 409.

5, in Brazil, this has ramifications for the waste pickers, who have been advocating for inclusive legislation for decades. They had some success in terms of legislation, but faced severe downfalls in practice, because their victories, such as being recognised in the National Waste Policy, did not translate to extensive integration into waste management systems, as discussed in Chapter 5, Section 5.2.1 'The Model Articulating the National Waste Policy'.

Thus, the UN and, particularly the SDGs, operate inside the flawed environmental law system. The UN has had a valuable effect in terms of compelling states to work together, partially weakening the fragmented vision that environmental problems can be addressed independently.[478] This approach is particularly vital in times of global environmental problems, such as climate change, which need interdependent actions.[479] However, fragmentation is still present, considering that only three legal documents by the UN[480] explicitly address sustainable development within planetary boundaries.[481]

As a result, in a possible attempt to overcome compartmentalisation, the SDGs promote environmental reductionisms and anthropocentrism. The SDGs endorse the illusion that social justice and environmental protection can occur without challenging endless economic growth.[482] It promotes a weak, anthropocentric vision of sustainable development that puts economic matters above socio-environmental concerns.[483] The SDGs fail when they promote a new form of economic development, renamed as sustainable development, as observed in Chapter 1 in connection with the marginalised communities in the Global South.[484]

The flaws diagnosed by the UN's agreements show that the problems are fundamental. To solve environmental issues, the need is not for more laws, but better ones. The legal system must recognise ecological networks and interdependencies and must decouple law from a perspective that privileges humans over nature and individual rights over collective responsibilities.[485] In short, an ecological approach to environmental law and governance is required that internalises ecological integrity as a fundamental principle of law.[486]

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[478] BOSSELMANN, **The Principle of Sustainability: Transforming law and Governance**, p. 180.
[479] BECK, **The Metamorphosis of the World: How Climate Change Is Transforming Our Concept of the World**, p. 38.
[480] These documents are the 1975 United Nations Programme decision 20 (III), Article 2 of the United Nations Framework Convention on Climate Change, and the Paris Agreement.
[481] VERSCHUUREN, The Role of Sustainable Development and the Associated Principles of Environmental Law and Governance in the Anthropocene, p. 21.
[482] ADELMAN, The sustainable development goals, Anthropocentrism and Neoliberalism, p. 44.
[483] *Ibid*.
[484] *Ibid*., p. 45.
[485] BOSSELMANN; TAYLOR, Introduction, p. 1.
[486] *Ibid*., p. 2.

2.3.2 Initiatives Implementing Innovative, Ecologically Oriented Approaches to Environmental Law

Initiatives aiming to protect nature linked to ecologically informed approaches to environmental law are gradually appearing in courts, law and policy and are even articulated in Constitutional innovations.[487] These experiences exist in Global North countries, such as Australia, New Zealand and the United States.[488] Nonetheless, this section focuses on Brazil as a significant country from the Global South, which is a leading figure, mainly due to the New Constitutional Law[489] in Latin America.[490]

Latin America deserves emphasis from the recent environmental perspective of the Inter-American Court of Human Rights. Traditionally, the implication of environmental rights at the Inter-American Court of Human Rights chiefly concerns conflicts of industrial and economic interests, the exploration of nature and the human rights of Indigenous people and other traditional communities.[491] Latin America is the home of significant biodiversity, and it hence attracts the attention of the extractive industry, leading to conflicts with traditional peoples.[492] In the past 20 years, the Court has gradually coupled ecological approaches to

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[487] *See* BOYD, **The rights of nature: A legal revolution that could save the world**.
[488] *See* BATES, **Environmental Law in Australia**, p. 89–90; BOYD, **The rights of nature: A legal revolution that could save the world**; IORNS, Catherine J. Magallanes, International Human Rights and Their Impact on Domestic Law on Indigenous Peoples' Rights in Australia, Canada and New Zealand, *in*: HAVEMANN, Paul (org.), **Indigenous Peoples' Rights in Australia, Canada and New Zealand**, Auckland: Oxford University Press, 1999, p. 235.
[489] *See* Norma Sueli Padilha, Cristiane Derani and Fernando Antonio de Carvalho Dantas (eds), *Direitos Da Natureza II* (CONPEDI, 2018); Zaffaroni, *La Pachamama y el humano* (n 7).
[490] The New in Constitutional Law in Latin America championed rights and responsibilities for nature, also known as *Pacha Mama*, and respect by *sumak kawsay, buen vivir* or *pleno vivir*, which represent fundamental ethical values in the relations between the State, the people and especially nature. The Constitutions of Bolivia, Ecuador and Colombia are the primary examples of the New in Constitutional Law in Latin America.
[491] CAVEDON-CAPEDEVILLE, Fernanda Sales, Capítulo 5 – Jurisprudência Ecologizada nas Cortes de Direitos Humanos: Contribuições para a Ecologização dos Direitos Humanos, *in*: LEITE, José Rubens Morato (org.), **A ecologização do direito ambiental vigente: rupturas necessárias**, Rio de Janeiro: Lumen Juris, 2018, p. 216.
[492] In a report published in 2015, the Commission flagged the high frequency of demands related to environmental, human, social, health and cultural effects on traditional communities resulting from this type of conflicts. However, the broader point raised by this report is the take on environmental cases not directly related to the traditional communities, such as the contamination of water resources used for public supply. *See* COMISIÓN INTERAMERICANA DE DERECHOS HUMANOS, Pueblos indígenas, comunidades afrodescendientes y recursos naturales: protección de derechos humanos en el contexto de actividades de extracción, explotación y desarrollo, 2015; CAVEDON-CAPEDEVILLE, Capítulo 5 – Jurisprudência Ecologizada nas Cortes de Direitos Humanos: Contribuiçoes para a Ecologização dos Direitos Humanos.

environmental law and human rights, with 12 cases[493] adding ecological concerns to its jurisprudence.[494]

The most prominent case of ecological approaches to environmental law in Latin America is Constitutional change and transformation, which began with[495] the Brazilian Constitution of 1988.[496] Two groups significantly influenced the Brazilian Constitution, one defending the rights of Indigenous peoples and the other advocating for the right of an ecologically balanced environment, leading to the terms socio-environmental rights and socio-environmentalism as their union.[497] Thus, the Brazilian Constitution supported the socio-environmental rights' perspective, recognising the undivided bond between communities and nature, and social diversity and biodiversity.[498] The Constitutional approach is characterised by solidarity and communal values,[499] influencing the creation, application and enforcement of the law.[500] Despite representing a landmark, the Constitutional respect for nature and traditional people[501] still lacks effectiveness, particularly when confronted with economic values.[502] In this sense, the Brazilian Constitution initiated a break from anthropocentrism, compartmentalisation and fragmentation, which is insufficient without strong commitment from law and policy, as well as monitoring and compliance.

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[493] The cases are Community Mayagna (Sumo) Awas Tigni versus Nicaragua (2001); Community Yakye Axa of the Enxet-Lengua People versus Paraguai (2005); Community Sawhoyamaxa versus Paraguai (2006); Saramaka People versus Suriname (2007); Community Xákmok Kásek versus Paraguai (2010); Kichwa de Sarayaku Indigenous People versus Equador (2012); Afro-descendant communities displaced from the Cacarica River basin (Operation Genesis) versus Colombia (2013); Kuna Indigenous People of Madungandí and the Emberá Indigenous People of Bayano versus Panama (2014); Kalina and Lokono Peoples versus Suriname (2015); Community Garífuna Triunfo de la Cruz versus Honduras (2015); Garifuna Community of Punta Piedra versus Honduras (2015); and Claude Reyes and others versus Chile.

[494] CAVEDON-CAPEDEVILLE, Capítulo 5 – Jurisprudência Ecologizada nas Cortes de Direitos Humanos: Contribuiçoes para a Ecologização dos Direitos Humanos, p. 218.

[495] In the 1980s and 1990s, many Latin American countries went through re-democratisation processes after long dictatorships, which assisted with the distancing from the dominant legal thinking.

[496] SOUZA FILHO, Os Povos Indígenas e o Direito Brasileiro, p. 15; SOUZA FILHO, A Essência Socioambiental do Constitucionalismo Latino-Americano, p. 199.

[497] SOUZA FILHO, **A liberdade e outros direitos: ensaios socioambientais.**, p. 10.

[498] *Ibid*., p. 9, 10.

[499] LEITE; AYALA, **Direito ambiental na sociedade de risco**, p. 35; LEITE, José Rubens Morato, **Dano Ambiental: do individual ao coletivo extrapatrimonial**, 4. ed. São Paulo: Revista dos Tribunais, 2011, p. 32–33.

[500] FERREIRA, Heline Sivini; LEITE, José Rubens Morato, A Expressão dos Objetivos do Estado de Direito Ambiental na Constituição Federal de 1988, *in*: LEITE, José Rubens Morato; FERREIRA, Heline Sivini; CAETANO, Matheus Almeida (orgs.), **Repensando o estado de direito ambiental**, Florianópolis: Fundação Boiteux, 2012, v. 3, p. 39.

[501] For more information about traditional peoples' rights, see LEUZINGER, Márcia Dieguez; LYNGARD, Kylie, The land rights of indigenous and traditional peoples in Brazil and Australia, **Brazilian Journal of International Law**, v. 13, p. 419–439, 2016.

[502] LEUZINGER, Márcia Dieguez; VARELLA, Marcelo Dias, O Meio Ambiente Na Constituição Federal E Na Legislação Infraconstitucional: Avanços Ou Retrocessos (1988 A 2014)?, **Revista do Programa de Pós-Graduação em Direito da UFC**, v. 34, n. 2, p. 299–314, 2014, p. 133.

Notably, Brazil's socio-environmental perspective strength is based on the connection between environmental issues and social movements.[503] Social movements in Brazil[504] started to gain prominence in the 1970s, leading to a better organisation in the 1980s.[505] During the 1990s, the Brazilian social movements intensified their discourse with trending agendas, such as public participation, empowerment and environmental concerns pushed by the UN.[506] Currently, social movements are often the leading voices advocating against the environmental problems[507] faced by Brazilian society,[508] such as the inadequate attention given to traditional people's rights, sustainable agriculture and food sovereignty, energy and water, and sustainable waste management.

The push for socio-environmental rights was often simultaneous. Some of the most prominent alliances between social movements and environmental protection can be systematised into four.[509] First, the historical claim for Indigenous peoples' right to exist as Indigenous peoples,[510] and not be forced into hegemonic society in an integrationist approach, which was later accompanied by the determination of similar rights to other traditional

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[503] Social movements are collective actions maintained by organised groups of society that aim to push for some social cause. In general, their advocacy represents the voice of excluded, marginalised and vulnerable people.
[504] *See* SCHERER-WARREN, Ilse; LÜCHMANN, Lígia Helena Hahn (orgs.), **Movimentos sociais e participação : abordagens e experiências no Brasil e na América Latina**, Florianópolis: Editora da UFSC, 2011.
[505] CORREIA, Mary Lúcia Andrade; DIAS, Eduardo Rocha, Democracia, Movimentos Sociais e o Meio Ambiente, **Revista Justiça do Direito**, v. 31, n. 1, p. 5–23, 2017, p. 13–14.
[506] SCHERER-WARREN, Ilse; LÜCHMANN, Lígia Helena Hahn, Situando o debate sobre movimentos sociais e sociedade civil no Brasil – Introdução, **Política & Sociedade**, v. 3, n. 5, p. 13–35, 2004, p. 16.
[507] Brazil is often ranked as one of the deadliest countries for environmental defenders, especially of Indigenous peoples. For more information, see BUTT, Nathalie *et al*, The supply chain of violence, **Nature Sustainability**, v. 2, n. 8, p. 742–747, 2019, p. 743.
[508] The approach of social movements, particularly waste pickers in the National Waste and Citizenship Forum, contributes to representation and participation justice. See DIAS, Sonia; MATOS, Marlise, Fórum Lixo e Cidadania - Inovação institucional na formulação de políticas públicas de resíduos sólidos, *in*: KEMP, Valéria Heloisa; CRIVELLARI, Helena Maria Tarchi (orgs.), **Catadores na cena urbana: construção de políticas socioambientais**, Belo Horizonte: Autêntica Editora, 2008, p. 257.For more information about the concepts of justice, environmental, distribution, recognition, and participation, see ACSELRAD, Henri, Ambientalização das lutas sociais - o caso do movimento por justiça ambiental, **Estudos Avançados**, v. 24, n. 68, p. 103–119, 2010; FRASER, Nancy; HONNETH, Axel, **Redistribution or recognition?: a political-philosophical exchange**, London: Verso Books, 2003; MILLER, David, The Stanford Encyclopedia of Philosophy, *in*: ZALTA, Edward N. (org.), , [s.l.: s.n.], 2017; RAWLS, John, **A Theory of Justice: Revised Edition**, 2. ed. Cambridge, MA: Harvard University Press, 1999; SCHLOSBERG, **Defining environmental justice**; YOUNG, **Justice and the politics of difference**.
[509] The list of four big social movements in Brazil has examples of important organisations; however, it does not discuss the totality of relevant social movements in the country. Some of the other examples are the Homeless Workers Movement (in Portuguese: *Movimento dos Trabalhadores Sem Teto – MTST*), and the rubber tappers (in Portuguese: *seringueiros*), led by Chico Mendes until his assassination in 1988, who fought for the protection of the Amazon rain forest, Indigenous peoples' rights and peasants.
[510] SOUZA FILHO, Os Povos Indígenas e o Direito Brasileiro, p. 15.

peoples.[511] Second, the start of the Landless Workers Movement[512] in the early 1980s advocating for peasants' rights and against land monopoly in agriculture, which since the 2000s has been pushing for sustainable agriculture and agroecology[513] promotion.[514] Third, the Movement of People Affected by Dams,[515] founded in the early 1990s to oppose the implementation of large-scale projects, mainly large hydroelectric power plants to produce electricity, and pushing for water and energy access to all.[516] Fourth, the National Waste Pickers' Movement,[517] officially created in the early 2000s, aiming to articulate inclusive and sustainable waste management programs in cities.[518] These movements were formed at different times, although they currently operate simultaneously.[519]

At the time of writing, these social movements under considerable pressure. There are significant tensions between the current administration and social movements in Brazil. During the 2018 presidential campaign, Bolsonaro pledged to work against social movements and the minorities.[520]

At present, the Bolsonaro administration has at best neglected environmental governance. The state of affairs, such as the massive deforastation in the Amazon region that

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[511] Brazil has an expressive socio-diversity, and many communities can be identified as traditional peoples (Indigenous and non-Indigenous people). For example: Indigenous peoples, *quilombolas*, artisanal fishers, rubber tappers, seaside dwellers, squatters, gatherers, nut harvesters, coconut shellers, wood gatherers, river dwellers and other cultural groups. See Brazil, 'FAQs - Desenvolvimento Rural - Povos e Comunidades Tradicionais', Ministério do Meio Ambiente https://www.mma.gov.br/perguntasfrequentes.html?catid=16.
[512] In Portuguese: *Movimento dos Trabalhadores Rurais Sem Terra (MST)*.
[513] Agroecology is a productive model fostering agricultural production based on ecological processes. Agroecological approaches have been particularly applied in Latin America, growing via bottom-up approaches, and designed based on local resources available, such as local people, local knowledge and local natural resources. See ALTIERI, Miguel A.; NICHOLLS, Clara I., Agroecology: a brief account of its origins and currents of thought in Latin America, **Agroecology and Sustainable Food Systems**, v. 41, n. 3–4, p. 231–237, 2017.
[514] SILVA, Silvana Aparecida DA; BALESTRIN, Nádia Luzia; BRANDENBURG, Alfio, A Agroecologia Como Um Projeto Em Construção No Movimento Dos Trabalhadores Rurais Sem Terra - MST, **Revista GeoPantanal**, v. 13, n. 24, p. 85–98, 2018, p. 87, 91–92.
[515] In Portuguese: *Movimento dos Atingidos por Barragens (MAB)*.
[516] RIBEIRO, Ana Maria Motta; MORAIS, Hugo Belarmino de, Classe social, identidade e luta por Direitos Humanos no Movimento de Atingidos por Barragens - Brasil, **Revista Direito e Práxis**, v. 10, n. 2, p. 1046–1070, 2019, p. 1050.
[517] In Portuguese: *Movimento Nacional De Catadores De Recicláveis No Brasil (MNCR)*. *See* SANTOS *et al*, Frames De Ação Coletiva: Uma Análise Da Organização Do Movimento Nacional De Catadores De Recicláveis No Brasil (MNCR).
[518] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 30.
[519] The Landless Workers Movement, the Movement of People Affected by Dams, and the National Waste Pickers' Movement commenced in the early 1980s, 1990s and 2000s, respectively. Nevertheless, their members had formed informal organisations prior to their official structuring.
[520] ARAÚJO, Bruno; PRIOR, Hélder, Framing Political Populism: The Role of Media in Framing the Election of Jair Bolsonaro, **Journalism Practice**, v. 15, n. 2, p. 226–242, 2021, p. 227.

has had international repercussion,[521] is indicative that this administration actively shatters environmental governance, by dismantling institutions, curtailing participation, and delegitimising opposition.[522]

Brazilian social movements have had a positive influence in implementing ecologically informed approaches to environmental law, challenging this mechanistic mindset and adopting a network approach that unites communities, social rights and environmental concerns. They take issue with anthropocentrism by highlighting the need to work in favour of environmental protection, promoting a healthy environment. However, often these movements operate inside the environmentalism of the poor[523]—the union of social and environmental demands—remaining anthropocentric rather than accounting properly for ecology and the environment. For instance, waste pickers' work reduces water and energy use, and overall pollution within waste management.[524] As briefly explained in Chapter 1 and further developed in Chapters 4 and 5, waste pickers in Brazil are currently advocating for a tailored PES scheme, connecting social concerns and environmental protection.

The social movements' network system also challenges fragmentation and compartmentalisation. Fragmentation is opposed by the strengthening of their communities and groups of workers coupled with environmental matters. One example is the waste pickers who support policies addressing sustainable waste management, in a demand where workers' and nature's concerns interrelate. Concurrently, this sector's environmental benefits influence different subtopics of environmental law, such as biodiversity protection and climate change mitigation.[525]

Social movements object to compartmentalisation because they have intergroup solidarity. The different social movement groups often partner with each other. For instance, the connection between waste pickers and Indigenous peoples' advocacy in social enterprises promoting recycling,[526] whose members are Indigenous people from the Amazon region.

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[521] GUDYNAS, Eduardo, Ecología política del fuego: ambiente y desarrollo en los incendios sudamericanos de 2019., *in*: NÁPOLI, Andrés; PÍA MARCHEGIANI, Pía (Orgs.), **Informe Ambiental 2020: Lo ambiental debe ser política de Estado**, Buenos Aires: Fundación Ambiente y Recursos Naturales, 2019, v. 12, p. 40.
[522] MENEZES, Roberto Goulart; BARBOSA, Ricardo, Environmental governance under Bolsonaro: dismantling institutions, curtailing participation, delegitimising opposition, **Zeitschrift für Vergleichende Politikwissenschaft**, v. 15, n. 2, p. 229–247, 2021, p. 232.
[523] *See* MARTINEZ-ALIER, **The Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation**.
[524] Waste pickers deliver environmental services; see Chapter 3.
[525] See Chapter 3.
[526] One example is the *Associação de Catadores e Reciclagem Solidária de Sao Gabriel da Cachoeira*, also known as Ekatina.

Innovation, social inclusion and bringing ecological approaches to environmental law in Brazilian legislation are strongly context dependent. For instance, for the waste pickers, relevant legislation usually emerges when they, together with their advocates, including supportive governmental officials, seize the opportunity of favourable political moments to campaign for progressive legislation.[527] Waste pickers' networks, cooperatives and associations and the national movement combine public protests with activism and advocacy to create social mobilisation and develop inclusive legislation.[528] To date, this has resulted in their acknowledgement in important legislation, such as the Brazilian National Waste Policy.[529]

To summarise, despite the vast influence of the dominant legal thinking, there is a movement to promote disruptions and emphasise ecological approaches to environmental law in Latin America. In this context, nature is protected, and law decouples from the reductionist approach. These ruptures have subtly begun in different jurisdictions such as Brazil via Constitutions, law and policy, and judicial decisions.[530] These initiatives show that the law can be an instrument for socio-environmentalist rights. Brazil is a fertile ground for further uptake of ecological approaches to environmental law due to its socio-environmental rights' perspective and strong social movements. The next section articulates the elements of a criterion for putting law and policy in practice within this innovative theoretical approach.

2.3.3 Elements for Transitioning to Ecological Approaches to Environmental Law

The debates on ecologically informed and ethically concerned environmental law are not new. In this sense, the Ecology of Law, or merely ecolaw or ecolegal order, is a transformative concept for the relationship between law and nature developed by Capra and Mattei.[531] Ecolaw seeks the transformation of the entire legal system, and not only environmental law, to allow for greater recognition of the nuances and complexities of the socio-environmental crisis, including waste management. This conception is particularly essential for the Global South, owing to its current urbanisation wave, as informed in Chapter 1. The crisis will intensify with population growth in cities, and as socio-environmental

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[527] See Chapter 5.
[528] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 5.
[529] See Chapter 5, Sections 5.1 and 5.2.
[530] AYALA, Patryck de Araújo, Capítulo 4 – Constitucionalismo Global Ambiental e os Direitos da Natureza, *in*: LEITE, José Rubens Morato (org.), **A ecologização do direito ambiental vigente : rupturas necessárias**, Rio de Janeiro: Lumen Juris, 2018, p. 183.
[531] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**

problems become more pressing, they can instigate changes in the legal system. This thesis applies some ecolaw elements into the Brazilian waste management spectrum. Chapter 3, Sections 3.2.3 and 3.3.3, investigate the business models of the competing waste management models of waste-to-energy incineration and the organised waste pickers and how they relate with generative property.

The ecolegal order seeks to promote ecological and human communities, perceiving the law as interconnected with other life elements,[532] such as politics, economics and justice.[533] The shift proposed by ecolaw is a model of understanding, cooperation and collaboration that identifies the socio-environmental crisis as systematic and not a disordered natural context. Science and law must recognise their interconnection and lead the battle against the crisis,[534] pushing other fields to join in.

Ecolaw challenges dominant legal reasoning. It calls for the legal system to decouple with extraction and exploitation models[535] and focus on regenerative practices.[536] This regeneration of ecosystems requires a shift from the private property towards communal values and institutions.[537] To explain further, collective rights are prioritised over individual rights. Communities and people networking can capture communal values and reshape private property predominance and individualism. This process, also known as 'commoning',[538] can influence traditional legal institutions.[539] This thesis aims to be a first step towards a commoning vision for waste management in Brazil. However, it is not a commoning-centred study because it applies PES,[540] an instrument developed to be consistent with market structures. In short, PES can mature through an ecolaw-informed framework, becoming a tool for promoting socially inclusive and environmentally sustainable waste management systems.

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[532] BOSSELMANN; TAYLOR, Introduction, p. 1.
[533] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 194.
[534] BIBER, Which Science? Whose Science? How Scientific Disciplines Can Shape Environmental Law, p. 471; BROSNAN, Science, Law, and the Environment: The Making of a Modern Discipline, p. 987.
[535] See Chapter 3.
[536] CAPRA; MATTEI, **The Ecology of Law: Toward a Legal System in Tune with Nature and Community.**, p. 179.
[537] *See* Bosselmann, 'Chapter 2 Property Rights and Sustainability: Can They Be Reconciled?' (n 6); Eric T Freyfogle, 'Chapter 3 Taking Private Property Seriously' in David P Grinlinton and Prue Taylor (eds), *Property Rights and Sustainability : The Evolution of Property Rights to Meet Ecological Challenges* (Brill Publishers, 2011) 43; Prue Taylor and David Grinlinton, 'Chapter 1. Property Rights And Sustainability: Toward A New Vision Of Property' in David Grinlinton and Prue Taylor (eds), *Property Rights and Sustainability* (Brill Publishers, 2011) 1 https://brill.com/view/book/edcoll/9789004201057/Bej.9789004182646.i-415_002.xml ('Chapter 1. Property Rights And Sustainability').
[538] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 14–15, 144, 153–154, 162–165, 180.
[539] *Ibid*., p. 169–187.
[540] See Chapter 4.

Ecolaw alters the objectives of the law and the means to achieve them. The shift to ecolaw and from capital to commons is established on interconnected elements. Capra and Mattei developed three strategic objectives[541] aimed at moving the juridical order beyond the mechanistic trap: 'disconnecting law from power and violence', 'making communities sovereign' and 'making ownership generative'.[542] Further, the regeneration of the commons requires two mechanisms, 'ecodesign' and 'ecoliteracy'.[543]

In this thesis, two of the three strategic objectives and one mechanism are converted into three 'criteria for ecolaw', that is, 'making communities sovereign', 'making property generative' and 'ecodesign'. These three criteria for ecolaw are ideal for the analysis that follows in Chapters 3–5, which focuses on the connection with waste in its socio-environmental (ecodesign), communal (sovereign communities) and organisational (generative property) levels. The third strategic objective, 'disconnection of law from power and violence', is subsumed within the ecolaw criterion 'making communities sovereign'. This choice is because, in the context of waste management in the Global South, these two objectives interact, and their integration facilitates the comprehension of both, as demonstrated in Chapter 3. 'Ecodesign' is discussed as an independent criterion, separate from 'regeneration of the commons', as done by Capra and Mattei. This change is because 'ecodesign' discusses the design of technologies and social institutions in line with nature,[544] which is vital for the analysis of waste management models.[545] Ecoliteracy, which is the basic knowledge of ecosystems and networks,[546] permeates all three criteria and is thus not separately included.

The adaptation of these criteria to the waste context in Brazil is one contribution of this thesis, based on prior research about ecological approaches to environmental law.[547] The

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[541] See CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 131–146.
[542] *Ibid*., p. 131.
[543] *Ibid*., p. 155, 175, 176, 178.
[544] *Ibid*., p. 178; KARLSSON, Reine; LUTTROPP, Conrad, EcoDesign: what's happening? An overview of the subject area of EcoDesign and of the papers in this special issue, **Journal of Cleaner Production**, v. 14, n. 15–16, p. 1291–1298, 2006, p. 1292; WIMMER, Wolfgang *et al*, Outlook: Sustainability – What Does the Future Hold?, *in*: WIMMER, Wolfgang *et al* (orgs.), **Ecodesign - The Competitive Advantage**, Dordrecht: Springer Netherlands, 2010, p. 194.
[545] For a discussion on waste management models using ecodesign, making communities sovereign and making ownership generative, see Chapter 3.
[546] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 194. Also see chapter 3.
[547] AYALA, Capítulo 4 – Constitucionalismo Global Ambiental e os Direitos da Natureza; BOYD, **The rights of nature: A legal revolution that could save the world**; CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**; BOSSELMANN, Losing the Forest for the Trees; KIM; KOTZÉ, Planetary boundaries at the intersection of Earth system law, science and governance: A state-of-the-art review; LEITE, José Rubens Morato; SILVEIRA, Paula Galbiatti, Capítulo 3 – A Ecologização do Estado de Direito: uma Ruptura ao Direito Ambiental e ao Antropocentrismo Vigentes, *in*: LEITE, José Rubens Morato

strength of the existing literature is articulating the need to transition from a capital-based to a commons-based system, particularly the creation of the three criteria. This thesis tests these elements' applicability, aiming to operationalise these in context-based practice, that is, promoting change without completely disrupting the legal system. Although recognising the importance of disruptive theories, this thesis asserts the need for the law to recognise waste pickers, who are currently exploited. The three-element criteria build on previous practices of the ecological approaches to environmental law, aiming to achieve community-driven sustainability and social justice objectives.

(org.), **A ecologização do direito ambiental vigente : rupturas necessárias**, Rio de Janeiro: Lumen Juris, 2018, p. 101–144; SOUZA FILHO, **A liberdade e outros direitos: ensaios socioambientais.**

2.3.3.1 Sovereign Communities

A central tenet of modernity forged with the Scientific Revolution is that people dominate nature and the future by transforming commons into capital.[548] This mindset separates people from nature, hinders the building of communities and, consequently, impedes citizens' collectives from organising and seeking meaningful social change, mainly through the legal order. This alienation is especially severe in cities[549] because nature is often not introduced into the urban core.[550]

The first criterion for the ecolaw-informed framework—making communities sovereign—involves a process of empowerment and promotion of people's networks and people along with nature. This is the reason academics from the ecological approaches to environmental law prefer the term 'ecological' to the term 'environmental', since the first connects the human world to the natural world.[551] This is an important point as it brings clarification as to what the legal order aims to do.[552]

Together with the disconnection of the juridical order from power and violence, it approximates the legal system, communities and networks.[553] Through this process, also known as legal empowerment,[554] the ecolaw fosters a systemic and ecological perception of society, where communities participate in developing the laws that will guide them.[555]

It is essential to note the connection between violence and the dominance of nature, and violence and the domination of people,[556] mostly excluded people. As previously explained in Section 2.1.3 'Consequences for the Global South', the reasoning that led to violence against nature also fostered the dominance of the Global South and marginalised people.

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[548] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 136; KORAB-KARPOWICZ, **On the History of Political Philosophy : Great Political Thinkers from Thucydides to Locke**, p. 162; PARDO, **O desconcerto do Leviatã: política e direito perante as incertezas da ciência.**, p. 119.

[549] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 136–137.

[550] HEYNEN, Nik; KAIKA, Maria; SWYNGEDOUW, Erik, Urban political ecology: politicizing the production of urban natures, *in*: HEYNEN, Nik; KAIKA, Maria; SWYNGEDOUW, Erik (orgs.), **In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism**, London: Routledge, 2006, p. 1–2.

[551] See BOSSELMANN, Klaus, From Environmental to Ecological Law, Auckland, 2021.

[552] Idem.

[553] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 132.

[554]Legal empowerment gives people and communities the power to understand and use the law. For more information about legal empowerment, see GOODWIN, Laura; MARU, Vivek, What Do We Know about Legal Empowerment? Mapping the Evidence, **Hague Journal on the Rule of Law**, v. 9, n. 1, p. 157–194, 2017.

[555] *Ibid*., p. 158.

[556] CONCA, Ken; DABELKO, Geoffrey D., **Green Planet Blues: critical perspectives on global environmental politics**, 5. ed. New York: Westview Press, 2015, p. 313.

Simultaneously, the environmental problems resulting from this violence produced more severe negative effects on vulnerable people,[557] as the concept of environmental justice informed in Chapter 1. Therefore, this thesis takes the position that the law must prioritise local participation in informal economy sectors and bottom-up approaches to waste management.

Regarding violence against people and environmental protection, it is important to highlight some of the Global South's reality. People engaged in protecting nature, such as community activists, lawyers, members of social movements, Indigenous peoples and peasants, face various forms of violence.[558] This violence can be direct, structural or cultural, causing physical or psychological harm.[559] The year 2017 was the deadliest year on record when at least 207 environmental defenders were murdered worldwide.[560] Approximately 60 per cent of these murders occurred in Latin America, and 57 registered homicides were in Brazil alone, which leads the killing list.[561] Other dangerous places were the Philippines, the Democratic Republic of Congo, and India.[562]

In this context, the law, much like culture or the arts, can be used as an instrument through which a collective safely communicates and produces politically viable decisions.[563] Communities self-organise and participate in decision-making processes, encouraging community-based bottom-up legal solutions, generating quality-based human norms and furthering social resources.[564] In short, it is a way to aid the marginalised members of society, think outside the legal box and improve justice.[565]

Sovereign communities or legal empowerment are a tool to decentralise power; however, they are not magic bullets.[566] Structural challenges are embedded in the dominant reasoning, which will take time and effort to be surpassed.[567] Thus, the ultimate responsibility

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[557] *Ibid*.
[558] BUTT *et al*, The supply chain of violence, p. 742.
[559] *Ibid*.
[560] GLOBAL WITNESS, **At What Cost?**, London: Global Witness, 2018, p. 8.
[561] *Ibid*.
[562] *Ibid*., p. 10.
[563] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 135.
[564] Ibid 132–135, 141.
[565] VAN ROOIJ, Benjamin, Bringing Justice to the Poor, Bottom-up Legal Development Cooperation, **Hague Journal on the Rule of Law**, v. 4, n. 2, p. 286–318, 2012, p. 317.
[566] *Ibid*.
[567] *Ibid*.

cannot be put to individuals and communities to achieve their own accountability, for it is often outside their control.[568]

Instead, it is crucial to situate community sovereignty inside the Global South – Global North divide, in the local elites' dimension and dominating power layers. The literature has revealed the importance of bottom-up proposed strategies moving from discussion to practice in the Global South, without significant input from the Global North and the local elites.[569] This suggestion is because actions facilitated by the World Bank and other investors tend to follow the dominant reasoning, fostering stereotypes, creating top-down decisions and expanding inequality.[570]

At the same time, the decentralisation of power to small-scale communities in tune with the laws of ecology has a particular impact on the Global South. Therefore, an ecolaw-informed framework would improve the dynamics of the legal system with the people by applying a design that is not abstract and top-down; on the contrary, it originates from the particular needs of the community.[571] For instance, the Brazilian National Waste Policy[572] is an example of social participation in decision-making processes because of the organised waste pickers.[573] Although they were not the only actors influencing the legislation, they were essential,[574] considering it a significant community success.[575]

As mentioned above, ecoliteracy permeates all three criteria. Sovereign communities require ecoliteracy as a tool for understanding how to live sustainably and putting this knowledge as a critical part of human law conducting communities. Ecoliteracy needs to work in phases by collaborating with numerous institutional and bottom-up practices and forming alliances with the public or the private sector as required.[576]

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[568] WIFVESSON, Anna, **The Legal Empowerment Paradoxy?: A Critical Exploration of Power Imbalances in the Legal Empowerment Discourse from a Global North/South Perspective**, Master Thesis, Uppsala University, Uppsala, Sweden, 2020, p. 48.
[569] Ibid 48-49.
[570] *Ibid*., p. 48.
[571] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 180.
[572] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. Institui a Política Nacional de Resíduos Sólidos; Altera a Lei Nº 9.605, de 12 de Fevereiro de 1998; e Dá Outras Providências.' (2010) http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm.
[573] See Chapter 5.
[574] See Chapter 5, Section 5.2.1 'The Model Articulating the National Waste Policy'.
[575] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 8.
[576] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 155, 175, 176.

The connection between people and the law is essential to ecoliteracy. The best legal practices emerge when communities discuss, understand and adapt them to their situation. Thus, it is possible to create social justice and ecological sustainability through knowledge and power diffusion, guaranteeing that everybody can participate.[577]

Sovereign communities can link communities and nature to challenge—and remedy—flaws in environmental laws. First, the perception of the connection between social and environmental issues, as well as the decentralisation of power, goes against compartmentalisation due to the promotion of networks. Second, uniting communities and the environment reinforces that people are not above nature, consequently resisting anthropocentrism.

2.3.3.2 Generative Ownership

The sovereignty of communities is a response to people's alienation from nature, especially in urban areas. The process of making communities sovereign promotes a reconnection between people, nature and the commons.[578] This process requires a revision of ownership and its relationship with state sovereignty; thus, property and ownership have to be generative and not exploitive, which is the second criterion for the ecolaw-informed framework of this thesis. The critical difference is that extractive ownership focuses on extracting financial wealth for the economy, whereas generative models aim for equality, justice, sustainability and participation.[579] Generative ownership is not a new phenomenon; the cooperative movement is an example of historical interest in generative models.[580]

Private property does not disappear in the generative context, but is considered a community tool and a social institution, part of community sovereignty and the regenerative goal.[581] Thus, the private property itself is not the issue; instead, the problem lies in property rights, entitlements and responsibilities that allow unrestrained economic growth, ignoring environmental effects.[582] This problem occurs because the task of the law is to set parameters in a social system for the property to develop in a sustainable manner.[583] This vision of property

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[577] *Ibid*., p. 156–157.
[578] *Ibid*., p. 137, 139, 140.
[579] KELLY, Marjorie; HANNA, Thomas M., Democratic ownership in the USA: a quiet revolution, **International Journal of Public Policy**, v. 15, n. 1/2, p. 92, 2019, p. 2.
[580] *Ibid*., p. 4.
[581] FREYFOGLE, Chapter 3 Taking Private Property Seriously, p. 45.
[582] TAYLOR; GRINLINTON, Chapter 1. Property Rights And Sustainability, p. 5.
[583] BOSSELMANN, Klaus, From Environmental to Ecological Law, Auckland, 2021.

is already possible in some countries. For example, the Brazilian Constitution provides that the state can expropriate private property when it fails to fulfil its social function,[584] which is connected to socio-environmental concerns.[585]

Thus, generative ownership is a vision based on recognising common needs, emphasising a healthy environment.[586] In this context, private property is recognised as a human institution, situated within the relationship between nature and people.[587] Again, community and nature are key, and individuals are required to respect this goal.

The ecolegal order promotes practices aligned with common needs—for instance, farmers who produce organic products or enterprises that conduct sustainable waste management. In opposition to exploitation, the generative aspect refers to nature and people because of the strong sense of community in the ecolegal order. In short, generative ownership is ownership designed to create and maintain conditions for communities to flourish, simultaneously pursuing social justice and ecological sustainability.[588]

In this sense, ecoliteracy assists generative ownership by promoting knowledge. Ecoliteracy allows people to understand that individuals and private property are part of a broader network, of a community, where actions affect the functioning of ecosystems. In essence, people understand the importance of sustainable practices.

Many ownership business models respect the purpose of serving the common good. Examples include the models of public, worker, cooperative and non-profit ownership, and hybrids, such as benefit corporations.[589] To systematise the models, there are four broad categories of generative ownership design: commons ownership and governance, stakeholder ownership, social enterprises and mission-controlled corporations.[590] These models place

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[584] Brasil, 'Constituição Da República Federativa Do Brasil de 1988.' Article 184 http://www.planalto.gov.br/ccivil_03/Constituicao/ Constituicao.htm.

[585] The social function of the property is described in article 186 of the Brazilian Constitution. In short, the social function is fulfilled when it respects the rational and adequate use of the environment; the adequate use of the available natural resources and environmental preservation; the compliance with labour regulations; and the exploitation as favouring the wellbeing of owners and workers.

[586] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 144.

[587] BURDON, Peter, **Earth Jurisprudence: Private Property and the Environment**, New York: Routledge, 2015, p. 123.

[588] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 144,146.

[589] KELLY; HANNA, Democratic ownership in the USA, p. 6.

[590] KELLY, Marjorie, **Owning our future: the emerging ownership revolution**, 1. ed. San Francisco, CA: Berrett-Koehler Publishers, 2012, p. 107–108.

decision-making control with people interested in promoting a healthy relationship with communities and nature.[591]

The first, commons ownership and governance, governs the assets in common; examples are parks, forests and municipal power plants that are 'held or governed indivisibly by a community'.[592] Second, stakeholder ownership is a model with 'ownership by people with a human stake in a private enterprise', such as cooperatives, partnerships, credit unions, employee-owned firms and family-owned companies.[593] However, to be generative, these enterprises must have a life-serving goal beyond their private interests.

The third category is social enterprises, distinguished by having chiefly a social or environmental mission, and the business is a means to this end.[594] This model is present in the design of non-profit organisations, subsidiaries of non-profits and private companies. The last model, mission-controlled corporations, are traditionally owned corporations; however, they have a strong social mission, and mission-oriented leaders hold governing control.[595] Mission-controlled corporations are standard in Northern Europe, with large foundations, families or trusts controlling companies.[596]

Prior research has suggested that ecolaw will emerge gradually through the expansion of bottom-up approaches emphasising communal values and nature in generative properties. For this to happen, innovative laws must be fostered to support this transition. Examples[597] of efforts to create a legal system based on the commons have emerged from the struggles of bottom-up approaches. This thesis argues that similar approaches should be implemented or waste management. As mentioned, ecolaw theory addresses the legal system—the law as a whole—whereas this thesis discusses incorporating some of its elements into the waste management spectrum, for testing their application. Sections 3.2.3 and 3.3.3 of Chapter 3 investigate the business models of the competing waste management models of waste-to-energy incineration and the organised waste pickers, respectively, and their relationships with generative property.

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[591] Ibid 105.
[592] *Ibid*., p. 141.
[593] *Ibid*.
[594] *Ibid*.
[595] *Ibid*.
[596] *Ibid*., p. 107–108.
[597] Capra and Mattei provided the example of the Teatro Valle in Rome, which is currently organised as a commons foundation. They also discussed two publicly owned municipal water systems in Naples and Paris. All three cases are a response from the public against privatisation efforts. See CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 157, 165.

Generative ownership pushes the boundaries created by flaws in environmental law in three respects. First, by recognising planetary boundaries and excluding extractive practices, it weakens fragmentation. Second, the prominence of common needs, namely a healthy environment, above individual property rights assists in transitioning from an anthropocentric context. Third, this process dismantles compartmentalisation by combining environmental law with other laws, such as civil and torts laws.

2.3.3.3 Ecodesign

The ecolegal order focuses on communities that can self-organise, live in harmony with nature and promote generative ownership. However, another key consideration is identifying the activities and technologies that should be prioritised. This issue raises a question: what is the role of the production process in this new system?

Ecodesign requires the design of technologies and social institutions to be sustainable.[598] It integrates different aspects of design techniques and environmental concerns in product development, aiming to create sustainable outcomes and satisfy human needs.[599] Ecodesign examples include agroecology, green architecture and smart buildings and hybrid electric cars.[600]

The ecoliteracy mechanism is a key element of ecodesign for both concepts aim to articulate knowledge. In this regard, ecoliteracy embodies the skill to understand nature and its vital role on earth, which allows life, and using this knowledge to create sustainable human communities. Ecodesign applies this wisdom in all stages of the product development process—its full life cycle—to present sustainable materials to the economy, displacing the polluting and disposable ones.

The effectiveness of ecodesign approaches depends on the availability of useful techniques and its accessibility, particularly to small and medium enterprises.[601] In this sense, ecodesign should be present across supply chains and involve technological and non-technological activities. For instance, when applied to waste management, ecodesign pays attention to the type of technology used, favouring the option that has less impact on nature and

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[598] *Ibid*., p. 178.
[599] KARLSSON; LUTTROPP, EcoDesign, p. 1292.
[600] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 179.
[601] KNIGHT, Paul; JENKINS, James O., Adopting and applying eco-design techniques: a practitioners perspective, **Journal of Cleaner Production**, v. 17, n. 5, p. 549–558, 2009, p. 549.

can connect with the community, promote waste education and prevention and meet long-term targets.

In terms of waste management, the a priori waste hierarchy reflects a form of ecodesign. This hierarchy benefits from applying the ecological integrity and the dignified life as criteria to conduct its context-based analysis.[602] It promotes waste avoidance and minimisation, reusing or repairing products and materials, and recycle strategies.[603] Initiatives respecting this hierarchy and fostering sustainable activities in waste management are part of the concept of ecodesign.

As a part of the ecolegal order, ecodesign is more than innovative and technological strategies. Ecodesign is developed and implemented in social contexts and must respect communal values. Recent studies have concluded that effective ecodesign and sustainability practices observe basic ecology principles. Both have the basic features of business sustainability in that they favour small-scale,[604] community-oriented initiatives[605] that are environmentally adequate[606] by being energy-efficient and non-polluting.[607] Further, they promote responsible labour practices,[608] such as establishing labour-intensive enterprises, creating job opportunities and maintaining diversity.[609]

Ecodesign challenges the flawed system of environmental law in three aspects. First, it contests fragmentation by requiring energy efficiency and non-pollution combined and considers the technology's long-term use. Second, it opposes compartmentalisation owing to its essential features that draw together different law areas, such as labour law and

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[602] POPE, **Transferência Transfronteiriça de Resíduos sob a Perspectiva da Justiça Ecológica : Rumo à Gestão Internacional de Resíduos**, p. 409.
[603] *Ibid*., p. 394.
[604] RYAN, Chris, Climate Change and Ecodesign, Part II: Exploring Distributed Systems, **Journal of Industrial Ecology**, v. 13, n. 3, p. 350–353, 2009, p. 350.
[605] BARNETT, Jonathan; BEASLEY, Larry, **Ecodesign for Cities and Suburbs**, 2. ed. Washington: Island Press, 2015, p. 211.
[606] Wolfgang Wimmer et al, 'Outlook: Sustainability – What Does the Future Hold?' in Wolfgang Wimmer et al (eds), *Ecodesign - The Competitive Advantage* (Springer Netherlands, 2010) 191, 194 https://doi.org/10.1007/978-90-481-9127-7_6.
[607] *Ibid*., p. 193.
[608] EHNERT, Ina, Paradox as a Lens for Theorizing Sustainable HRM, *in*: EHNERT, Ina; HARRY, Wes; ZINK, Klaus J. (orgs.), **Sustainability and human resource management: Developing sustainable business organizations.**, New York: Springer, 2013, p. 256,262; OSRANEK, Regina; ZINK, Klaus J., Corporate Human Capital and Social Sustainability of Human Resources, *in*: EHNERT, Ina; HARRY, Wes; ZINK, Klaus J. (orgs.), **Sustainability and human resource management: Developing sustainable business organizations.**, New York: Springer, 2013, p. 116–117; ZINK, Klaus J., Social Sustainability and Quality of Working Life, *in*: EHNERT, Ina; HARRY, Wes; ZINK, Klaus J. (orgs.), **Sustainability and human resource management: Developing sustainable business organizations.**, New York: Springer, 2013, p. 45.
[609] Capra and Mattei (n 1) 179.

environmental law. Third, it counters anthropocentrism by putting ecological concerns at the centre of technological innovation and design.

To summarise, sovereign communities, generative ownership and ecodesign all assist in developing a network approach to environmental law and policy. These elements also put social and environmental concerns at the forefront of the law, highlighting communal values. In terms of waste management in the Global South, they can lead to regulations more concerned with the local context, the labour conditions of the workers and sustainability.

2.4 CONCLUSION

After centuries of promotion and development, the perception that the world is a cosmic machine and humans are above nature became the mainstream approach and dominant reasoning. The literature has demonstrated that the law and science co-evolved. They have a parallel history from antiquity to modern times and were only recently decoupled by a new shift in science that perceives the world as a vast community network. The law has struggled to transform similarly because of its connection to economics, the enduring legal systems based on private property, the concept of state sovereignty and legal professionalism, which has caused legal inaccessibility.

The UN's sustainable development concept represents an important step in environmental law and policy. However, the UN's SDGs are still rooted in the dominant reasoning and enact the most significant flaws of environmental law, namely, anthropocentrism, fragmentation and compartmentalisation. In contrast, this thesis argues that the ecological approaches to the environmental law framework understand environmental law problems, dynamics and outcomes, thus offering a new alternative to complex problems, such as waste management.

The ideas of ecology and networks, which was first developed in science, has gradually expanded to law and environmental law research and practice in the past decades. Among many cases, the initiatives in Latin America—by the Inter-American Court of Human Rights and the Constitutional change and transformation—are landmarks. This thesis argues that ecolaw is suitable for Brazil, owing to the country's Latin American roots, innovative perspective on socio-environmental rights and strong social movements.

The ecolaw-informed framework adopted and adapted in this thesis offers basic concepts and structures to create legal order according to life's ecological principles. It is a reconceptualisation of the law that puts ecological sustainability and social justice through

community strength at its core. The suggested framework is articulated and operationalised in this thesis to address the Global South – Global North divide and the facets of sustainable waste management in the Global South. It is a reconfiguration of the ecolaw approach, giving voice to its concerns in working with the current system. This chapter identified three essential elements or criteria, which will guide the remaining chapters. These are sovereign communities for communal values and empowerment, generative property for an organisational level and ecodesign for socio-environmental concerns.

As socio-environmental problems expand in the Global South and continue to be further embedded in the dominant reasoning, it is essential to researchers and critical scholars to report ways to evolve the legal system. The intention of the ecological approaches to environmental law framework defined and adapted in this chapter is to provide a technique that can be used to inform theory, regulation and context-based practices in the Global South. The next chapter continues this work, investigating the two competing waste management models for the Global South through the lenses of the three criteria, which have the capacity to achieve community-driven sustainability and social justice objectives.

3 ECOLAW TRANSITION IN WASTE MANAGEMENT: TESTING THE COMPETING MODELS OF BOTTOM-UP WASTE PICKERS AND TOP-DOWN WASTE-TO-ENERGY INCINERATION

The literature review on environmental law in Chapter 2 showed that the ecological approach to environmental law is an appropriate substitute for the dominant legal thinking. It is an innovative pathway for the law in tune with the trends in science and the current societal needs. Both models are based on science and promote different types of waste management, and therefore, the narratives discussed in this chapter do not deny scientific methods or progress. The investigation is for identifying the best scientific technique for Brazil. To achieve the ecolaw-informed framework, Chapter 2 proposed three criteria for ecolaw: sovereign communities, generative ownership and ecodesign.

This chapter applies the ecolaw-informed criteria to the two competing waste management models in the Global South—the bottom-up approach of the organised waste pickers and the top-down system of waste-to-energy incineration—using Brazil as a case study. At first glance, there is no competition between them, since waste pickers work with recyclable waste and incinerators use residue; consequently, these technologies use different materials. However, as explained in Section 3.2.2, waste-to-energy practices negatively affect preferred technologies, such as recycling,[610] and waste pickers could lose work if these practices are adopted.[611] Waste-to-energy incineration and organised waste picking are opposing practices, and the Brazilian waste pickers have been actively protesting against incineration,[612] including in the past years when the Brazilian Environment Minister has been advocating in favour of implementing waste-to-energy incineration.[613]

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[610] PIRES, Ana; MARTINHO, Graça, Waste hierarchy index for circular economy in waste management, **Waste Management**, v. 95, p. 298–305, 2019, p. 304.
[611] BRASIL CONTRA A INCINERAÇÃO DO LIXO, Manifesto contra a destruição dos resíduos sólidos urbanos por desperdício zero, p. 4; GUTBERLET, O custo social da incineração de resíduos sólidos: Recuperação de energia em detrimento da sustentabilidade, p. 1.
[612] FOLHA DE SÃO PAULO, **Protesto de catadores de lixo faz evento com Ricardo Salles mudar de lugar**, Disponível em: https://www1.folha.uol.com.br/ambiente/2019/04/protesto-de-catadores-de-lixo-faz-evento-com-ricardo-salles-mudar-de-lugar.shtml. acesso em: 5 maio 2021; GLOBALREC, **Resíduo zero e a luta contra a incineração**; GLOBALREC, **Brasil: Grande mobilização contra a incineração de resíduos**, Aliança Global de Catadores, Disponível em: https://globalrec.org/pt-br/2019/10/22/brasil-grande-mobilizacao-contra-a-incineracao-de-residuos/. acesso em: 5 maio 2021; MNCR, **Catadores vão à luta contra incinerador em Mauá – SP**; MNCR, Diga não à Incineração de Lixo!
[613] SALLES, Ricardo, **Live AgroSaber com Ricardo Salles: gestão de resíduos**, Ricardo Salles, Disponível em: https://ricardosalles.com.br/live-agrosaber-com-ricardo-salles-gestao-de-residuos/. acesso em: 11 maio 2021.

Until date, a comprehensive comparative study has not been conducted on waste-to-energy incineration and organised waste pickers through the ecolaw-informed framework. This approach has not been used because the ecolaw-informed criteria were developed recently.[614] To fill this literature gap, this chapter identifies which of the competing models follows the ecolaw-informed criteria developed in Chapter 2 and should therefore be reflected in Brazilian law and policy. Before applying the criteria, first, it is necessary to explain the context of waste management in Brazil and conceptualise the two models. This explanation is presented in Section 3.1. Next, in Section 3.2 waste-to-energy incinerators are examined through the three ecolaw criteria. In Section 3.3, organised waste pickers are investigated through the same criteria. In Section 3.4, it is concluded that the organised waste pickers are more suited than waste-to-energy incinerators for a future with ecolaw-informed law and policy within waste management.

3.1 EXAMINING THE INTERACTION BETWEEN WASTE MANAGEMENT, INCINERATION AND WASTE PICKERS

Waste management is a subfield of environmental law that refers to the different practices to manage and dispose of waste. These practices can involve preventing, collecting, processing, reusing, recycling, landfilling and incinerating waste. As noted in the introduction, sustainable waste management focuses on environmentally adequate waste practices based on pollution reduction and nature conservation to provide a healthy environment.[615]

The waste hierarchy framework clarifies and systematises the language about waste management. The waste hierarchy principle is discussed by academics and is included in international and national regulations, ranking strategies in order of preference.[616] It commands prioritising waste avoidance and minimisation, and reusing or repairing products and materials.[617] In short, it aims to reduce resource use and production at the source, preserve and

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[614] The ecolaw criteria—ecodesign, making communities sovereign and making ownership generative—were recently developed, although the concept of ecolaw is part of the ecological approaches to the environmental law movement, which started in the twentieth century. See Chapter 2.
[615] UNNISA, Introduction, p. xiii.
[616] PIRES; MARTINHO, Waste hierarchy index for circular economy in waste management, p. 298; POTTING, José *et al*, **Circular economy: measuring innovation in the product chain**, The Hague: PBL Netherlands Environmental Assessment Agency, 2017, p. 15–16.
[617] KIRCHHERR; REIKE; HEKKERT, Conceptualizing the circular economy, p. 223; PIRES; MARTINHO, Waste hierarchy index for circular economy in waste management, p. 298.

reuse materials once they are in use, reintroduce products into the production chain and capture maximum value and energy from recovered resources, in that order.

Different practices can be part of a waste hierarchy, also called the Rs framework.[618] This thesis follows the a priori hierarchy, which is a context-based analysis. This means that the law must not be restrained by an abstract and inflexible hierarchy of management objectives, valid for all waste management in all circumstances.[619] The most appropriate way to deal with waste management is by analysing a specific case.[620]

Pope defended using the a priori waste hierarchy for different legal systems, such as Brazil.[621] The author argued that the criteria of ecological integrity and dignity of life assist in analysing the Brazilian context,[622] recognising the inherent value of nature and people.[623] In this sense, at a theoretical level, in the a priori hierarchy, recycling precedes incineration. In practical terms, recycling generates less environmental and social effects than does incineration, as explained in Section 3.3.4. Last, although the work of waste pickers focuses on recycling, they have the potential to promote the previous stages of the hierarchy if they receive the necessary support. This is not the case with waste-to-energy incinerators.

3.1.1 Waste Management in Brazil

Waste initiatives tend to be successful when building on existing waste management practices. In the Global South, and particularly in Brazil, waste pickers are the primary providers of sustainable waste management,[624] who have sought payment in an attempt to have their critical role in providing environmental services recognised.[625] The continued integration

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[618] The most well known is the 3Rs framework (Reduce, Reuse, Recycle); however, some frameworks include more strategies, such as the 9Rs (Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpuse, Recycle, Recover). See KIRCHHERR; REIKE; HEKKERT, Conceptualizing the circular economy.
[619] ARAGÃO, **O Direito dos Resíduos**, p. 33; ARAGÃO, Os resíduos e a sua gestão internacional, p. 300.
[620] ARAGÃO, Os resíduos e a sua gestão internacional, p. 300; ARAGÃO, **O Direito dos Resíduos**, p. 33.
[621] POPE, **Transferência Transfronteiriça de Resíduos sob a Perspectiva da Justiça Ecológica : Rumo à Gestão Internacional de Resíduos**, p. 409.
[622] *Ibid*.
[623] *Ibid*., p. 416.
[624] GUTBERLET *et al*, Bridging Weak Links of Solid Waste Management in Informal Settlements, p. 106; GUTBERLET; BAEDER, Informal recycling and occupational health in Santo André, Brazil, p. 11.
[625] Sonia Maria Dias, 'Livelihood Profile: Waste Pickers' in Sally Roever, Sinha Shalini and Sonia Maria Dias (eds), *AAPS Planning Education Toolkit: The Informal Economy.* (Association of African Planning Schools AAPS, 2011) 26; Sonia Dias, 'Waste and Development – Perspectives from the Ground' [2012] (Special Issue 6) *Field Actions Science Reports [Online]* 1, 4 http://journals.openedition.org/factsreports/1615; Sonia Dias and Melanie Samson, *Informal Economy Monitoring Study Sector Report: Waste Pickers* (Women in Informal Employment Globalizing and Organizing WIEGO, 2016) 60, 43; Jutta Gutberlet, 'More Inclusive and Cleaner Cities with Waste Management Co-Production: Insights from Participatory Epistemologies and Methods' (2015) 46 *Habitat International* 234, 241 https://linkinghub.elsevier.com/retrieve/pii/S0197397514001428 ('More

of these otherwise informal workers into formal waste management systems will increase their stability and safety and improve their lives as well as the rates of recycling in Brazil.

Waste pickers are mostly informal workers who have traditionally collected recyclable and reusable items to sell, as further discussed in Sections 3.1.3 'The Informal Recycling Sector and Waste Pickers' and 3.3 'Organised Waste Pickers'. In this sense, waste pickers have been paid for what they can trade, but they have not been paid in recognition of the social good that they perform for society, which is sustainable waste management primarily through waste collection and recycling. To integrate these workers into formal waste management systems under inclusive law and policy is to change the nature of their employment and to advance their rights, ultimately improving their lives. It also means a recognition of their historical role in sustainable waste management, and a promotion of recycling practices.

In the Global South, waste pickers are threatened by the mechanistic legacy in environmental law within waste management systems.[626] This is the vision that modern solid waste systems use mechanisation and capital-intensive technology and that private companies are the service providers. In this perspective, waste pickers are a feature of pre-modern systems, and recovery by incineration is the next step towards progress in the Global South.[627]

As explained in Chapter 1, waste management is a pressing issue for the Global South, which requires urgent action. In Brazil, waste is a complex issue owing to the population size, but mostly because of system inefficiency.[628] In the past decade, the country's production of urban solid waste,[629] commonly referred to in English as municipal solid waste, increased by 19 per cent,[630] from 67 million tonnes to 79 million tonnes per year.[631] A recent study has projected that waste production will increase by 50 per cent before 2050 because of the increase

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Inclusive and Cleaner Cities with Waste Management Co-Production'); Movimento Nacional dos Catadores de Materiasi Reciclaveis MNCR, 'NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais' (18 May 2011) http://www.mncr.org.br/artigos/nota-publica-psau-programa-de-pagamentos-de-servicos-ambientais-urbanos; Melanie Samson, *Refusing to Be Cast Aside – Waste Pickers Organising Around the World.* (WIEGO Women in informal employment globalizing and organizing, 2009) 95, 88.

[626] See Chapter 2.

[627] DIAS; SAMSON, **Informal Economy Monitoring Study Sector Report: Waste Pickers**, p. 6.

[628] RENGEL-GONÇALVES, Ana Paula; AYDOS, Elena, No Time To Waste: Payment For Urban Environmental Services As A Tool To Support Invisible Recyclers In Brazil., **Oregon Law Review**, v. 99, p. 387–418, 2021, p. 390.

[629] Urban solid waste is waste produced from households and other urban facilities. It usually consists of technical engineered materials, such as plastics, metals, glass, paper and cardboard. See Chapter 5.

[630] ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2020**, São Paulo: Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais - ABRELPE, 2020, p. 32.

[631] *Ibid*., p. 14.

in population and in the consumption of single-use materials. Further, municipalities will not be prepared for this increase because they lack sustainable waste management systems.[632]

On average, in Brazil 92 per cent of waste is collected,[633] and 56.6 per cent of waste[634] is selectively collected.[635] Waste pickers significantly contribute to selective collection because their enterprises participate in almost 50 per cent of all official selective collection conducted in Brazil. City halls (39 per cent) and private companies (36 per cent) are also significant contributors, for municipalities can have more than one agent providing selective collection.[636] These data suggest that waste pickers' organisations have the expertise to participate in many steps of the sustainable waste management chain, from collection to recycling.

Waste-related issues are aggravated because dumps and landfills remain the main form of waste disposal in Brazil. Dumps, where waste is disposed on open-air places, and controlled landfills, where waste is covered without soil protection, received 40 per cent of the urban solid waste collected in 2019. In contrast, that same year sanitary landfills, with impermeable soil, received about 60 per cent of urban solid waste.[637]

In theory, Brazil is gradually moving away from dumps, and sanitary landfills are becoming more common. According to the National Policy for Solid Waste Management of 2010,[638] municipalities must cease using dumps and focus on sanitary landfills as an environmentally adequate final disposal of waste.[639] In the past decade, the country increased the disposal of waste in sanitary landfills by approximately 3 per cent only.[640] The small increase relates to the fact that these landfills are large and expensive facilities, which makes room for the discussion about other types of waste management technologies.[641] Among these new methods, waste-to-energy incineration stands out. As explained in Section 3.2 'Waste-to-Energy Incinerators', this method is ill-suited to Brazil because it has a negative effect on the a

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[632] *Ibid*., p. 40.
[633] *Ibid*., p. 16.
[634] *Ibid*., p. 19.
[635] Selective collection is the collection of recyclable waste materials previously sorted at the source, such as households. The process usually separates the different types of paper, plastics, metals and glass.
[636] CEMPRE, *supra* note 16 at 25.
[637] ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2018/2019**, São Paulo: Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais - ABRELPE, 2019, p. 11; ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2020**, p. 20.
[638] See Chapter 5, Section 5.2.1 'The Model Articulating the National Waste Policy'.
[639] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010' (2010), articles 9, 54 http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm.
[640] ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2020**, p. 21.
[641] GUTBERLET, O custo social da incineração de resíduos sólidos: Recuperação de energia em detrimento da sustentabilidade, p. 5.

priori waste hierarchy, threatens the livelihoods of waste pickers and presents environmental risks.

Ultimately, neither recycling nor recovery alone can address the global waste crisis, and other initiatives need to support the reduction and reuse of waste. However, until that cultural change is embedded, recycling and recovery remain critical and hence were chosen to be studied in this research. They also feature strongly in current debates in the Global South, in general, and Brazil, in particular. Brazilian law establishes that waste management practices must integrate the activities promoted by organised waste pickers, which is chiefly recycling. However, decision-makers often feel compelled to modernise their waste management systems by investing in recovery with incineration and waste-to-energy technologies.[642]

3.1.2 Waste-To-Energy Incineration

The evolution of incinerators connects to technological advancements and societal demands. The first incinerators date back to the late nineteenth century, as water wall incinerators, to capture steam for energy production.[643] Later, furnaces for burning waste were developed. Currently, the most sophisticated facilities aim to recover heat and energy using combustion technology, a model developed in Europe.[644]

The combination of energy production and waste disposal arises from current needs. During the past decades, the Global South and the Global North increased waste generation due to massive urbanisation, population growth and increasing consumption.[645] Waste leads to social and environmental problems, and waste disposal sites are becoming more expensive and more challenging to find. There are different processes to dispose of waste through combustion, and not all generate energy.

Incineration is a waste management process to directly eliminate waste through controlled burning. This process has different terminologies, such as mass burn incineration, and has the advantage of decreasing the volume of waste. Incineration is a complex process[646]

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[642] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, Bonn , Germany: Deutsche Gesellschaft für Internationale Zusammenarbeit, 2017, p. 6.
[643] MAKARICHI, Luke; JUTIDAMRONGPHAN, Warangkana; TECHATO, Kua-anan, The evolution of waste-to-energy incineration: A review, **Renewable and Sustainable Energy Reviews**, v. 91, p. 812–821, 2018, p. 813.
[644] *Ibid*., p. 812, 813.
[645] See Chapter 1.
[646] COLE-HUNTER, Tom *et al*, The health impacts of waste-to-energy emissions: a systematic review of the literature, **Environmental Research Letters**, v. 15, n. 12, p. 123006, 2020, p. 16.

that requires careful planning, advanced technology, a significant amount of financial investment and qualified staff.[647] Owing to the risks associated with incineration, a comprehensive legal framework is essential, as well as the monitoring and enforcement of environmental standards.[648]

Incinerators that generate energy are denominated thermal treatments, commonly referred to as waste-to-energy. The concept of dealing with waste and simultaneously producing energy is increasingly attractive to decision-makers, who believe that this technology can modernise their waste management systems.[649] For this reason, waste-to-energy is arguably the most promoted type of incinerators.[650]

Waste-to-energy incineration figures in the international debate as an alternative to treat waste. This argument is based on the push to have incinerators considered a source of renewable energy. For example, the World Economic Forum of 2009 presented incineration as an emerging large-scale sector and an efficient, economical alternative to landfills.[651]

Figure 1 - Waste-to-energy plants in the world

Source: Waste Atlas. Available at: http://www.atlas.d-waste.com/.

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[647] MMA, **Compostagem doméstica, comunitária e institucional de resíduos orgânicos: manual de orientação**, Brasília, DF: MMA - Ministério do Meio Ambiente, 2017, p. 24.
[648] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 6, 13.
[649] *Ibid*., p. 6.
[650] GAIA, **Facts about "waste-to-energy" incinerators**, Quezon City, Philippines: GAIA - Global Alliance for Incinerator Alternatives, 2018, p. 1.
[651] GREENWOOD, Chris, Towards a Clean Energy Infrastructure, *in*: O'BRIEN, John (org.), **Opportunities Beyond Carbon**, Carlton, Vic: Mebourne University Publishing, 2009, p. 213; GUTBERLET, O custo social da incineração de resíduos sólidos: Recuperação de energia em detrimento da sustentabilidade, p. 5.

This chapter will explore incineration, concentrating on waste-to-energy technology. This thesis focuses on urban solid waste, also known as municipal solid waste;[652] therefore, this chapter does not analyse other waste generation, such as medical waste or hazardous waste generation. Further, because it focuses on waste-to-energy incineration, this chapter will not discuss other technologies.[653]

Waste-to-energy incineration is historically a waste treatment created and applied in the Global North, gradually gaining momentum in the Global South.[654] According to the World Bank, Brazil is an interesting case for implementing alternative waste treatment technologies.[655] It is among the most urbanised nations in the Global South,[656] with more than 85 per cent of its population living in cities. Despite recent improvements, many Brazilian cities still struggle with urban environmental problems, including solid waste management, which is increasingly privatised.[657]

As mentioned, incinerators are not a new technology, and Brazil has had plants in the past. Brazil's first incinerators were built in the Amazon region. The first, built in 1896 in the city of Manaus, was deactivated in 1958 due to maintenance problems. The next was in the early 1990s, in the city of Belem, which was also shut down due to maintenance issues in 1978. These incinerators were not advanced technologically and did not generate energy.[658]

During the 1970s, Brazil implemented incinerators to manage specific types of waste. Waste from hospitals, industries and airports and other dangerous materials were treated via controlled burning. More recently, important cities, such as São Paulo and São Bernardo do Campo, have considered implementing incinerating plans.[659] At present, incineration in the country is only conducted to handle medical and hazardous waste.[660]

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[652] See Chapter 5.
[653] Waste-to-energy technologies are divided in three groups, thermo-chemical, comprising incineration, gasification and pyrolysis; bio-chemical, comprising anaerobic digestion, fermentation and landfill with gas capture; and chemical, esterification. See Section 3.2.1.1 'Environmental Impact'.
[654] The European Union, the United States and Japan are the global leaders in waste-to-energy industry. See MAKARICHI; JUTIDAMRONGPHAN; TECHATO, The evolution of waste-to-energy incineration.
[655] *See* JAMMI, Ramachandra; OLIVEIRA, Márcia Côrtes Pereira de, **Integrated Solid Waste Management and Carbon Finance Project in Brazil**, Washington: World Bank, 2018.
[656] A leader in the waste-to-energy incineration industry, Veolia strategically targets the Global South, particularly Latin America. See VEOLIA, **Registration Document 2016, Annual Financial Report: Resourcing the World**, p. 36.
[657] JAMMI; OLIVEIRA, **Integrated Solid Waste Management and Carbon Finance Project in Brazil**, p. 1.
[658] LIMA, Luiz Mario Queiroz, **Lixo Tratamento e Biorremediação**, 3. ed. São Paulo: Hemus, 2004, p. 118.
[659] GUTBERLET, **Recovering resources-recycling citizenship: Urban poverty reduction in Latin America**, p. 28; GUTBERLET; BAEDER, Informal recycling and occupational health in Santo André, Brazil, p. 27.
[660] MORGADO, Túlio Cintra; FERREIRA, Osmar Mendes, Incineração De Resíduos Sólidos Urbanos, Aproveitamento Na Co-Geração De Energia. Estudo Para A Região Metropolitana De Goiânia, **Revista da Engenharia Ambiental da Universidade Católica de Goiás, Goiânia**, v. 2, p. 18, 2006, p. 4, 10.

Nonetheless, Brazil is a prominent case for waste-to-energy, and it is one of the countries with the highest number of projects from the World Bank. The World Bank has financed at least eight projects promoting incineration and waste-to-energy in Brazil.[661] These techniques have not yet been implemented for managing urban solid waste in Brazil.

3.1.3 The Informal Recycling Sector and Waste Pickers

The informal recycling sector provides a livelihood for millions of people in the Global South. The concept of livelihood connects with waste picking better than with employment, offering a broader vision than income generation. Livelihood is the means of gaining a living, with livelihood capabilities, having access to resources and opportunities while coping with shock[662] and stress.[663] Regarding waste pickers, the idea of livelihoods connects waste studies and the waste pickers' realities, including social inclusion and environmental protection,[664] and a PES approach to waste pickers would allow livelihoods as opposed to a marginal existence. This livelihood approach is particularly strong in waste pickers' organisations, where recycling creates social capital in including people into meaningful work.[665]

Although waste pickers are a large number of people conducting different activities, for many years, they were portrayed as unable to be politically organised.[666] Considered the most provocative figure in human poverty, they were included in the counter-revolutionary lumpenproletariat[667] in a double-sense: 'dressed in rags (lumpen) and occupied with them'.[668]

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[661] Neil Tangri, *Bankrolling Polluting Technology: The World Bank Group and Incineration* (GAIA - Global Alliance for Incinerators Alternatives/Global Anti-Incinerator Alliance, 2002) 17 https://www.essentialaction.org/waste/bankrolling/worldbankreport.pdf.

[662] Modern livelihood studies often focus on the lives of vulnerable and poor people. See CHAMBERS, Robert; CONWAY, Gordon, Sustainable Rural Livelihoods: Practical Concepts for the 21st Century. IDS Discussion Paper 296., **Institute of Development Studies (UK).**, p. 1–33, 1992, p. 9–12.

[663] *Ibid*.

[664] DIAS, Waste pickers and cities, p. 376.

[665] GUTBERLET, Jutta, Informal and Cooperative Recycling as a Poverty Eradication Strategy: Informal and cooperative recycling, **Geography Compass**, v. 6, n. 1, p. 19–34, 2012, p. 26.

[666] O'HARE, Patrick, Mobilizing Concealment and Spectacle Among Uruguay's Waste-Pickers, *in*: ATZENI, Maurizio; NESS, Immanuel (orgs.), **Global Perspectives on Workers' and Labour Organizations**, Singapore: Springer Singapore, 2018, p. 45.

[667] The lumpenproletariat is a term mainly used by Marxist theorists to describe the déclassé segment of the lower/underclasses devoid of class consciousness, who are regularly excluded from the Marxist revolution. For more information: HANSSEN, Beatrice (org.), **Walter Benjamin and the Arcades project.**, London, UK: Continuum, 2006.

[668] BENJAMIN, Walter, **The Arcades Project**, Cambridge, MA: The Belknap Press of Harvard Univeristy Press, 1999, p. 441.

Historically, workers in the informal waste sector have been marginalised in different ways. They are usually poor, disadvantaged, members of vulnerable social groups,[669] including racial minorities.[670] The economic factor is the fundamental reason that attracts people into waste picking. For many people, the choice is either starving or waste picking.[671] In essence, waste pickers represent one of the most widely excluded, impoverished and disempowered worker group.[672]

Despite their social exclusion, waste pickers provide an essential service to the Global South. Although they are at the bottom of the recycling value chain,[673] waste pickers are its largest contributor.[674] For instance, 90 per cent of all that is recycled in Brazil is by waste pickers.[675] This context is a crucial factor in understanding the importance of waste pickers, since they are a significant global phenomenon that cannot be reduced to a simplistic narrative of 'financial underdevelopment', 'institutional failure' or even 'backwardness'.[676]

There are three important practical requirements for waste picking to be functional. First, the urban solid waste should generate residual value, which in practice fluctuates highly. Second, this waste should be accessible by waste pickers. Third, there should be a vulnerable urban population so impoverished or socially marginalised that they are prepared to conduct activities commonly regarded as physically unpleasant.

In Brazil, a significant part of waste management is conducted by the informal recycling sector, specifically the waste pickers. The official data estimated that there are approximately 400,000 to 600,000 waste pickers in Brazil,[677] with 1.4 million people being supported[678] by waste picking.[679] However, the National Waste Pickers' Movement[680] estimated a more prominent presence of 800,000 waste pickers in Brazil, with at least 100,000 taking part in the social movement.[681]

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[669] In some countries, waste pickers can be part of religious minorities or be immigrants or refugees.
[670] UN-HABITAT, **Solid Waste Management in the World's Cities : Water and Sanitation in the World's Cities 2010.**, London, UK: Routledge, 2010, p. 140.
[671] MEDINA, The informal recycling sector in developing countries, p. 1.
[672] GUTBERLET, Waste, poverty and recycling, p. 171.
[673] WILSON; VELIS; CHEESEMAN, Role of informal sector recycling in waste management in developing countries, p. 800.
[674] ILO, **Working towards sustainable development**, p. 52.
[675] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 50.
[676] VELIS, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era., p. 329.
[677] IPEA, **Relatório de pesquisa: Diagnóstico sobre catadores de resíduos sólidos.**, p. 13.
[678] This figure considers waste pickers' family members.
[679] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 50.
[680] In Portuguese: *Movimento Nacional de Catadores de Materiais Recicláveis – MNCR.*
[681] IPEA, **Relatório de pesquisa: Diagnóstico sobre catadores de resíduos sólidos.**, p. 13.

In waste picking, waste is a significant resource that becomes a source of income and livelihood. Fundamentally, waste picking reintroduces products into production processes, adding value to discarded materials. For example, used aluminium cans are collected, sorted from other recyclable materials and transformed and can be recycled into a new can. As an informal economy, it is often operated as an unregulated public service, which is dangerous,[682] with precarious and hazardous working conditions.[683] The idea that extended contact with waste may pose a severe risk to human health is well known,[684] and most waste pickers are unassisted and lack health protection measures.[685] Because of these health and safety issues, the Brazilian Ministry of Labour and Employment has classified waste picking as 'unhealthy to a maximum extent'.[686]

Waste pickers face numerous health and safety issues related to their work.[687] The literature on occupational health problems related to waste picking has suggested that this line of work exposes people to chemical and biological risks from contaminated materials, to issues related to posture and emotional wellbeing and to injuries by accidents.[688] Waste pickers face mechanical trauma issues, such as cuts, blunt trauma, fractures, falls, lacerations and traffic

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[682] The health issues are various and grave. Waste pickers in Mexico City were reported to have a life expectancy of 39 years. In Port Said, Egypt, the waste picker community has an infant (children aged less than 1 year) mortality of one death out of every three lives, which is several times higher than the rate of the general population. In India, children involved with informal recycling have 2.5 times higher potential of morbidity than the national average. A study conducted in Medellín, Colombia, reported the high risk of contamination when 100 per cent of female and 95.5 per cent of male waste pickers reported having contact with decomposing materials, such as food and dead animals. See MEDINA, Scavenger cooperatives in Asia and Latin America, p. 53; COINTREAU, Sandra, **Occupational and Environmental Health Issues of Solid Waste Management**, Washington: World Health Organization (WHO), 2006, p. 14; BALLESTEROS, Viviana L. *et al*, Factores de riesgo biológicos en recicladores informales de la ciudad de Medellín, 2005, **Revista Facultad Nacional de Salud Pública**, v. 26, n. 2, p. 169–177, 2008, p. 171.

[683] BINION; GUTBERLET, The effects of handling solid waste on the wellbeing of informal and organized recyclers, p. 43.

[684] MEDINA, Serving the unserved, p. 391.

[685] BINION; GUTBERLET, The effects of handling solid waste on the wellbeing of informal and organized recyclers, p. 43.

[686] BRASIL, Ministério do Trabalho e Emprego. NR 15 - Atividades e Operações Insalubres.

[687] In Rio de Janeiro, Brazil, a study based on the former biggest landfill in Latin America (in Portuguese, *Aterro Metropolitano de Jardim Gramacho*, but better known as *Lixão de Gramacho*) identified that 42.3 per cent of the waste pickers working there would consume food found in the waste. The same study showed that these workers had cold/flu (88.1 per cent), conjunctivitis (45.5 per cent), dengue (23.3 per cent), worms (22.3 per cent), allergies (11.9 per cent) and skin problems (11.4 per cent). The *Lixão de Gramacho* was closed in 2012. For more information about the impact of the closure on the waste pickers, see BASTOS, Valeria Pereira, O fim do lixão de Gramacho: além do risco ambiental, **O Social em Questão**, v. 33, p. 265–288, 2015.

[688] BINION; GUTBERLET, The effects of handling solid waste on the wellbeing of informal and organized recyclers, p. 50; DIAS, Sonia; OGANDO, Ana Carolina, **Cuidar Project: Waste Pickers' Health Risk Mapping**, Cambridge, MA: Women in Informal Employment Globalizing and Organizing - WIEGO, 2018, p. 5.

accidents.[689] Poor posture, heavy lifting in tight/disorganised workspaces and repetitive movements cause muscular-skeletal pain.[690]

Infection is a significant problem because waste pickers handle numerous chemicals and biological waste by-products.[691] Chemical risks occur due to contact with pesticides, batteries, paint/ink, medicine and cleaning products.[692] Biological by-products can be classified by contamination via viruses, fungi, protozoa and other bacteria.[693] Disease vectors, such as pigeons, rats and insects, are another problem.[694] Infections such as hepatitis-B may occur by direct contact with biological pathogens. Medical waste and syringes are one of the higher perceived occupational threats for waste pickers.[695]

The chemical, biological, postural and safety problems aggravate the existing mental health issues of waste pickers. Emotional vulnerabilities emerge due to malnourishment, undernourishment, low education, high birth rates, physical and emotional abuse, lack of training about basic health care and first aid, lack of access to health care facilities and precarious living arrangements.[696] These can lead to more issues, and the use and abuse of alcohol and other drugs by waste pickers are dangerous occurrences on reports.[697]

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[689] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 6; GUTBERLET, Jutta *et al*, Participatory Research Revealing the Work and Occupational Health Hazards of Cooperative Recyclers in Brazil, **International Journal of Environmental Research and Public Health**, v. 10, n. 10, p. 4607–4627, 2013, p. 4615; GUTBERLET; BAEDER, Informal recycling and occupational health in Santo André, Brazil, p. 10–11; KATUSIIMEH; BURGER; MOL, Informal waste collection and its co-existence with the formal waste sector, p. 6–7; KENNEDY, S M *et al*, Point-of-sale glass bottle recycling: indoor airborne exposures and symptoms among employees., **Occupational and Environmental Medicine**, v. 61, n. 7, p. 628–635, 2004, p. 634; PORTO, Marcelo Firpo de Souza *et al*, Lixo, trabalho e saúde: um estudo de caso com catadores em um aterro metropolitano no Rio de Janeiro, Brasil, **Cadernos de Saúde Pública**, v. 20, n. 6, p. 1503–1514, 2004, p. 1509; ZIA; DEVADAS; SHUKLA, Assessing informal waste recycling in Kanpur City, India, p. 605.

[690] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 5; GUTBERLET *et al*, Participatory Research Revealing the Work and Occupational Health Hazards of Cooperative Recyclers in Brazil, p. 4615.

[691] COINTREAU, **Occupational and Environmental Health Issues of Solid Waste Management**, p. 25; KATUSIIMEH; BURGER; MOL, Informal waste collection and its co-existence with the formal waste sector, p. 6; ZIA; DEVADAS; SHUKLA, Assessing informal waste recycling in Kanpur City, India, p. 605.

[692] GALON; MARZIALE, Condições de Trabalho e Saúde de Catadores de Materiais Recicláveis na América Latina: Uma Revisão de Escopo, p. 182.

[693] BINION; GUTBERLET, The effects of handling solid waste on the wellbeing of informal and organized recyclers, p. 46–48.

[694] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 6.

[695] BINION, **The perception of health with informal recyclers in Buenos Aires, Argentina**, p. 30.

[696] BINION; GUTBERLET, The effects of handling solid waste on the wellbeing of informal and organized recyclers, p. 42; DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 3; GUTBERLET *et al*, Participatory Research Revealing the Work and Occupational Health Hazards of Cooperative Recyclers in Brazil, p. 4615; PARVEEN, Saila; FAISAL, Islam M, Occupational health impacts on the child waste-pickers of Dhaka City, **WIT Transactions on Biomedicine and Health**, v. 9, p. 295–304, 2005, p. 300.

[697] GUTBERLET *et al*, Participatory Research Revealing the Work and Occupational Health Hazards of Cooperative Recyclers in Brazil, p. 4615.

These workers usually have close ties with scrap dealers in an often-prejudicial relationship. Commonly, waste pickers are given waste collecting equipment and then are kept dependent or in debt. Likewise, they are more subjected to the price policy imposed by those intermediaries. The waste pickers who work on the streets, dumps or landfills lack access to water, food and toilets and often work long hours in these conditions.[698] Gangs and cartels may be involved in informal recycling activities or open dump operations.[699] It is essential to understand that waste picker poverty tends to be caused by the exploitative relationship with intermediaries[700] in unfair value chains.

As a response to their difficulties, waste pickers are uniting in collective organisations,[701] such as cooperatives and associations.[702] There are many cases of waste picker organisation, activism and trade unionism.[703] These organisations have resulted in many networks and federations of their organisations worldwide,[704] among which the National Waste Pickers' Movement[705] in Brazil stands out[706] as the largest worldwide, with more than 500 affiliated cooperatives[707] and at least 80,000 members.[708]

Brazil is a noticeable case of waste pickers' inclusion and formalisation in organised groups. In 2008, Brazil already had high figures, with more than 1,174 waste pickers' cooperatives or associations in 684 municipalities whose membership exceeded 30,000

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[698] *Ibid*.
[699] UN-HABITAT, **Module 5 - Solid Waste Management in Cities**, New York, NY: United Nations, 2018, p. 3.
[700] MEDINA, Living off Trash in Latin America: Debunking the Myths, p. 21.
[701] SAMSON, **Refusing to be Cast Aside – Waste Pickers Organising Around the World.**, p. 3.
[702] Other examples are as small groups, extended family groups, micro-enterprises and community-based organizations (CBOs). See DIAS; FERNANDEZ, Waste Pickers - A gendered perspective, p. 153; GUTBERLET, Social aspects of solid waste in the global South, p. 327–328; GUTBERLET, Jutta *et al*, Socio-environmental entrepreneurship and the provision of critical services in informal settlements, **Environment and Urbanization**, v. 28, n. 1, p. 205–222, 2016, p. 206; TIRADO-SOTO; ZAMBERLAN, Networks of recyclable material waste-picker's cooperatives, p. 153.
[703] Some of the most well-known examples are the Self-Employed Women's Association (SEWA) Organising Through Union and Co-operative, in India; the Ankara Recycling Association, in Turkey; the Ikageng Ditamating Recycling and Waste Management Group, in South Africa; and Coopcarmo Cooperative, in Mesquita, Brazil. See SAMSON, **Refusing to be Cast Aside – Waste Pickers Organising Around the World.**, p. 14–27.
[704] Some noteworthy examples are the Asociación de Recicladores de Bogotá (ARB) in Colombia and the SWACHH National Alliance of Waste Pickers in India.
[705] See Chapters 2 and 5.
[706] SAMSON, **Refusing to be Cast Aside – Waste Pickers Organising Around the World.**, p. 33–48.
[707] *Ibid*., p. 42.
[708] FERNANDEZ, Lucia; CHEN, Martha, Recycling livelihoods., **ReVista Harvard Review of Latin America (Cambridge)**, v. 14, n. 2, p. 24–28, 2015, p. 26.

people,[709] which meant there were 461 waste pickers for every 100,000 workers in Brazil.[710] The number of cooperatives and associations currently exceeds 1,700,[711] and this outstanding performance resulted from the 10 years of continued governmental support[712] via the 'Social Technology Network'.[713]

Section 3.3 of this chapter, 'Organised Waste Pickers', will explain in further detail the activities promoted by these organised waste pickers in Brazil. This focus is justified by the fact that the primary legislation, the National Policy for Solid Waste Management,[714] requires the municipalities to offer incentives to promote and support waste pickers' cooperatives and enterprises. This choice is also justified by Brazil's leading position in terms of waste pickers' enterprises and the national movement, as well as by the enhancement of waste pickers' livelihoods when they are members of cooperatives, associations or other enterprises. However, first, Section 3.2 will discuss waste-to-energy incinerators.

3.2 WASTE-TO-ENERGY INCINERATORS

Waste-to-energy incinerators or energy-from-waste is the strategy of managing waste through controlled burning, while recovering energy. The energy generated can be as electricity or as heat. It is represented in the waste hierarchy as 'recover'. The following sections will analyse waste-to-energy incinerators through the three criteria of the ecolaw-informed framework as detailed in Chapter 2, in Section 2.3.3 entitled 'Elements for Transitioning to Ecological Approaches to Environmental Law', to determine the best path forward for environmental law.

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[709] IBGE, **Pesquisa Nacional de Saneamento Básico, 2008 – PNSB**, Rio de Janeiro: IBGE, 2008, p. 87.
[710] DAGNINO; JOHANSEN, Os catadores no Brasil: características demográficas e socioeconômicas dos coletores de material reciclável, classificadores de resíduos e varredores a partir do censo demográfico de 2010, p. 118.
[711] VELIS, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era., p. 330.
[712] *Ibid*.
[713] The Social Technology Network (STN), created in 2004, aimed to foster a process of social inclusion, public participation and income generation by drawing from existing capabilities in Social Technology. For more information about the program: FRESSOLI, Mariano; DIAS, Rafael, The Social Technology Network: A hybrid experiment in grassroots innovation. STEPS Working Paper 67., **Brighton: STEPS CENTRE University of Sussex**, p. 39, 2014.
[714] Lei Federal N° 12.305, de 2 de Agosto de 2010, article 8.IV. (n 20).

3.2.1 Evaluation of Incineration through the Ecodesign Lens

Ecodesign, as explored in Chapter 2, focusses on all stages of the value chain, including disposal, with a view to minimising adverse environmental outcomes. In short, it integrates environmental protection within the product life cycle. As this section explains, an ecodesign-based scrutiny of waste-to-energy incineration reveals concerns about energy and pollution.

3.2.1.1 Environmental Impact

Waste-to-energy is commonly promoted as the answer to a municipality's waste and energy problems and is positioned as an energy-efficient initiative. Therefore, it would seem, at first glance at least, to be a useful tool for ecodesign. However, incineration is the least sustainable option[715] for the Global South in the energy-from-waste industry.[716]

Energy generated from household waste contributes to approximately 5 per cent of the overall electricity demand of a city.[717] The process to apply the produced energy is a complex one, and it is an ineffective method of energy utilisation from waste.[718] Therefore, European cities mostly direct this energy to produce heat, which is less useful in most Global South[719] countries since they are located in Latin America, Africa and Asia[720] and consequently often have warmer weather than European countries.

Waste-to-energy incinerators are less energy-efficient, particularly when compared with the consumption and generation patterns of recycling practices. Recycling processes consume less energy than waste-to-energy incinerators.[721] Possibly, waste-to-energy incinerators consume more energy than they produce.[722] For instance, a ton of paper treated in

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[715] Studies showed that anaerobic digestion, pyrolysis and gasification are more sustainable options. See KHAN, Imran; KABIR, Zobaidul, Waste-to-energy generation technologies and the developing economies: A multi-criteria analysis for sustainability assessment, **Renewable Energy**, v. 150, p. 320–333, 2020.
[716] *Ibid*., p. 325.
[717] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 15.
[718] PAVLAS, Martin *et al*, Waste incineration with production of clean and reliable energy, **Clean Technologies and Environmental Policy**, v. 13, n. 4, p. 595–605, 2011, p. 604.
[719] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 15.
[720] DADOS, Nour; CONNELL, Raewyn, The Global South, **Contexts**, v. 11, n. 1, p. 12–13, 2012, p. 12.
[721] MORRIS, Jeffrey, Comparative LCAs for Curbside Recycling Versus Either Landfilling or Incineration with Energy Recovery, **The International Journal of Life Cycle Assessment**, v. 10, n. 4, p. 273–284, 2005, p. 12.
[722] GAIA, **Facts about "waste-to-energy" incinerators**, p. 2.

an incinerator generates around 8,200 MJ of energy. The same quantity in recycling saves approximately 35,200 MJ of energy, considering the embodied energy of the manufacture and supply of new virgin paper, including the fuel and energy-related to timber, power paper mills and transportation.[723]

A standard parameter is used to evaluate whether incinerators can produce energy. For waste-to-energy incinerators, that parameter is the energy content, denominated lower calorific value (LCV) in MJ/kg. To ensure autothermic combustion of waste, the LCV must not be less than 7 MJ/kg on average per year.[724] Currently, the Global South's waste context and conditions[725] are often less than this figure.[726] This evidence suggests that the burning of the Global South's waste would not produce energy.

In Brazil, waste-to-energy incineration technology is potentially less energy-efficient than in Europe, and it is already less efficient. To increase efficiency, the waste would need to be sorted, which is the role of the informal recycling sector. In this context, the urban solid waste is burned, which comprises the materials used by this sector.

The debate about energy efficiency connects to pollution concerns. In this regard, waste-to-energy incineration has positive and negative environmental outcomes. On the positive side, it assists in achieving a volume reduction of waste and saves space for landfills, leading to environmental protection. The biomass[727] content of the waste makes a part of the energy recovered to be considered carbon neutral.[728]

Nevertheless, incineration facilities generate significant environmental problems. Waste-to-energy incinerators produce toxic emissions, threatening nature and the health[729] of

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[723] DONAHUE, Marie, **Waste Incineration: A Dirty Secret in How States Define Renewable Energy**, Washington, DC: Institute for Local Self-Reliance, 2018, p. 11.
[724] IJGOSSE, Jeroen, **Waste Incineration and Informal Livelihoods: A Technical Guide on Waste-to-Energy Initiatives**, Manchester, UK: WIEGO, 2019, p. 8; WORLD BANK, **Municipal Solid Waste Incineration**, Washington, DC: World Bank, 2000, p. 2.
[725] These conditions are the fact that waste in the Global South is frequently unsorted and significantly composed of organic matter. Although some municipalities in Brazil are successful in collecting waste already separated in households, they require a re-sorting of the waste for it is frequently mixed with non-recyclable products. However, Brazil, similarly to the rest of the Global South, produces more organic waste than solid waste.
[726] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 21.
[727] At present, there are four types of biomass applied: food and agricultural products; solid waste; landfill gas and biogas; and alcohol-based fuels, such as ethanol or biodiesel.
[728] MOORA, Harri *et al*, Determination of biomass content in combusted municipal waste and associated CO 2 emissions in Estonia, **Energy Procedia**, v. 128, p. 222–229, 2017, p. 222; GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 22.
[729] The effect on human health of dioxins from waste-to-energy incineration starts as early as pre-pregnancy and can cause health issues for the infant and miscarriage. *See* LUNG, For-Wey *et al*, The impermanent effect of waste incineration on children's development from 6 months to 8 years: A Taiwan Birth Cohort Study, **Scientific Reports**, v. 10, n. 1, p. 3150, 2020, p. 1.

neighbouring communities.[730] Even the most advanced incinerators release large amounts of emissions that can have permanent health effects,[731] and contaminate the air, soil and water resources. These pollutants[732] can enter the food supply and negatively affect the food chain.[733] Incineration processes, especially of plastic, releases toxins[734] linked to the development of cancer and damage to the human immune system.[735]

Waste-to-energy incineration produces large amounts of flue gases that require treatment, even under optimal circumstances. During combustion, the chief environmental concerns are the emissions to water and air, including odour, slag production, such as heavy metal contamination, the production of noise and vibration and the consumption of water and other raw materials. After the burning process, pollution-related issues involve the disposing or recycling of hazardous fly ash residues and dealing with fugitive emissions.[736]

Certain technological advancements are capable of controlling the pollution caused by waste-to-energy incineration.[737] This control requires treating the emissions, substantially increasing project costs.[738] The cost factor is critical for the Global South, where many countries may not have the financial resources to purchase the latest technology and instead choose outdated, unsafe models.[739] In Brazil, the government has recognised that incineration is a costly waste management technique for its context.[740]

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[730] ROOTES, Christopher, Environmental movements, waste and waste infrastructure: an introduction, **Environmental Politics**, v. 18, n. 6, p. 817–834, 2009, p. 822; GAIA, **Facts about "waste-to-energy" incinerators**, p. 3.
[731] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 7, 22.
[732] Pollutants related to incineration are hydrogen chloride (HCI), hydrogen fluoride (HF), sulphur dioxide (SO2), mercury, dioxins and nitrogen dioxide (NO2). See *Ibid*.
[733] GAIA, **Facts about "waste-to-energy" incinerators**, p. 3; MAZZUCCO, Walter *et al*, The Management of Health Hazards Related to Municipal Solid Waste on Fire in Europe: An Environmental Justice Issue?, **International Journal of Environmental Research and Public Health**, v. 17, n. 18, p. 6617, 2020, p. 6617.
[734] COLE-HUNTER *et al*, The health impacts of waste-to-energy emissions, p. 6; ROOTES, Environmental movements, waste and waste infrastructure, p. 822.
[735] GUTBERLET, **Recovering resources-recycling citizenship: Urban poverty reduction in Latin America**, p. 27.
[736] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 22, 23.
[737] Even the state-of-the- art and best managed incinerators can malfunction, and emissions exceedances are routine. See ROOTES, Environmental movements, waste and waste infrastructure, p. 822.
[738] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 7, 22.
[739] GUTBERLET, **Recovering resources-recycling citizenship: Urban poverty reduction in Latin America**, p. 27.
[740] MMA, **Compostagem doméstica, comunitária e institucional de resíduos orgânicos: manual de orientação**, p. 24.

In summary, waste-to-energy incinerators pose significant environmental risks to Brazil. The moisture and organic composition of Brazilian waste[741] are not suitable for burning and would likely lead to incomplete combustion, hence not producing energy. Moreover, the toxicity of the pollution created challenges any possibility of ecodesign in incineration.

3.2.1.2 Services Provided

Arguably, if waste-to-energy incinerators are considered to provide renewable energy, they would fulfil the ecodesign criterion as an environmentally adequate waste alternative. However prior studies that explored the renewability of this method concluded that it is unclear whether this type of incinerators is a source of renewable energy because the concept of renewable energy itself is still uncertain.[742] Although it is widely accepted that energy fuel sources are either fossil fuels or renewable sources, the definition of 'renewable energy' is under debate, and often criticised as over-inclusive. In general, 'renewable' activities are those draining natural resources at an equal or slower rate than its replacement rate.[743]

Political debates shape national legal concepts of renewable energy.[744] All energy sources create financial and environmental costs.[745] In this context, governments make a contextual analysis to examine whether a particular energy source can be considered renewable, connecting renewable energy laws to other relevant problems. Hence, factors such as employment and environmental justice[746] frequently influence decisions.[747]

There are cases of waste-to-energy incineration as a part of renewable energy laws, but they are not a majority. A legal consensus is that specific energy sources are renewable,[748]

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[741] In average, 45.3 per cent of Brazilian urban waste is organic. See ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2018/2019**, p. 39.
[742] CROSSLEY, Penelope Jane, **Re-conceptualising renewable energy law: A comparative study of the national laws used to accelerate the deployment of renewable energy**, University of Sydney, Sydney, 2015, p. 134, 191, 407.
[743] *Ibid*.
[744] *Ibid*., p. 134, 405.
[745] OTTINGER, Richard L; BRADBROOK, Adrian J. **UNEP Handbook for Drafting Laws on Energy Efficiency and Renewable Energy Resources**. Nairobi, Kenya: UNEP, United Nations Environment Programme, 2007.
[746] See Chapter 1.
[747] CROSSLEY, **Re-conceptualising renewable energy law: A comparative study of the national laws used to accelerate the deployment of renewable energy**, p. 134, 405.
[748] The vast majority of federal legislation about renewable energy sources includes only the following technologies: wind power, photovoltaic solar power, concentrated solar thermal energy, biomass, landfill gas, sewage treatment gas and biogas, and small-scale hydropower. See CROSSLEY, **Re-conceptualising renewable energy law: A comparative study of the national laws used to accelerate the deployment of renewable energy**.

and 85 per cent of the countries with national renewable energy legislation do not include waste-to-energy incineration in these legislations.[749] There are arguments that favour the addition of waste-to-energy incineration in the category of renewables, championed by the United States[750] and the European Union.[751]

Therefore, the classification of waste-to-energy as renewable energy is controversial. On the inclusion side, the main argument focuses on waste-to-energy producing less methane than landfilling and reducing greenhouse gas emissions.[752] This reasoning suggests that waste-to-energy incineration is an asset for greenhouse gas reduction,[753] is carbon neutral and is an essential advantage against climate change.

Nonetheless, the same scientists whose research was applied to justify the introduction of waste-to-energy incineration as renewable energy in environmental policies have challenged these policies.[754] In this sense, this inclusion is argued to be a strategy that shifts the common community perception that waste-to-energy incineration primarily benefits its industry to the narrative that it serves broader socio-environmental purposes.[755] Therefore, there is a paradox with the growing accusations that these incinerators produce toxic pollutants, significantly affecting vulnerable communities.[756] Another leading argument is the increasing body of evidence suggesting that waste-to-energy incinerators require constant burning of waste, hence negatively affecting preferable waste treatments, such as waste prevention and recycling.[757] In short, it is questioned how a technology that hinders the reintroduction of waste into production processes can be considered renewable.

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[749] *Ibid*., p. 408.
[750] Most states of the United States that apply incineration legally consider waste-to-energy incineration a renewable source of energy.
[751] DONAHUE, **Waste Incineration: A Dirty Secret in How States Define Renewable Energy**, p. 22; EUROPEAN COMMISSION, **Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: The role of waste-to-energy in the circular economy**, Brussels: European Commission, 2017; EUROPEAN PARLIAMENT, Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the Promotion of the Use of Energy From Renewable Sources and Amending and Subsequently Repealing Directives 2001/77/EC and 2003/30/EC. The European Union classifies waste-to-energy as renewable energy.
[752] WORLD BANK, **Municipal Solid Waste Incineration**, p. 1.
[753] YI, Sora; JANG, Yong-Chul; AN, Alicia Kyoungjin, Potential for energy recovery and greenhouse gas reduction through waste-to-energy technologies, **Journal of Cleaner Production**, v. 176, p. 503–511, 2018, p. 504.
[754] BEHRSIN, Ingrid, Controversies of justice, scale, and siting: The uneven discourse of renewability in Austrian waste-to-energy development, **Energy Research & Social Science**, v. 59, p. 101252, 2020, p. 101252.
[755] BEHRSIN, Ingrid, Rendering Renewable: Technoscience and the Political Economy of Waste-to-Energy Regulation in the European Union, **Annals of the American Association of Geographers**, v. 109, n. 5, p. 1362–1378, 2019, p. 1374.
[756] *Ibid*.
[757] PIRES; MARTINHO, Waste hierarchy index for circular economy in waste management, p. 300; GAIA, **Facts about "waste-to-energy" incinerators**, p. 2.

Because of the growing public concern, jurisdictions are removing waste-to-energy incineration from the legal category of renewable energy. There are prominent examples of this in the United States, in which a growing number of states have excluded this incineration technology from their Renewable Portfolio Standard programs. Some examples are the states of New York, California,[758] Massachusetts, Texas, Wisconsin, New Mexico, Arizona, Rhode Island and Colorado.[759] The European Union is also withdrawing its support of waste-to-energy incinerators.[760]

In Brazil, it is unclear whether waste-to-energy incineration is a renewable source of energy. The government's energy research companies have argued in favour of contextual analysis, applying socio-environmental, economic and technical criteria to determine case by case whether this energy is renewable in the municipal, state and federal levels of the federation.[761] However, environmental non-governmental organisations, collective organisations in neighbourhoods and organised waste pickers,[762] have claimed that the incineration method will pose significant risks to the surrounding communities and to the waste pickers' livelihoods. These perspectives challenge the argument that waste-to-energy incineration is a renewable source of energy. Outside of the conflicting perspectives of energy research companies and local organisations, in terms of legislation, the National Policy for Solid Waste Management considers recover, which englobes waste-to-energy incineration, as an environmentally adequate final waste disposal.[763] Consequently, it is possible to use these waste disposals for the co-processing of waste in rotary kilns to produce cement clinker and thermal energy.[764] Although it is not common practice, it appears to be within the bounds of legislation to consider waste-to-energy as renewable energy in Brazil. This consideration is controversial owing to the potential severe negative socio-environmental effects of waste-to-energy incineration in Brazil, as discussed in this section.

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[758] The state of California gave an exemption for a single pre-existing municipal solid waste incineration facility.
[759] OTTINGER; BRADBROOK, **UNEP Handbook for Drafting Laws on Energy Efficiency and Renewable Energy Resources**, p. 111.
[760] See EUROPEAN COMMISSION, **Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: The role of waste-to-energy in the circular economy**.
[761] EPE, **Nota técnica DEA 16/2014: Economicidade e Competitividade do Aproveitamento Energético dos Resíduos Sólidos Urbanos**, Rio de Janeiro: Empresa de Pesquisa Energética, 2014, p. 34.
[762] CNI, **Recuperação Energética De Resíduos Sólidos: Um Guia Para Tomadores De Decisão**, Brasília: Confederação Nacional da Indústria, 2019, p. 64.
[763] Lei Federal N° 12.305, de 2 de Agosto de 2010, article 3. VII. (n 11).
[764] Conama, Resolução Nº 499, De 06 De Outubro De 2020, article 3. http://www2.mma.gov.br/port/conama/legiabre.cfm?codlegi=750.

Decision-makers and leaders view the inclusion of waste-to-energy incineration in the renewable energy spectrum as positive because they have an extra tool to mitigate climate change.[765] The advantage to the industry is that as an official renewable energy, waste-to-energy incineration plants are eligible for additional subsidies and incentives. In this sense, these plants remove resources from other sources of energy, such as wind power and solar electric power.[766] In interstate distribution networks, incinerators can sell their power to other localities, affecting their existing and future systems.[767] In the case of Brazil applying this model, waste-to-energy can hurt the promotion of cleaner energy sources in neighbouring states, thus repeating the contradictions in place in the Global North.

3.2.2 Evaluation of Incineration through the Sovereign Communities Lens

Sovereign communities are the second feature of the ecolaw-informed criteria. They are communities that promote bottom-up approaches and respect socio-environmental visions. First, they secure and exercise their own empowerment. Second, they connect people and nature through understanding nature and its processes, adapting this knowledge to their context and putting it into practice with their empowerment. The following sections will apply the ecolaw-informed criteria to waste-to-energy incinerators through these two elements, in order to determine whether this technology shares the same goal as required by sovereign communities.

3.2.2.1 Empowerment

Incinerators are an industry in decline in the Global North, since they are a source of public health threats, a risky investment and a classic case of environmental[768] injustice.[769] In the United States, 79 per cent of active incinerators are located in environmental justice communities.[770] That is, they are located in neighbourhoods where people of colour[771] and the

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[765] BEHRSIN, Controversies of justice, scale, and siting, p. 101252.
[766] DONAHUE, **Waste Incineration: A Dirty Secret in How States Define Renewable Energy**, p. 22.
[767] LAU, Chris; AGA, Jaineel, **Bottom Line on Renewable Energy Certificates**, Washington, DC: World Resources Institute, 2008, p. 1.
[768] See chapter 1.
[769] DONAHUE, **Waste Incineration: A Dirty Secret in How States Define Renewable Energy**, p. 3.
[770] Environmental justice communities are unfairly burdened communities in terms of demographic and socio-economic characteristics. In short, they are usually neighbourhoods where non-white and poor people live subjected to environmental hazards.
[771] The referenced research applied the term ‘people of colour’, which is an expression mostly used in the United States to describe non-white communities.

socio-economically disadvantaged live subjected to environmental hazards, which are overburdened by pollution from other industrial sources, thus significantly harming the lives of inhabitants. [772] Communities living near incinerators face negative health effects and are more likely to have respiratory diseases, including asthma.[773]

The location of waste management plants is a consequence of urban development. Areas of lower real estate value are where vulnerable families live and poor housing expands. Consequently, they are near landfills, incineration plants and irregular waste management facilities. The situation found in North America is similar to that in many Global South countries.[774]

In Brazil, the perspective of solid waste incineration follows the same context. During the early 1990s, the administration of the city of São Paulo examined the possibility of implementing a waste incinerator near a low and middle-income housing area. In addition, the facility was also projected to be close to Lake Billings, which is a critical drinking water reservoir in São Paulo. Popular mobilisation and the pressure of non-governmental organisations successfully opposed the project, and it did not continue.[775] More recently, since the early 2010s, the municipality of São Bernardo do Campo has sought to implement an incineration facility. The proposed location poses environmental and social concerns because it is near a protected watershed and low-income settlements.[776] Nevertheless, an incineration facility remains on the agenda in this municipality.[777]

Waste incineration is a technology created in the Global North. In the case of its application in Brazil, significant adaptation is required, for waste characteristics differs from the Global North to the Global South.[778] In terms of local waste production, over half of urban

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[772] ROOTES, Christopher; LEONARD, Liam (orgs.), **Environmental Movements and Waste Infrastructure**, New York: Routledge, 2012, p. 9; THE TISHMAN ENVIRONMENT AND DESIGN CENTER AT THE NEW SCHOOL, **U.S. Municipal Solid Waste Incinerators: An Industry in Decline**, p. 4.
[773] THE TISHMAN ENVIRONMENT AND DESIGN CENTER AT THE NEW SCHOOL, **U.S. Municipal Solid Waste Incinerators: An Industry in Decline**, cap. Public Health and Community Impacts.
[774] GUTBERLET, **Recovering resources-recycling citizenship: Urban poverty reduction in Latin America**, p. 28.
[775] *Ibid*.
[776] GUTBERLET, Informal and Cooperative Recycling as a Poverty Eradication Strategy, p. 27.
[777] *See* EJ ATLAS, **Wastepicker mobilization against incinerator in São Bernardo do Campo, São Paulo, Brazil**, EJ Atlas: Mapping Environmental Justice, Disponível em: https://www.ejatlas.org/print/wastepicker-mobilization-against-incinerator-in-sao-bernardo-do-campo-sao-paulo-brazil, acesso em: 5 mar. 2021.
[778] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 12; LUTHRA, Aman, Waste-to-Energy and Recycling, **Economic & Political Weekly**, n. 13, p. 51–58, 2017, p. 56.

solid waste in Brazil is organic,[779] making it inappropriate for waste-to-energy incineration,[780] and suitable for reuse[781] in composting.[782] Thus, due to technical aspects, waste-to-energy incineration is inappropriate to the Brazilian context.[783]

Waste-to-energy incineration also conflicts with communities' desires. Incinerators are historical objects of NIMBY protests[784] and other socio-ecological conflicts,[785] and face resistance from the Brazilian population[786] and the organised waste pickers.[787] This scenario, combined with the possible health risks for the communities near incineration plants, make incinerators an ill-suited technology for community empowerment in Brazil.

3.2.2.2 Connecting People and Nature

As previously explained, the a priori waste hierarchy is fundamental because it shows the order of the methods to be promoted by sustainable waste management practices based on context. Academia and practitioners have addressed different Rs frameworks for decades, indicating that it is an established concept.[788] Initially, the three Rs framework—Reduce, Reuse, and Recycle—prevailed.[789] The literature has suggested that the introduction of 'Recover' as the fourth R in the European Union Waste Framework[790] pushed for the four Rs framework. While the three Rs focused on preventing resource use, repairing, closing the loop and

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[779] ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2018/2019**, p. 39.
[780] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 21.
[781] ABRELPE, **Panorama dos Resíduos Sólidos no Brasil 2020**, p. 46; MMA, **Compostagem doméstica, comunitária e institucional de resíduos orgânicos: manual de orientação**, p. 5.
[782] Composting is the process of transforming waste organic matter in organic fertilisers. In other words, composting is organic waste recycling since the generated fertiliser can be used in agriculture and in gardens.
[783] IDEC, **Consumo Sustentável: Manual de educação**, Brasília, DF: Instituto Brasileiro de Defesa do Consumidor - IDEC, 2005, p. 121.
[784] RASMUSSEN, Not in My Backyard: The Politics of Siting Prisons, Landfills, and Incinerators, p. 128.
[785] ROOTES, Environmental movements, waste and waste infrastructure, p. 817; TEMPER, Leah; DEL BENE, Daniela; MARTINEZ-ALIER, Joan, Mapping the frontiers and front lines of global environmental justice: the EJAtlas, **Journal of Political Ecology**, v. 22, n. 1, p. 255–278, 2015, p. 269.
[786] CNI, **Recuperação Energética De Resíduos Sólidos: Um Guia Para Tomadores De Decisão**, p. 64; LINO, Fatima A. M.; ISMAIL, Kamal A. R., Incineration and recycling for MSW treatment: Case study of Campinas, Brazil, **Sustainable Cities and Society**, v. 35, p. 752–757, 2017, p. 757.
[787] MNCR, Diga não à Incineração de Lixo!, p. 28.
[788] BLOMSMA; BRENNAN, The Emergence of Circular Economy, p. 611.
[789] GHISELLINI; CIALANI; ULGIATI, A review on circular economy, p. 14; KING, Andrew M. *et al*, Reducing waste: repair, recondition, remanufacture or recycle?, **Sustainable Development**, v. 14, n. 4, p. 257–267, 2006, p. 249–263; MURRAY; SKENE; HAYNES, The Circular Economy, p. 371.
[790] EUROPEAN COMMISSION, Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and Repealing Certain Directives.

cycling,[791] the fourth R proposed discussions around the incineration of materials with energy recovery.[792]

Regardless of whether a three or four Rs framework is adopted, there is a waste hierarchy. In the a priori hierarchy, the local context dictates the appropriate practice.[793] In this sense, ecological integrity and the dignity of life are significant criteria that must be considered when deciding between options in policy and regulatory contexts.[794] In Brazil, the waste pickers are local providers of recycling, whereas incinerators are not a local technology. The latter disrupt the waste hierarchy because they undermine efforts for preferable waste management options.[795]

Prior research has indicated that incineration is a negative contributor and symbolises a leakage from the industrial system.[796] Waste-to-energy practices affect the a priori waste hierarchy implementation. Societies dependent on incineration do not comply with the Rs framework.[797] In terms of Brazilian legislation, article 9 of the Waste National Policy[798] includes the waste hierarchy but does not prohibit incineration. On the contrary, in the first paragraph, it states that energy reuse can be carried out, as long as its technical and environmental feasibility is proven. Under Brazilian law, incineration has not been declared illegal. Article 24 of the waste incineration resolution[799] allows and regulates the incineration activity, establishing targets for segregating waste for recycling and reuse that the system must fulfil concomitant with the incineration activity.

The disregard for natural protection is likely due to economic reasons. Incinerators are expensive technologies,[800] and waste-to-energy conversion produces a demand for waste to be burned continuously, removing incentives from waste minimisation practices.[801] Incinerators not only neglect the waste context and hierarchy but also undermine efforts to conserve resources and reduce materials, as well as the energy-conserving activities of recycling and

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[791] The concepts of closing the loop and cycling argue that the value of products, materials and resources must be maintained for as long as possible, minimising waste and resource use.
[792] KIRCHHERR; REIKE; HEKKERT, Conceptualizing the circular economy, p. 223.
[793] ARAGÃO, **O Direito dos Resíduos**, p. 30.
[794] POPE, **Transferência Transfronteiriça de Resíduos sob a Perspectiva da Justiça Ecológica : Rumo à Gestão Internacional de Resíduos**, p. 394.
[795] GAIA, **Facts about "waste-to-energy" incinerators**, p. 2.
[796] PIRES; MARTINHO, Waste hierarchy index for circular economy in waste management, p. 300.
[797] *Ibid*., p. 304.
[798] BRASIL, Lei Federal n° 12.305, de 2 de agosto de 2010. Institui a Política Nacional de Resíduos Sólidos.
[799] BRASIL, Resolução CONAMA n° 316, de 29 de outubro de 2002.
[800] See the following subtopic, generative ownership.
[801] GAIA, **Facts about "waste-to-energy" incinerators**, p. 2.

composting. Because of their endless demand for waste,[802] in the waste-to-energy process, communities participate as taxpayers covering the costs and consumers generating waste. Thus, it does not promote treating waste as a part of nature, and people are likely to become more disconnected from environmental matters.

The problem is worst from the Global South perspective. The waste composition and regulations of most Global South nations are substantially different from those of their Northern counterparts, which have the bulk of the world's incinerators. The integration of incinerators in the Global South is still in very early stages, and research indicates that it can be a technology unsuitable to its particular context, which differs from the Global North.[803]

In short, waste-to-energy incinerators will not make communities sovereign because they further alienate people from nature. Incineration practices are a threat to the Rs framework,[804] and a particular issue for Brazil and the Global South. They boost the vision of nature as comprising only natural resources, minimising the idea that waste production is a negative contributor to environmental protection. That is, they consider that waste is not something to avoid and prevent, but fuel to produce energy.

3.2.3 Evaluation of Incineration through the Generative Ownership Lens

Chapter 2 explained that property rights bounded to socio-environmental responsibility define generative ownership. In short, generative ownership must aim to create a healthy environment and communities. This section will analyse waste-to-energy incinerators through the generative ownership criterion in the micro—the business—and the macro—the community—ownership perspectives.

3.2.3.1 Generative Ownership in the Business

The essence of generative property designs ownership with communal responsibility and a living purpose. Businesses must have at least one design feature that assures that they seek generative objectives. In short, the presence of one feature shows that the business has enforced its generative intention. Many generative businesses models are possible, as

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[802] *Ibid*.
[803] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 6, 15.
[804] PIRES; MARTINHO, Waste hierarchy index for circular economy in waste management, p. 302.

previously exemplified in Chapter 2. This section will analyse whether incineration plants' business models associate with generative business models.

Although there is a trend in the Global South to privatise public services, incinerators can have different models. For instance, incineration plants are owned and operated by governments; are built and operated by private companies; and are built and owned by governments but managed by private contractors.[805] Given the expensive technologies required, incineration is often only viable through public–private partnerships, usually through long-term operating contracts.[806]

There is no evidence that waste-to-energy incinerators businesses can be considered generative ownership. As public–private partnerships are frequently the case, incineration facilities would have to have commons ownership and governance, such as a social enterprise or a mission-controlled corporation, to be generative.[807] However, the financial burdens commonly attached to these businesses suggest that they are extractive and not generative.[808]

In terms of creating generative ownership through labour, incineration is not a labour-intensive practice.[809] The limited generation of jobs in waste-to-energy is for high-skilled professionals.[810] Incinerators require staff with specific training and experience, which often leads to the hiring of international experts on a long-term basis.[811]

Incineration presents limited job creation. This issue has also been explored in prior studies by the Global Alliance for Incinerator Alternatives (GAIA). Data collection from 36 sources representing 16 countries reveals that incineration and landfilling are the two worst

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[805] CHEN, Yi-Tui; CHEN, Chung-Chiang, The privatization effect of MSW incineration services by using data envelopment analysis, **Waste Management**, v. 32, n. 3, p. 595–602, 2012, p. 595.
[806] GUTBERLET, Waste in the City: Challenges and Opportunities for Urban Agglomeration, p. 198.
[807] See Chapter 2.
[808] See the next section.
[809] As has been previously reported in the literature, incinerators create fewer jobs than does recycling in the Global North. In Spain, the number of jobs per tonne of treated waste in incineration is between 7 and 39 times lower than that in waste recycling. Other studies have highlighted that the employment potential of waste is in recycling. This information reflects the context of the Global North, where collection, separation and recycling activities are not as labour-intensive as in countries such as Brazil. See CASCADIA CONSULTING GROUP, **Recycling and economic development: a review of existing literature on job creation, capital investment, and tax revenues.**, Washington, USA: King Country Linkup, 2009, p. 3; FORN, Maria Calaf; MONTSERRAT, Maria Mestre, **La incineración de residuos en cifras: Análisis socio-económico de la incineración de residuos municipales en España**, Madrid: Greenpeace España, 2010, p. 26; GUTBERLET, Informal and Cooperative Recycling as a Poverty Eradication Strategy, p. 25; WEGHMANN, **Waste Management in Europe. Good Jobs in the Circular Economy?**, p. 39.
[810] IJGOSSE, **Waste Incineration and Informal Livelihoods: A Technical Guide on Waste-to-Energy Initiatives**, p. 11.
[811] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 22.

waste management alternatives in terms of employment.[812] These activities can create two jobs per 10,000 tonnes of waste processed per year, whereas other activities, such as repair[813] (404 jobs), recycle (115 jobs) and remanufacture (55 jobs), present much higher figures.[814]

In the Global South, incinerators have serious effects on employment.[815] Incineration plants in the Global South have neglected the presence of the informal recycling sector, and the diversion of recyclable materials to incinerators has resulted in extensive income loss for waste pickers.[816] In Brazil, the organised waste pickers' concerns over employment loss proved to be accurate when the city of São Bernardo do Campo, aiming to install incinerators, ignored the work of local waste pickers' cooperatives.[817]

To summarise, waste-to-energy incineration models are large-scale, capital-intensive businesses. Since there is no evidence that these systems follow generative ownership designs, the generative aspect could potentially be covered by healthy labour practices. However, incinerators disrupt existing employment and livelihoods. Hence, waste-to-energy incinerators observe an extractive ownership design and are not a desirable model to be promoted via law and policy.

3.2.3.2 Generative Ownership in the Community

Waste-to-energy incineration plants represent financial pressure for the host communities.[818] They require significant capital investments to initiate and continue their

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[812] RIBEIRO-BROOMHEAD, John; TANGRI, Neil, **Zero Waste and Economic Recovery: The Job Creation Potential of Zero Waste Solutions**, Berkley: GAIA - Global Alliance for Incinerator Alternatives, 2021, p. 2.
[813] This study explained that repair includes the activities of collection, refurbishment and resale of durable goods. For instance, furniture or electronics. These are not materials covered under the scope of this thesis.
[814] RIBEIRO-BROOMHEAD; TANGRI, **Zero Waste and Economic Recovery: The Job Creation Potential of Zero Waste Solutions**, p. 3.
[815] TANGRI, Neil, **Waste Incineration: A Dying Technology**, Berkley: GAIA - Global Alliance for Incinerators Alternatives/Global Anti-Incinerator Alliance, 2003, p. 30.
[816] IJGOSSE, **Waste Incineration and Informal Livelihoods: A Technical Guide on Waste-to-Energy Initiatives**, p. 11.
[817] GUTBERLET, Informal and Cooperative Recycling as a Poverty Eradication Strategy, p. 27.
[818] Waste management is a multibillion-dollar industry, and the profit is in waste-to-energy. A leading waste technology corporation is the French group Veolia, which has waste-to-energy as its main activity and earns billions of dollars of revenue yearly. Veolia has been involved with waste collection and disposal; nonetheless, its current focus is to increase the lucrative business of waste-to-energy. Although it strategically targets the Global South, particularly Latin America, in 2018, the company signed a 25-year long-term, USD450 million value contract to operate Australia's first waste-to-energy facility in Kwinana (Western Australia). Veolia is notorious for being accused by the GMB trade union of diverting recyclable waste to its waste-to-energy incinerators. *See* GUTBERLET, Waste in the City: Challenges and Opportunities for Urban Agglomeration, p. 198; VEOLIA, **Registration Document 2016, Annual Financial Report: Resourcing the World**, p. 1; VEOLIA, Press Release: Veolia will operate Australia's first Waste to Energy Facility, 2018; WASTE MANAGEMENT REVIEW, **Veolia signs 25 year deal to operate WA WtE facility**, Disponível em:

operations. In addition, incinerators use an ageing technology that critics consider 'too expensive to maintain, too risky to finance, and too costly to upgrade'.[819]

These businesses need long-term financial planning and sufficient resources to secure their implementation.[820] The costs increase due to the demand for treatment processes and the mitigation of operational risks, such as accidents and fires. Personnel costs, auxiliary materials, spare parts and maintenance, insurance and taxes, electricity and the charges for the disposal of residues[821] are the chief operational costs.[822] The most outstanding example of financial disaster occurred in Harrisburg, Pennsylvania, in the United States, when the city declared bankruptcy, arguing that the expensive incinerator was a major contributing factor to the crisis.[823]

The financial and institutional aspects of waste-to-energy plants are crucial owing to their costs and imminent risks. The World Energy Resources reports state that the average capital costs of waste-to-energy incineration are much higher than that of other established power generation sources.[824] Waste-to-energy incineration is also more expensive than sanitary landfills and the recycling chain,[825] representing a substantial financial risk for all stakeholders, which frequently include businesses and municipalities.[826]

The financing of waste-to-energy system costs through the sale of their recovered energy would assist in making these businesses generative. This finance angle has been explored in prior studies that have suggested that it is unrealistic to expect the high capital and operational costs of waste-to-energy plants to be covered by selling energy at market prices.[827] Waste-to-energy incineration is not a system that produces cost-covering incomes, and thus requires significant additional gate fees and revenues.[828]

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http://wastemanagementreview.com.au/veolia-signs-25-year-deal-to-operate-wa-wte-facility/, acesso em: 26 set. 2019; WEGHMANN, **Waste Management in Europe. Good Jobs in the Circular Economy?**, p. 11, 31.

[819] THE TISHMAN ENVIRONMENT AND DESIGN CENTER AT THE NEW SCHOOL, **U.S. Municipal Solid Waste Incinerators: An Industry in Decline**, p. 6.

[820] COLE-HUNTER *et al*, The health impacts of waste-to-energy emissions, p. 16.

[821] The main residues are slag and fly ash.

[822] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 24.

[823] BECKETT-CAMARATA, Jane; GRIZZLE, Cleopatra, Financial crisis in Harrisburg, Pennsylvania, **Public Finance and Management**, v. 14, n. 1, p. 5–29, 2014, p. 5, 6.

[824] WEC, **World Energy Resources 2016**, London, UK: World Energy Council, 2016, cap. Waste to Energy.

[825] IJGOSSE, **Waste Incineration and Informal Livelihoods: A Technical Guide on Waste-to-Energy Initiatives**, p. 15.

[826] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 22.

[827] *Ibid*., p. 8–10.

[828] IJGOSSE, **Waste Incineration and Informal Livelihoods: A Technical Guide on Waste-to-Energy Initiatives**, p. 19; GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 15.

Waste-to-energy incinerators can be small-scale initiatives, potentially more in tune with the local context. Large plants involve higher initial investments than do smaller plants; nevertheless, larger models produce lower annual costs per tonne of waste treated. As a result, establishing large-scale incinerators is often recommended[829] to reach feasible economy of scale.[830]

Notably, incinerators are not a technology created for Brazil and the Global South. Thus, its application would require adjustments, particularly as regards the high level of organic waste, local capacities and the need to separate organic waste from dry waste. The Global South has limited existing projects and even fewer successful stories of waste-to-energy incineration. Simple technology transfers have failed, and do not meet the local conditions of the Global South, particularly in terms of costs, input material composition and local capacities.[831] Most notably, the waste-to-energy incineration plant in Addis Ababa, the capital of Ethiopia, received attention due to the landslide on the adjacent landfill, which killed 100 people. Most studies on this disaster have linked it with the technical, financial, environmental and institutional burdens the city faced in managing that plant.[832]

Financial problems are a significant concern for countries such as Brazil. Brazilian municipalities are often unable to collect and sort waste and rely heavily on informal waste pickers; open dumps are still a reality here. In addition, this technology is not suitable for the high-moisture waste present in organic content,[833] and over half of Brazilian urban waste is organic.[834] Consequently, to finance incineration costs is simply contradictory to the Brazilian context.[835] Such financing is unlikely in the Brazilian context, and in addition, incineration is unlikely to be effective without significant technology advances and large-scale changes to the waste system infrastructure.

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[829] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 8, 24.
[830] Economy of scale is an economic term related to the cost advantages that businesses gain due to their scale of operation. In this sense, enterprises have a proportionate saving in costs due to an increased level of production.
[831] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 9, 12.
[832] IJGOSSE, **Waste Incineration and Informal Livelihoods: A Technical Guide on Waste-to-Energy Initiatives**, p. 12.
[833] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 13.
[834] MMA, **Compostagem doméstica, comunitária e institucional de resíduos orgânicos: manual de orientação**, p. 5.
[835] GIZ, **Waste-to-Energy Options in Municipal Solid Waste Management; A Guide for Decision Makers in Developing and Emerging Countries Waste**, p. 8.

The financial burdens created by waste-to-energy incinerators raises the question of why they are applied. Over time, literature has developed on the irresponsible advertisement of waste-to-energy incinerators. Since the risks are becoming well known and incineration in the Global South is likely not bankable, experienced international companies are reluctant to invest,[836] which has allowed new, inexperienced businesses to emerge. This technology is complicated and difficult to understand, and research stresses its propensity to be biased and non-transparent.[837] There are several cases of companies seeking to take advantage of municipalities. In this scenario, the Global South is an interesting target due to its incineration inexperience; hence, decision-makers must critically analyse the context, considering that a company's main objective is selling its product, not mitigating local problems.[838]

The drive to find new places to expand the incineration industry frontiers may relate to the Global North's shifting away from incineration. Europe, which is home to some to the most state-of-the-art incinerators,[839] is straying from them. The European Commission highlighted the need for redefining the role of incineration and suggested phasing out its support schemes, stressing that waste prevention and recycling are better options for the environment.[840]

Simply put, the incinerator market is adjusting to the reduction of European demand. The market for selling this technology is becoming saturated in Europe, and the industry is in search of new entrepreneurial opportunities. Companies are searching for countries with lower environmental standards in their legislation.[841]

In Brazil, investing public money on incineration, even if partially, would mean promoting extractive ownership. This angle adds more complexity to an already controversial topic, as waste-to-energy incineration undermines the waste hierarchy,[842] particularly the a priori hierarchy applied in this thesis. Moreover, it is oppressive and disrespectful to the ecolaw-informed system to impose unnecessary and substantial financial burdens on communities.

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[836] *Ibid*., p. 15.
[837] *Ibid*.
[838] *Ibid*.
[839] GAIA, **Facts about "waste-to-energy" incinerators**, p. 4.
[840] EUROPEAN COMMISSION, **Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: The role of waste-to-energy in the circular economy**, p. 8, 10, 11.
[841] IJGOSSE, **Waste Incineration and Informal Livelihoods: A Technical Guide on Waste-to-Energy Initiatives**, p. 4.
[842] GAIA, **Facts about "waste-to-energy" incinerators**, p. 2.

3.2.4 Results

This section examined waste-to-energy incinerators through the ecolaw-informed criteria. The following paragraphs summarise the findings and contributions of this thesis. The results clarify that waste-to-energy incinerators fail to meet the ecolaw benchmark.

The analyses show that these plants fail to address ecodesign concerns, given that they present significant environmental risks to their neighbouring communities. An important question associated with these incinerators is renewable energy generation. In Brazil, waste-to-energy incinerators can be considered renewable energy according to the law. Nonetheless, they may raise concerns about the concept of renewable energy and for environmental justice communities. Therefore, waste-to-energy incinerators should not be considered a generator of renewable energy, per the ecolaw-informed criteria.

In terms of sovereign communities, the results demonstrate two issues. First, incinerators often disrespect community desires; therefore, their promotion represents an oppressive top-down approach. Second, they threaten preferable waste strategies, such as prevention and recycling, which further alienates people from nature.

Last, the results demonstrate that waste-to-energy incinerators do not comply with generative ownership. They are capital-intensive and not labour-intensive schemes, which disrespect generative ownership for the community and in the business. In short, this analysis found evidence to conclude that Brazilian law and policy that seek to foster an ecolaw-informed framework should not promote waste-to-energy incinerators.

3.3 ORGANISED WASTE PICKERS

As previously explained, waste pickers are the traditional backbone of sustainable waste management in the Global South and Brazil. This section focuses on organised waste pickers, or waste pickers organised in cooperatives, associations and other collective enterprises. Although they are the minority in Brazilian waste picking, these enterprises are enshrined in the National Waste Policy legislation[843] and the specialised literature as conductors of positive change in the lives of the workers, lessening their vulnerabilities.[844]

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[843] Brasil (n 16), article 36.
[844] ILO, **Waste pickers' cooperatives and social and solidarity economy organizations**, Geneva: ILO, 2019, p. 3; ILO; WIEGO, **Summary of Key Findings from Cooperation Among Workers in the Informal**

3.3.1 Evaluation of Waste Pickers through the Ecodesign Lens

Through sustainable waste management strategies, including, but not limited to, recycling, organised waste pickers benefit their communities in many ways. This section will investigate the organised waste pickers in Brazil through the criterion of ecodesign. This criterion is divided into two, environmental effects—pollution and energy—and services provided by these workers.

3.3.1.1 Environmental Impact

There is strong evidence that recycling is more beneficial to the environment than incineration in terms of pollution, energy and overall environmental effects.[845] Recycling is an interaction of a chain of agents in which one uses the other's waste as a resource, delaying waste outputs.[846] It reintroduces discarded materials into production processes to be transformed again into products.[847] Notably, the European Union, which has the first key countries to support incineration, recently shifted position. The European Commission[848] has highlighted the need to move away from incineration, arguing 'it is waste prevention and recycling that deliver the highest contribution in terms of energy savings and reductions in greenhouse gas emissions'.[849]

Recycling is preferable to incineration because recycling reutilises materials. Waste pickers' actions save energy and water, and their techniques are less polluting than practices that require constant extraction of virgin resources. It increases the supply security of primary materials, assisting in closing resource loops, and results in lower generation of greenhouse gases owing to energy savings.[850] In 2017, it was estimated that 247 Brazilian waste pickers' cooperatives and associations recovered 36,000 tonnes of CO2.[851]

Economy: A Focus on Home-Based Workers and Waste Pickers, Geneva: International Labour Office - ILO, 2017, p. 2–4.

[845] GUTBERLET, Informal and Cooperative Recycling as a Poverty Eradication Strategy, p. 25.

[846] MURRAY, Alan; SKENE, Keith; HAYNES, Kathryn, The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context, **Journal of Business Ethics**, v. 140, n. 3, p. 369–380, 2017, p. 371.

[847] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 10.

[848] The European Commission is the executive branch of the European Union.

[849] EUROPEAN COMMISSION, **Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: The role of waste-to-energy in the circular economy**, p. 8, 10, 11.

[850] DIAS, Livelihood Profile: Waste Pickers, p. 25; MEDINA, Living off Trash in Latin America: Debunking the Myths, p. 23.

[851] ANCAT, Associação Nacional dos Catadores e Catadoras de Materiais Recicláveis. **Anuário da Reciclagem 2017-2018**. São Paulo: ANCAT, 2019.

In terms of energy, recycling activities present better outcomes than do their incinerators counterparts.[852] Recycling is also more beneficial than producing new products with raw materials, which connects to incineration.[853] Based on the Brazilian market of 2010, when compared with the production of raw materials, recycling generates environmental benefits through energy savings[854] in many products,[855] such as steel,[856] aluminium,[857] cellulose,[858] plastic[859] and glass.[860]

Recycling enables materials to re-enter the production process chain, positively affecting pollution repeatedly. Several materials can be recycled multiple times without losing their physical properties, such as metals and steel. In Brazil, the recycling of metals and steel is considered established. In the country, each tonne of recycled steel saves 1,140 kilos of iron ore, 154 kilos of coal and 18 kilos of lime.[861]

Due to the work of the waste pickers, Brazil is a global leader in aluminium can recycling.[862] On average, the country recycles over 96 per cent of its aluminium cans, which is approximately 319,900 tonnes of cans. The recycling of a tonne of aluminium saves 95 per cent of energy in the production process;[863] in other words, each recycled aluminium can represents energy saving equivalent to one television turned on for three hours. The recycling of 1 kg of aluminium, which is 67 cans, also saves 5 kg of bauxite, and in the process, reduces 85 per cent of air pollution and 76 per cent of water consumption.[864]

Nonetheless, Brazilian waste pickers also precipitate specific environmental problems owing to the nature of their work. Neighbours of organised waste pickers' storage sheds have complained about the odour and pathogen infestations and exhibited hostility about the visual

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[852] MORRIS, Comparative LCAs for Curbside Recycling Versus Either Landfilling or Incineration with Energy Recovery, p. 12.
[853] Incineration consists of burning solid waste; therefore, production processes produce new products with raw materials.
[854] Value calculated based on Brazilian Reais (BRL) per tonne, and later converted to United States dollars (USD) per tonne. The currency conversion was based on the exchange rate of BRL and USD of 1 July 2010.
[855] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, p. 16.
[856] BRL26.37 per tonne; USD14.59 per tonne.
[857] BRL168.86 per tonne; USD93.45 per tonne.
[858] BRL9.72 per tonne; USD5.37 per tonne.
[859] BRL5.16 per tonne; USD2.85 per tonne.
[860] BRL3.18 per tonne; USD1.75 per tonne.
[861] J. MENDO CONSULTORIA, **Estudo da Reciclagem de Metais no País**, Brasília, DF: Ministério de Minas e Energia MME, 2009, p. 14.
[862] ASSOCIAÇÃO BRASILEIRA DO ALUMÍNIO - ABAL; ABRALATAS, Campeão da Reciclagem, **Revista Alumínio**, v. 55, p. 50, 2019, p. 34.
[863] This is because 17.600 kwh is needed to produce aluminium from raw materials, against 750 kwh from recycled products.
[864] J. MENDO CONSULTORIA, **Estudo da Reciclagem de Metais no País**, p. 56.

impact of the sheds.[865] Many of these complaints lead to conflicts, and reports of criminal fires set in an attempt to force the waste pickers to move have been filed.[866] These types of objections are not that dissimilar to other NIMBY complaints, which also affect incinerators, as previously discussed in Chapter 1.

Nevertheless, on balance, waste pickers mainly produce environmental benefits to their communities. Recycling activities reduce the pressure of resource exploitation, climate change, accumulation of toxic substances in ecosystems and biodiversity loss.[867] Even in cases where materials are transported over reasonably long distances, these benefits are not compromised.[868]

3.3.1.2 Services Provided

The organised waste pickers, in their small-scale businesses,[869] have developed a local technology to manage waste sustainably. Waste picking in cooperatives and associations has several phases. The work phases are the collection, reception and transportation of the materials; classification,[870] pressing and ascertaining weight, storing, transporting and marketing.[871] In 2018, a research conducted with 260 Brazilian waste pickers' enterprises showed that, on average, they commercialise 34.3 tonnes of waste every month.[872]

In Brazil, waste pickers have been advocating for recognition as environmental stewards who provide urban environmental services.[873] Thus, they seek to be paid for the environmental services they provide in cities.[874] They want to be paid for what they trade and for the benefits that their sustainable waste management practices generate for society.

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[865] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 7.
[866] *Ibid*.
[867] UN ENVIRONMENT, **Global Environment Outlook - GEO-6**, p. 426.
[868] MERRILD, Hanna; LARSEN, Anna W.; CHRISTENSEN, Thomas H., Assessing recycling versus incineration of key materials in municipal waste: The importance of efficient energy recovery and transport distances, **Waste Management**, v. 32, n. 5, p. 1009–1018, 2012, p. 1017.
[869] GUTBERLET, Informal and Cooperative Recycling as a Poverty Eradication Strategy, p. 21.
[870] Classification is specific material separation for cardboard, ferrous materials, soft and hard plastics, the different sorts of glass, leather and textiles, and furniture, amongst others.
[871] GUTBERLET, Social aspects of solid waste in the global South., p. 328.
[872] ANCAT, **Anuário da Reciclagem 2017-2018**, p. 42.
[873] *See* MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**.
[874] DIAS, Livelihood Profile: Waste Pickers, p. 26; DIAS; SAMSON, **Informal Economy Monitoring Study Sector Report: Waste Pickers**, p. 95; SAMSON, **Refusing to be Cast Aside – Waste Pickers Organising Around the World.**, p. 95; GUTBERLET, Jutta, More inclusive and cleaner cities with waste management co-production: Insights from participatory epistemologies and methods, **Habitat International**, v. 46, p. 234–243, 2015, p. 241–242.

Urban environmental services are a definition derived from environmental service and ecological service ideas and is widely used in the literature.[875] The term ecological services gained recognition after being popularised by the Millennium Ecosystem Assessment, and they consist of the services people obtain from healthy ecosystems.[876] Environmental services are the flow of materials, energy and information that come from nature and are combined with human labour to produce wellbeing for people.[877] In practice, these terms are used as synonyms.[878]

In Brazil, the most common expression[879] is environmental services,[880] and it is recognised[881] that waste pickers provide urban environmental services.[882] In this sense, waste pickers provide services in urban areas, generating positive environmental externalities[883] or minimising negative environmental externalities. In terms of waste management, urban environmental services would include the correct disposal of solid waste and urban waste recycling.[884]

These practices generate many benefits for society. Some examples are the decrease in the risks of infectious diseases, in water and energy consumption, in greenhouse emissions, and in the need for renewable and non-renewable virgin raw material;[885] and the preservation of biodiversity and non-wooden resources.[886] In brief, waste pickers' activities reintroduce

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[875] WUNDER, Revisiting the concept of payments for environmental services, p. 239.
[876] MEA, **Ecosystems and human well-being: a framework for assessment**, Washington: Millennium Ecosystem Assessment, 2003, p. 53.
[877] COSTANZA, Robert *et al*, The value of the world's ecosystem services and natural capital, **Nature**, v. 387, p. 253–260, 1997, p. 254.
[878] WUNDER, Revisiting the concept of payments for environmental services, p. 242.
[879] NUSDEO, **Pagamento por Serviços Ambientais. Sustentabilidade e disciplina jurídica.**, p. 13.
[880] In Portuguese: *serviço ambiental.*
[881] *See* IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**
[882] Examples of urban environmental services unrelated to waste pickers include sewage treatment for improved water quality; public transport, which results in a reduction of greenhouse gases; and maintenance of green areas by increasing soil permeability and reducing the risks of floods and landslides.
[883] The externality concept results from some consequences of the production process not being imputed by the economic system. These consequences can be positive or negative, affecting society. The use of nature and the adverse effects on the environment caused by the production process are examples of negative externalities endured by the community, and not by the producers who obtain the profits.
[884] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, p. 32.
[885] Some examples of non-renewable virgin raw materials are pulp, iron ore, bauxite and petroleum.
[886] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, p. 32.

materials into the production chains, extend the life span of sanitary landfills that receive less waste, contribute to cities' cleanliness and reduce pollution.[887]

Significantly, urban environmental services are distinct from sanitation services.[888] The former is similar to the latter, but the difference is that the environmental services generate positive environmental externalities or minimise negative environmental externalities, at least partially relating to market failures to the environment. Within the scope of urban environmental services, the waste pickers' activities improve water quality, reduce greenhouse gas emissions and reduce the risk of infectious diseases.[889] Recycling reduces water consumption and pollution, the negative impact on natural resources and the use of virgin renewable and non-renewable raw materials. In other words, waste pickers' activities generate several environmental services, as required by PES theories,[890] further explained in Chapter 4.

Considering the decrease of pollution, previously addressed, and the environmental benefits provided by waste pickers, their services are consistent with the concept of environmental services established in the Brazilian legislation. For example, through their activities, they assist in maintaining biodiversity[891] and decreasing air pollution.[892]

Notably, organised waste pickers are active in different phases of the recycling value chain, adding value to materials and boosting the provision of environmental services. First, they collect mixed and discarded materials, where the recyclables are added value through their recovery via sorting. In the processing phase, waste pickers clean and compact the materials, significantly adding value. Last, they commercialise transformed products in local retail markets.[893]

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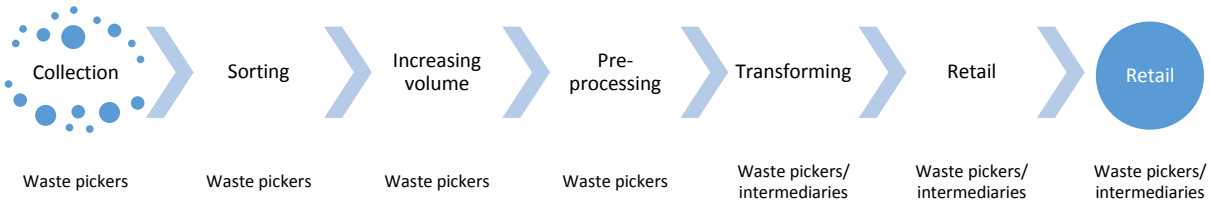
[887] DIAS, Sonia, Forward from WIEGO'S Waste Specialist in Paying Waste Pickers for Environmental Services: A Critical Examination of Options Proposed in Brazil., **WIEGO Technical Brief (Urban Policies)**, n. 6, 2012, p. 2.
[888] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, p. 32.
[889] *Ibid*.
[890] *Ibid*.
[891] Brasil, 'Lei Nº 14.119, de 13 de Janeiro de 2021' https://www.in.gov.br/en/web/dou/-/lei-n-14.119-de-13-de-janeiro-de-2021-298899394, article 2.II.b.
[892] Ibid, article 2.II.c.
[893] COHEN, Peter; IJGOSSE, Jeroen; STURZENEGGE, Germán, **Desarrollo de planes de inclusión para recicladores informales en sitios de disposición final: una guía operativa**, Washington, D.C.: Inter-American Development Bank - IDB, 2013, p. 78.

Figure 2 - The recycling value chain



Created by the author, based on previous research.[894]

In short, waste pickers are the main actors in sustainable waste management in Brazil and provide urban environmental services. These services lead to many environmental benefits, including overall pollution reduction. Waste pickers participate in all phases of the recycling value chain, significantly adding value to the materials and fulfilling the ecodesign criterion.

3.3.2 Evaluation of Waste Pickers through the Sovereign Communities Lens

Sovereign communities and waste management are interconnected topics since waste management systems are located near these communities. Waste management facilities are not isolated, and they can produce positive or negative outcomes for the surrounding population, as discussed earlier in Section 3.2.2 'Evaluation of Incineration through the Sovereign Communities Lens'. Understanding that waste management is part of communities is essential when investigating whether the models at hand contribute to, or disrupt, sovereign communities.

[894] *Ibid*.; THE ECONOMIST INTELLIGENCE UNIT, **Progress and Challenges for Inclusive Recycling: An Assessment of 12 Latin American and Caribbean Cities.**, New York, NY: EIU, 2017, p. 15.

3.3.2.1 Empowerment

A growing body of research has suggested that governments should recognise and remunerate the work of the waste pickers, particularly with public policies. As government-supported organised workers, they would be able to conduct their activities in a sanitary manner and be the perfect example of sustainable development. Waste picking creates jobs, reduces poverty, prevents pollution, decreases greenhouse gas emissions and protects nature.[895]

Waste pickers' facilities are mostly located in environmental justice communities because these workers are urban residents[896] living near waste disposal sites. Many Brazilian waste pickers live and work in precarious urban settlements, widespread in the urban fringe of large cities.[897] Data about informal activities is difficult, and the conditions in the various regions of the country differ; however, the literature has suggested that waste pickers' enterprises in Brazil are located near the workers' living areas, which are usually low-income communities.[898]

Since they are residents, the problem is not the location of their enterprises, but the conditions. A positive effect is that organised waste pickers have initiatives to give people livelihoods and empowerment,[899] thus fostering sovereign communities. The problem is that they are still economically undervalued, with serious health risks and social stigmatisation.[900] Although it is known that improper waste management facilities create unsanitary conditions for local communities; clear evidence of the extent of the risks is unavailable,[901] meaning that because the risks are unknown, waste pickers may struggle to overcome them.

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[895] MEDINA, Living off Trash in Latin America: Debunking the Myths, p. 23.
[896] Waste pickers in Brazil are an urban phenomenon, and 93 per cent of them live in cities. See IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 44.
[897] GUTBERLET, **Recovering resources-recycling citizenship: Urban poverty reduction in Latin America**, p. 6.
[898] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 65.
[899] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 9; NUNN, Neil; GUTBERLET, Jutta, Cooperative recycling in São Paulo, Brazil: towards an emotional consideration of empowerment: Cooperative recycling in São Paulo, Brazil, **Area**, v. 45, n. 4, p. 452–458, 2013, p. 454.
[900] ILO, **Waste pickers' cooperatives and social and solidarity economy organizations**, Geneva, Switzerland: International Labour Office - ILO, 2019, p. 1.
[901] WILSON; VELIS; CHEESEMAN, Role of informal sector recycling in waste management in developing countries, p. 804.

3.3.2.2 Connecting People and Nature

To connect people and nature and make communities sovereign, organised waste pickers must observe the a priori waste hierarchy. There is a growing concern, particularly among activists,[902] that waste management discussions may lose followers in the short term if the waste hierarchy and the Rs framework are strictly followed.[903] This indicates the reason that, in practice, policies around Rs have been more oriented towards promoting recycling.[904] The broader point raised by this argument is that despite being beneficial, policies promoting recycling and waste pickers must ensure compliance with the a priori waste hierarchy, ecological integrity for nature and a dignified life for people.[905]

In light of the reported connection between people and nature that organised waste pickers foster, these workers are allied with local communities as they make significant socio-environmental contributions. Their work contributes to public health, sanitation and the environment at the local, national and international levels.[906] In Brazil, it is estimated that they are responsible for most recycling,[907] and they operate from waste collection to reintroduction into the production process.[908] Waste picking perceives the importance of waste as part of nature, creating further use as a recycled or reused good.[909]

The informal recycling sector is an ally of local businesses, often partnering with them to collect waste materials. In Brazil, waste pickers self-identify as environmental agents,[910] and this relationship with the community can be useful in promoting education about how to waste less and recycle more.[911] This contact is an opportunity to create socio-environmental awareness.[912] With time, waste pickers tend to become highly skilled in identifying the

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[902] KIRCHHERR; REIKE; HEKKERT, Conceptualizing the circular economy, p. 227.
[903] CULLEN, Jonathan M., Circular Economy: Theoretical Benchmark or Perpetual Motion Machine?, **Journal of Industrial Ecology**, v. 21, n. 3, p. 483–486, 2017, p. 485.
[904] GHISELLINI; CIALANI; ULGIATI, A review on circular economy, p. 16.
[905] POPE, **Transferência Transfronteiriça de Resíduos sob a Perspectiva da Justiça Ecológica : Rumo à Gestão Internacional de Resíduos**, p. 409.
[906] ILO, **Waste pickers' cooperatives and social and solidarity economy organizations**, p. 1.
[907] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 19.
[908] GUTBERLET *et al*, Participatory Research Revealing the Work and Occupational Health Hazards of Cooperative Recyclers in Brazil, p. 4616.
[909] BINION; GUTBERLET, The effects of handling solid waste on the wellbeing of informal and organized recyclers, p. 43.
[910] MNCR, **Programa Nacional de Luta**, Programa Nacional de Luta, Disponível em: http://www.mncr.org.br/sobre-o-mncr/o-que-e-o-movimento/setores/programa-de-luta, acesso em: 8 dez. 2019, p. 1.
[911] GUTBERLET, **Recovering resources-recycling citizenship: Urban poverty reduction in Latin America**, p. 7.
[912] GUTBERLET, Informal and Cooperative Recycling as a Poverty Eradication Strategy, p. 26; GUTBERLET, Waste in the City: Challenges and Opportunities for Urban Agglomeration, p. 197.

ecological and economic value of waste,[913] and their work. In short, waste pickers' enterprises have strong ties with their communities, creating the possibility of fostering environmental education and strengthening the relationship between people and nature.

The connection with communities is particularly secure when waste pickers are organised. These workers have a great deal to gain by joining cooperatives and associations, mainly because it is a way for empowerment. They strengthen their arguments when dealing with industry and government, become actors in the development process and overcome poverty through social urban grassroots social movements[914] and development. Waste pickers' organisations generate stability, higher incomes and legalisation of their activities. Cooperatives and associations result in contracts with the industry or grant agreements with donors.[915] In this context, this thesis argues that law and policy should promote waste pickers' enterprises as a way to promote a socially fair and environmentally sustainable future in waste management for Brazil.

3.3.3 Evaluation of Waste Pickers through the Generative Ownership Lens

As previously explained, generative ownership is the ecolaw-informed criterion focused on responsible property. This responsibility must provide positive outcomes in the business and for the community where the business is located. The following section will investigate the organised waste pickers through both these elements of the generative ownership criterion.

3.3.3.1 Generative Ownership in Business

The informal recycling sector in Brazil deeply connects with the generative ownership criterion. As organised workers, waste pickers form cooperatives and associations with the mission of protecting nature and empowering vulnerable people through inclusive recycling practices.[916] The National Solid Waste Policy addresses the need to integrate waste pickers

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[913] WILSON; VELIS; CHEESEMAN, Role of informal sector recycling in waste management in developing countries, p. 801.
[914] See Chapter 2. For more information about urban social movements, see CASTELLS, Manuel, **The City and the Grassroots : A Cross-cultural Theory of Urban Social Movements.**, London, UK: E. Arnold, 1983.
[915] MEDINA, The informal recycling sector in developing countries, p. 1–2.
[916] MNCR, **Programa Nacional de Luta**.

approaching these business models.[917] Therefore, waste pickers' enterprises are addressing social and environmental improvements, as desired by generative ownership.

As reported in the literature, the cooperative model contributes to economic stability and resilience. Cooperatives have low capital requirements and transaction costs because the members are the primary users. In this setting, there is no conflict with investors, and businesses tend to be centred on workers.[918]

The organised waste pickers of Brazil stress the intersectionality[919] factor among workers, endorsing responsibility in their businesses. The National Waste Pickers' Movement has empowerment of women and gender equality[920] as one of its main programs.[921] This is important because according to the movement, black women are the majority of the group.[922]

By promoting black women, Brazilian waste pickers are working towards diversity. The intersection between race, gender and social class is historically problematic in Brazil. According to the National Waste Pickers' Movement, most of the women waste pickers are black, married to men with alcohol or drug addictions, are responsible for taking care of their children and are the leading household providers.[923] Often, they face social prejudice and are

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[917] Lei Federal N° 12.305, de 2 de Agosto de 2010. (n 11), article 8.IV.
[918] HENRŸ, Hagen, **Guidelines for Cooperative Legislation**, 3. ed. Geneva: International Labour Office - ILO, 2012, p. 23.
[919] Intersectionality is a concept that stresses the interconnected nature of social identities that create different sources of discrimination and privilege. For instance, gender, race and social class are overlapping factors contributing to the systemic discrimination of poor black women. *See* CHO, Sumi; CRENSHAW, Kimberlé Williams; MCCALL, Leslie, Toward a Field of Intersectionality Studies: Theory, Applications, and Praxis, **Signs: Journal of Women in Culture and Society**, v. 38, n. 4, p. 785–810, 2013; CRENSHAW, Kimberlé Williams, **On Intersectionality: Essential Writings**, New York: The New Press, 2017; KYRILLOS, Gabriela M., Uma Análise Crítica sobre os Antecedentes da Interseccionalidade, **Revista Estudos Feministas**, v. 28, n. 1, p. 1–12, 2020; GONZALEZ, Lélia, Cultura, Etnicidade e Trabalho: Efeitos Linguísticos e Políticos da Exploração da Mulher, *in*: **8º Encontro Nacional da Latin American Studies Association**. Pittsburgh, 1979.
[920] In 2008, the National Waste Pickers' Movement had their first event focusing on women waste pickers.
[921] *See* MNCR, **Programa Nacional de Luta**; MNCR, Movimento Nacional dos Catadores de Materiais Recicláveis, **Mulheres são maioria entre Catadores de Materiais Recicláveis**, MNCR Movimento Nacional dos Catadores de Materiasi Recicláveis, Disponível em: http://mncr.org.br/noticias/noticias-regionais/mulheres-sao-maioria-entre-catadores-organizados-em-cooperativas, acesso em: 31 jul. 2019.
[922] IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 30; MNCR, **Mulheres são maioria entre Catadores de Materiais Recicláveis**.
[923] The author's free translation of the statement, originally in Portuguese: '*A maioria negra, mulher de alcoólico ou drogado e responsável pelo sustento da família. Essa mulher levanta cedo, atende aos filhos, pega seu carrinho e vai trabalhar. Muitas são vítimas de preconceito, tratadas como mendiga. Queremos mostrar nossa importância para a sociedade, para o poder público.*'

treated as beggars rather than workers.[924] The concerns over gender in the movement aim to show society and the Public Power the critical role of socially excluded, poor, black women.[925]

Nevertheless, many problems remain for organised waste pickers. Although working as a member of a cooperative tends to alleviate health issues,[926] organised waste pickers face challenges with chemical hazards, infection, musculoskeletal damage, mechanical trauma, accidents, emotional vulnerabilities, exhaustion, headaches, respiratory problems, hypertension, gastrointestinal problems, and joint pain/disease and environmental contamination.[927] Improvements are needed in business conditions because of hygienic and structural issues in kitchens and bathrooms, and leaking roofs. Organised workers also struggle to use protective clothing and equipment, mostly because the available gear is not comfortable, adequate or durable, and is not tailored to their specific activities.[928]

Waste pickers' enterprises also have gender-based vulnerabilities. In the workplace, hegemonic masculinities emerge, and the most prestigious positions, such as drivers and press operators, are for men, with the justification that they demand strength and technical abilities. Thus, women have less prestigious posts, which require lower technical skills, such as material separation.[929] It is difficult for women to occupy positions of authority in waste pickers' enterprises or communities. If they do obtain such posts, it is not unusual that they receive less respect than their male counterparts.[930]

The issues faced by cooperatives and associations of waste pickers can be an indicator of bad management affecting the enterprises, hence affecting generative ownership. That is, a pursue of limitless opportunities for the enterprises, disregarding the wellbeing of the members. However, solidarity is a value of cooperativism[931] and organised waste picking, and the problems are likely linked to the lack of structure, funding and capacity-building training sessions.

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[924] IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 30.
[925] MNCR, **Encontro Nacional de Mulheres Catadoras**, Movimento Nacional dos Catadores de Materiais Recicláveis - MNCR, Disponível em: http://www.mncr.org.br/noticias/noticias-regionais/encontro-nacional-de-mulheres-catadoras, acesso em: 18 set. 2019.
[926] BINION; GUTBERLET, The effects of handling solid waste on the wellbeing of informal and organized recyclers, p. 43.
[927] GUTBERLET *et al*, Participatory Research Revealing the Work and Occupational Health Hazards of Cooperative Recyclers in Brazil, p. 4615.
[928] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 5.
[929] NUNN, Neil, 'It can be dangerous for the uterus': hegemonic masculinity and cooperative recycling in São Paulo, Brazil, **Gender, Place & Culture**, v. 20, n. 6, p. 794–810, 2013, p. 798.
[930] DIAS, Sonia; OGANDO, Ana Carolina, **Theoretical Considerations on Gender, Empowerment and Waste**, Manchester, UK: WIEGO Women in informal employment globalizing and organizing, 2015, p. 11.
[931] ICA, Statement on the Co-operative Identity, 2006, p. 1.

In light of the reported challenges, it is demonstrated that the benefits of waste pickers' organisations are expressive. Members of these businesses often share feelings of honour, dignity and pride in their role, and view the workspace as their own collective space, which builds resilience and strong social bonds.[932] Cooperatives and associations are perceived as places that improve physical and mental health, solidify friendships, develop skills and facilitate information sharing regarding health issues. In their own words, these collective workplaces are 'a safe haven', and 'a place that recovers one's soul'.[933]

In short, although there are difficulties, organising presents mental health and work benefits, aligning the organised waste pickers to generative ownership. It raises waste pickers' social status and self-esteem, making them a more appreciated part of society, with improved incomes, quality of life and work conditions. Organisations give institutional frameworks for hiring waste pickers as service suppliers to local bodies and firms, assisting in avoiding intermediaries, which improves their gains and profits. Collective strength also obstructs harassment and violence,[934] including exploitation from intermediaries, and decreases gender discrimination among waste pickers, as further discussed in Chapter 5, Section 5.3.1 'Key Stakeholders'.

3.3.3.2 Generative Ownership in the Community

The sense of responsibility for the community in organised waste pickers is clear. As previously mentioned, they conduct several practices, including, but not limited to, recycling, which directly benefits the community. In Brazil, waste pickers are the leading, and often the only, providers of sustainable waste management.

Nonetheless, some authors have also suggested that waste pickers can be regarded as non-committed workers, whose enterprises do not pay tax.[935] The Brazilian government recognised that waste pickers' enterprises have a different juridical nature from that of most economic societies, which, combined with the workers' lack of formal education, creates a

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[932] NUNN; GUTBERLET, Cooperative recycling in São Paulo, Brazil, p. 454.
[933] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 9.
[934] DIAS; FERNANDEZ, Waste Pickers - A gendered perspective, p. 153.
[935] BESEN, Gina Rizpah, **Programas municipais de coleta seletiva em parceria com organizações de catadores na Região Metropolitana de São Paulo: desafios e perspectivas.**, Masters' Dissertation, Universidade de São Paulo, São Paulo, 2006, p. 119, 129, 143; SCARLET, Carmo, A semântica do lixo e o desenvolvimento socioeconômico dos catadores de recicláveis—considerações sobre um estudo de caso múltiplo em cooperativas na cidade do Rio de Janeiro, **Cadernos Ebape**, v. 7, n. 4, p. 591–606, 2009, p. 602.

confusing context. As part of a federal program for waste pickers,[936] a guide explaining their tax obligations and exemptions was developed.[937]

The cooperative model challenges the assumption that waste pickers' organisations are non-committed. Prior studies have emphasised that cooperatives tend to invest in the community and create jobs, benefiting the local economy. The positive results in the local community have a return impact of strengthening the cooperatives.[938] In terms of labour, the National Waste Pickers' Movement indicates that there are 120,000 organised waste pickers in Brazil, not counting informal workers.[939] As previously mentioned, these workers are the most vulnerable and marginalised people.

A recent GAIA study concluded that there is a significant difference in job creation between incineration and recycling—recycling generates more than 50 times as many jobs as incinerators.[940] The authors contended that recycling offers better employment as well, because it can use skills beyond manual labour, give higher wages, create more permanent positions and improve the quality of life.[941] This report projected that with an 80 per cent diversion rate, the city of São Paulo can create over 30,000 new jobs in recycling.[942]

The organised waste pickers not only support their enterprises but also aim to strengthen cooperation between waste pickers' businesses. In 2014, the National Waste Pickers' Movement proposed to the Brazilian government the implementation of an investment program for popular recycling called Pronarep.[943] If applied, this program would create legally structured, inter-cooperative solidarity mechanisms, moving beyond the traditional credit lines that promote competition among waste pickers' enterprises. The popular recycling concept aims to create inclusion and equity throughout the recycling chain; thus, all waste pickers' cooperatives and associations involved would be fairly integrated and compensated from collection to recycling.[944] This evidence suggests that waste pickers' organisations are not concerned with particular enterprises, but with all organised waste pickers.

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[936] See Chapter 5.
[937] MMA, **Manual de Orientação Tributária destinado às Associações e Cooperativas de Catadoras e Catadores de Materiais Recicláveis**, São Paulo: Ministério do Meio Ambiente, 2015, p. 4.
[938] HENRŸ, **Guidelines for Cooperative Legislation**, p. 24.
[939] MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**, p. 2.
[940] RIBEIRO-BROOMHEAD, John; TANGRI, Neil, **Zero Waste and Economic Recovery: The Job Creation Potential of Zero Waste Solutions**, Berkley: GAIA - Global Alliance for Incinerator Alternatives, 2021, p. 4.
[941] *Ibid*.
[942] *Ibid*., p. 15.
[943] Pronarep is an acronym in Portuguese for *Programa Nacional de Investimento na Reciclagem Popular,* which translates to National Program for Investing in Public Recycling.
[944] IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 30; MNCR, Movimento

Waste pickers desire to organise in cooperatives and associations; however, this process has limitations. It requires persistence, leadership, the knowledge of formal procedures and the availability of financial resources.[945] For instance, the formation of cooperatives may involve the payment of fees, and other complicated, time-consuming processes, which are obstacles that deter waste pickers from formally forming a cooperative. Still, it is common for these workers to receive financial or technical support from other waste pickers' enterprises, non-governmental organisations, universities or the local government.[946]

Although there has been an improvement, waste pickers remain unacknowledged by municipalities, as further discussed in Chapter 5, Section 5.2 'How the Ecolaw-informed PES Model Can Advance the Successes and Address the Challenges of Existing Policies and Programs'. These workers should be perceived in the multiple dimensions that they represent, as environmental stewards, who collect and recycle waste; as economic actors, critical to the value chain; as political actors, who increase social inclusion through collective action; and as drivers of social change, who provide a source of income for vulnerable communities.[947]

3.3.4 Results

This section showed that organised waste pickers meet the ecolaw-informed criteria. By comparing with the results for waste-to-energy incinerators, the results for organised waste pickers were demonstrated to be superior in terms of energy savings and overall pollution prevention. This finding ties well with those of prior studies that assert that organised waste pickers are environmental service providers, chiefly due to recycling. Thus, the activities of waste pickers align well with ecodesign principles.

A further finding is that organised waste pickers respond well to making communities sovereign. The findings are directly in line with the argument that waste pickers empower communities because they are part of these communities. They have created a bottom-up, contextual-based waste management strategy, which handles the communal demands. The

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Nacional dos Catadores de Materiasi Reciclaveis, **Catadores entregam proposta do PRONAREP ao Governo Federal**, MNCR Movimento Nacional dos Catadores de Materiasi Recicláveis, Disponível em: http://www.mncr.org.br/noticias/noticias-regionais/catadores-entregam-proposta-do-pronarep-ao-governo-federal, acesso em: 23 set. 2019, p. 1.

[945] ZAPATA CAMPOS, María José; ZAPATA, Patrik, Translating Development Aid Into City Management: The Barrio Acahualinca Integrated Development Programme In Managua, Nicaragua: Translating Development Aid Into City Management, **Public Administration and Development**, v. 33, n. 2, p. 101–112, 2013, p. 109.

[946] GUTBERLET *et al*, Socio-environmental entrepreneurship and the provision of critical services in informal settlements, p. 206.

[947] DIAS, Waste pickers and cities, p. 376.

organised waste pickers provide many socio-environmental benefits and connect people to nature, since their connection to nature is less hierarchical.

This study has shown that regarding the generative ownership criterion, the organised waste pickers undergo some problems. The bulk of their issues arise from health and safety conditions in waste pickers' enterprises, which negatively affect generative ownership in the business. However, on comparing this result to those for other aspects, it must be highlighted that waste pickers' attention to the intersectional forms of oppression suffered by women in waste picking and the benefits of collective work are significant. In terms of generative ownership in communities, their enterprises positively affect the local economy. The results in this section suggest that, despite the problems, organised waste pickers satisfy the generative ownership criterion.

3.4 CONCLUSION

Considering the ecolaw-informed criteria, the organised waste pickers are the best-suited sustainable waste management model for Brazil, when compared with waste-to-energy incineration. They fulfil all three ecolaw-informed criteria, namely ecodesign, sovereign communities and generative ownership. The fact that they produce environmental services is arguably the most significant benefit waste pickers present. In contrast, the criteria for which waste-to-energy incinerators presented the worst results are the ones reflecting the negative effects that they have on the health, employment and finances of local communities.

Despite the many social, economic and environmental gains made by organised waste pickers, they still need improvement. First, only a minority of Brazilian waste pickers are members of a cooperative or association. This is problematic because organised workers are more empowered when negotiating their trades and claiming their rights. In addition, more can be done by enterprises to enhance the health and safety conditions of their workers. Since the waste pickers manage waste, which is the municipalities' responsibility, the local governments are also responsible for mitigating the risks these people face.

Therefore, government intervention is timely, and waste pickers' enterprises should be integrated into formal waste management systems. In the next chapter, it is argued that this should take place through PES. Thus, the next chapter discusses the main theories of PES, its application in Brazil and the connection between PES and the ecolaw-informed framework.

4 COMPETING CONCEPTIONS OF THE CONCEPT OF PAYMENT FOR ENVIRONMENTAL SERVICES

As Chapters 1 and 3 explained, ensuring a prosperous future for the Global South calls for imaginative solutions to counter the projected massive urbanisation levels and their environmental effects, particularly for waste management. As this thesis argues, waste initiatives can and should be built on the existing sustainable waste management practices[948] already being performed by waste pickers.[949] Their current waste management structures in the Global South has proven to the best option to foster due to their fulfilment of the ecolaw-informed criteria explained in Chapter 3—ecodesign, making communities sovereign and making ownership generative. Worldwide, waste pickers identify as environmental agents and request to be paid for providing sustainable waste management and generating environmental services.[950] The integration of these workers into formal waste management systems, giving them more stability and safety, is paramount to enhancing their lives and promoting recycling.

The most successful initiatives of waste pickers' enterprises occur when partnering with local governments. When they have signed contracts, organised waste pickers formally figure as sustainable waste management service providers in institutionalised settings. Public policies designing these inclusive systems are essential to have successful, lasting programs.[951]

PES models traditionally emerge in these scenarios. PES denotes an exchange between actors who provide sustainable practices benefiting nature and society, and the payers, often governments, who have a direct interest in those benefits. This raises the question whether PES is cohesive with the ecolaw-informed settings. Simultaneously, it confronts the instrument's capacity to be inclusive and to produce environmental and social gains. By examining the dominant debates on PES, its application in Brazil and its correspondence with the ecolaw-informed framework, this chapter relates to the previous discussions about the ecolaw-informed framework and to waste management models. The analysis of PES extends the application of the ecolaw-informed criteria to a current instrument of environmental law in the Global South, particularly Brazil, connecting PES and waste pickers through these criteria. In the next chapter,

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[948] GUTBERLET *et al*, Bridging Weak Links of Solid Waste Management in Informal Settlements, p. 1226.
[949] GUTBERLET; BAEDER, Informal recycling and occupational health in Santo André, Brazil, p. 12.
[950] DIAS, Livelihood Profile: Waste Pickers, p. 26; DIAS; SAMSON, **Informal Economy Monitoring Study Sector Report: Waste Pickers**, p. 95; SAMSON, **Refusing to be Cast Aside – Waste Pickers Organising Around the World.**, p. 95; GUTBERLET, More inclusive and cleaner cities with waste management co-production, p. 241–242.
[951] BESEN; GUTBERLET, Participatory urban solid waste governance in the global South, p. 17.

a PES model is developed to best secure sustainable waste management practices in Brazil in a manner that is inclusive of waste pickers and the ecolaw-informed criteria, consistent with the Brazilian legislation and lessons from previous waste management programs.

A large body of literature has sought to debate PES theory. Most prior research reflects two central frameworks: market-based or environmental economics PES, promoted by Sven Wunder[952] and social-based or ecological economics PES, led by Ronald Muradian.[953]

In regard to Brazil, a considerable body of research has been published on the conceptual framework of PES.[954] Some authors have emphasised its controversial connection with environmental economics,[955] and others have focused on analysing its application and the weakening of the land rights of traditional and vulnerable peoples, such as Indigenous communities and traditional farmers.[956] Studies of cases are well documented in the legal field; for example, the 'conservador das águas' project,[957] the 'Proambiente' program,[958] the two projects, 'Estradas com Araucárias' and 'Remanescentes Florestais - Mina D`Água' and the following programs: 'Bioclima e Biocrédito', 'Bolsa Verde', 'ProdutorES de Água—ES', 'Reflorestar', 'Certificação de Unidades Produtivas Familiares', 'SISA' and 'Bolsa Floresta'.[959] This literature has strongly suggested that social and environmental sustainability demands a departure from a purely market-based or environmental economics approach and a more significant role for a socially based and ecological economics model.[960] Previous studies have focused almost exclusively on rural areas. Although some research about PES on urban spaces

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[952] WUNDER, Payments for Environmental Services: Some Nuts and Bolts; WUNDER, Revisiting the concept of payments for environmental services.
[953] MURADIAN *et al*, Reconciling theory and practice.
[954] NUSDEO, **Pagamento por Serviços Ambientais. Sustentabilidade e disciplina jurídica.**
[955] PACKER, Larissa Ambrosano, Pagamento por "Serviços Ambientais" e flexibilização do Código Florestal para um capitalismo "verde"., 2011; PACKER, **Novo Código Florestal & Pagamento por Serviços Ambientais. Regime proprietário de bens comuns.**; MAMED, **Pagamento por Serviços Ambientais e Mercantilização da Natureza na Sociedade Moderna Capitalista.**
[956] FASE, **Visões Alternativas ao Pagamento por Serviços Ambientais.**, 1. ed. Rio de Janeiro: FASE - Solidariedade e Educação, 2013.
[957] JODAS, Natália, **Pagamento por Serviços Ambientais no âmbito do Projeto "Conservador das Águas" (Extrema/MG): uma análise da efetividade socioambiental**, Masters' Dissertation, Universidade Federal de Santa Catarina - UFSC, Florianópolis, 2015.
[958] FERREIRA NETO, Paulo Sérgio, **Avaliação do Proambiente Programa de Desenvolvimento Socioambiental da Produção Familiar Rural**, Brasília: Ministério do Meio Ambiente, 2008.
[959] *See* TEJEIRO, Guillermo; STANTON, Marcia; LAVRATTI, Paula (orgs.), **Sistemas Estaduais de Pagamento por Serviços Ambientais. Diagnóstico, lições aprendidas e desafios para a futura legislação.**, 1. ed. São Paulo: Planeta Verde, 2014.
[960] *See* MELO, **Pagamento por Serviços Ambientais (PSA): entre a proteção e a mercantilização dos serviços ecossistêmicos no contexto de crise ambiental.**; JODAS, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**; GONÇALVES, Ana Paula Rengel, **Agroecologia e Pagamentos por Serviços Ambientais: Lições e Perspectivas**, São Paulo: Planeta Verde, 2017.

and for waste pickers[961] has been published,[962] these matters remain largely unexplored. Therefore, in the next chapter, this thesis's task is to contribute to the field by developing a context-based, inductive model of PES tailored for the organised waste pickers in Brazil, based on the ecolaw-informed criteria explained in Chapter 2.

Overall, there is substantial literature about PES. In the past decade, many authors have discussed the main topics addressed in the previous paragraphs. It is essential to situate the leading debates worldwide and in Brazil. Nonetheless, an extensive re-investigation does not create an original contribution; hence, it is not the point of this chapter. Although PES has been criticised for its neoliberal roots and disconnection between theory and practice, this thesis argues that it is not the model itself that is flawed, but its execution based on old human–nature reasoning to further economic rationale (see Chapter 2, Section 2.1 'The Parallel Evolution of Scientific and Legal Thought in the Western World' and 2.2 'The Current State of Science and Law'). Hence, this chapter concludes by examining PES through the ecolaw-informed framework lenses, placing it under a new foundation.

In this chapter, a short review of the literature regarding PES will be undertaken, prior to an analysis of the different PES models through the criteria of the ecolaw-informed framework. The literature on this interlink is virtually inexistent. Prior research can be considered the first step towards a more profound understanding of PES in the ecolaw-informed approach. This chapter aims to address this gap in the literature, and to this end, builds on existing studies to identify the approach that is more aligned with the ecolegal system, given the criteria of ecodesign, making communities sovereign and making ownership generative. More specifically, Section 4.1 introduces the general concept of PES and its competing models (market-based and social-based models). Section 4.2 unfolds the dominant PES narratives in Brazil, analysing whether it is market-based or social-based or based on another perspective.

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[961] This thesis focuses on Brazil; however, it is important to mention the significant case of the recognition of the Colombian waste pickers, and their agreements with Colombian cities. *See* PARRA, Federico, The Struggle of Waste Pickers in Colombia: From being considered trash, to being recognised as workers, **Anti-Trafficking Review**, n. 15, p. 122–136, 2020; PARRA, Federico, **Reciclaje: ¡Sí, pero con recicladores! Gestión pública del aprovechamiento con inclusión de recicladores: Un nuevo paradigma en el manejo de los residuos en Bogotá, Colombia**, Manchester, UK: Women in Informal Employment Globalizing and Organizing - WIEGO, 2015.

[962] *See* ALTMANN, Pagamento por Serviços Ambientais Urbanos como instrumento de incentivo para os catadores de materiais recicláveis no Brasil; IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**; RIBEIRO, José Claudio Junqueira; REIS, Alexandre Magrineli dos, Pagamento Por Serviços Ambientais Urbanos - Psau: Criação E Implementação Do Bolsa Reciclagem, *in*: CARLI, Ana Alice De; AYDOS, Elena; AVZARADEL, Pedro Curvello Saavedra (orgs.), **O Estado Regulador no Cenário Ambiental**, São Paulo: Planeta Verde, 2017, p. 104–136.

Last, Section 4.3 investigates PES through the ecolaw-informed criteria, providing it clear guidelines and resonating with the waste pickers' reality.

4.1 COMPETING PES MODELS

PES represents an alternative take on environmental law that has gained prominence in the past two decades. The growing attention given to it led to the development of two main perspectives and one direction that rejects PES[963] as an inept form of commodification of nature.[964]

The two main theories parallel the conflicts between environmental economics and ecological economics.[965] The environmental economics approach centres on economic efficiency, placing PES in the market-based model, and was initiated by Sven Wunder.[966] The ecological economics theory, primarily mentored by Roldan Muradian,[967] simultaneously focuses on nature, vulnerable peoples' rights and economic efficiency, and places PES inside and outside markets. In this thesis, the model under the ecological economics theory is addressed as social-based PES.

This section briefly introduces the development of PES and then analyses the two leading theories on PES. The third vision will be addressed along with a discussion on the criticisms of the market-based approach. The section ends with an analysis of the unique hybrid model of the theories that have emerged in Brazil.

4.1.1 From the Government to Governance: The Rise of PES

During the last decades of the nineteenth century, the command-and-control approach dominated environmental regulation. Over time, it became less attractive and was criticised as costly,[968] inefficient and too complicated, because it requires an extensive network of specific

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[963] FARLEY, Joshua; COSTANZA, Robert, Payments for ecosystem services: From local to global, **Ecological Economics**, v. 69, n. 11, p. 2060–2068, 2010, p. 2160.
[964] KOSOY, Nicolás; CORBERA, Esteve, Payments for ecosystem services as commodity fetishism, **Ecological Economics**, v. 69, n. 6, p. 1228–1236, 2010, p. 1229.
[965] FARLEY; COSTANZA, Payments for ecosystem services, p. 2060.
[966] *See* WUNDER, Payments for Environmental Services: Some Nuts and Bolts; WUNDER, Revisiting the concept of payments for environmental services.
[967] *See* MURADIAN *et al*, Reconciling theory and practice; MURADIAN *et al*, Payments for ecosystem services and the fatal attraction of win-win solutions.
[968] JOHNSON, Stephen M, Economics v. Equity: Do Market-Based Environmental Reforms Exacerbate Environmental Injustice?, **Washington and Lee Law Review**, v. 56, n. 1, p. 111–168, 1999, p. 111.

information and integrated systems.[969] Consequently, market-based mechanisms emerged to assist with environmental problems.[970] The market-based model gained popularity as an antagonist to traditionalist regulation, an attractive, dramatic solution to humans' ongoing neglect of nature.[971] The vision of natural resources as scarce, with the potential of being controlled and engaged, enabled the market-based economy and its instruments.[972] This approach would lead to an emphasis on creating opportunities, trusting the agenda and rationality of actors and inciting land-users' entrepreneurial drive.[973]

The exponential interest in incentive-based schemes reflects a movement from the government to governance. In this sense, the State is no longer the only actor responsible for environmental matters.[974] This view reflects a shift in environmental law from rigid and precise state-based laws to a broader, more flexible configuration. This move also represents the transition in environmental law and policy from the polluter-pays principle[975] to receiver-protector[976] principle.[977] Regulation started to englobe imaginative solutions towards environmental goals, harnessing governments and markets.[978] Environmental governance is evident in market-based initiatives, such as PES.[979]

PES emerged in response to this governance vision; it is perceived as an innovative policy instrument and has been increasingly adopted worldwide since the 1990s. The idea behind PES is to promote environmental sustainability practices in the interest of beneficiary

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[969] SINCLAIR, Darren, Self-Regulation Versus Command and Control? Beyond False Dichotomies, **Law & Policy**, v. 19, n. 4, p. 529–559, 1997, p. 530.
[970] JOHNSON, Economics v. Equity: Do Market-Based Environmental Reforms Exacerbate Environmental Injustice?, p. 113.
[971] REDFORD, Kent H.; ADAMS, William M., Payment for Ecosystem Services and the Challenge of Saving Nature, **Conservation Biology**, v. 23, n. 4, p. 785–787, 2009, p. 785.
[972] DERANI, Cristiane, **Direito ambiental econômico**, 3. ed. São Paulo: Max Limonad, 2008, p. 117.
[973] MCCARTHY, James, Devolution in the Woods: Community Forestry as Hybrid Neoliberalism, **Environment and Planning A: Economy and Space**, v. 37, n. 6, p. 995–1014, 2005, p. 996.
[974] AGRAWAL, Arun; LEMOS, Maria Carmen, A Greener Revolution in the Making?: Environmental Governance in the 21st Century, **Environment: Science and Policy for Sustainable Development**, v. 49, n. 5, p. 36–45, 2007, p. 42.
[975] The polluter-pays principle implies that a polluting agent is obliged to bear the costs of repairing the damage caused to nature.
[976] The provider-gets principle, also known as receiver-protector, proposes the idea of rewarding any agent that has ceased exploiting their natural resources or that has promoted anything for social or environmental purposes.
[977] MAUERHOFER, Volker; HUBACEK, Klaus; COLEBY, Alastor, From Polluter Pays to Provider Gets: Distribution of Rights and Costs under Payments for Ecosystem Services, **Ecology and Society**, v. 18, n. 4, p. 1–13, 2013, p. 8.
[978] GUNNINGHAM, Neil, Environment Law, Regulation and Governance: Shifting Architectures, **Journal of Environmental Law**, v. 21, n. 2, p. 179–212, 2009, p. 181.
[979] AGRAWAL; LEMOS, A Greener Revolution in the Making?, p. 41.

groups, or the public, through financial trades.[980] There are currently more than 550 PES schemes in communities, regions and nations worldwide, with combined annual payments surpassing USD36 billion.[981] However it was typically quickly implemented, often without critical deliberation.[982]

At present, PES is a focal point in the conservation agenda. Several agencies have PES projects, including the United Nations Development Programme, the United Nations Environment Programme (UNEP), the International Fund for Agricultural Development, the Inter-American Development Bank and the World Bank, which has the largest portfolio.[983] The projects are also supported by governments (e.g. Costa Rica, Mexico and South Africa), the private sector (e.g. Danone Water) and non-governmental conservation organisations (e.g. the World Wildlife Fund).[984]

Although the idea behind PES derives from a Northern conception, its practice has spread to the Global South. Costa Rica is considered a pioneer of an authentic PES application, setting up a program in 1997 to promote forestry environmental services.[985] However, similar large-scale incentive-based schemes have also been applied in the Global North.[986] For example, the Conservation Reserve Program initiated in 1985 in the United States is among the first agricultural payment schemes[987] and can be considered the first step towards PES.

At present, various programs are implemented worldwide. Schemes have been developed towards carbon sequestration in Bolivia, Costa Rica and Ecuador.[988] Watershed protection PES is mainly present in Central America and Ecuador.[989] Habitat conservation and

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[980] WEGNER, Giulia Irene, Payments for ecosystem services (PES): a flexible, participatory, and integrated approach for improved conservation and equity outcomes, **Environment, Development and Sustainability**, v. 18, n. 3, p. 617–644, 2016, p. 618.
[981] SALZMAN, James *et al*, The global status and trends of Payments for Ecosystem Services, **Nature Sustainability**, v. 1, n. 3, p. 136–144, 2018, p. 136.
[982] REDFORD; ADAMS, Payment for Ecosystem Services and the Challenge of Saving Nature, p. 785.
[983] CAVELIER, Jaime; GRAY, Ian Munro. **GEF investments on payment for ecosystem services schemes**. Washington, DC: World Bank Group, 2014. Disponível em: http://documents.worldbank.org/curated/en/674691468155116353/GEF-investments-on-payment-for-ecosystem-services-schemes. Acesso em: 9 out. 2019.
[984] PASCUAL *et al*, Social Equity Matters in Payments for Ecosystem Services, p. 1027.
[985] PAGIOLA, Stefano, Payments for environmental services in Costa Rica, **Ecological Economics**, v. 65, n. 4, p. 712–724, 2008, p. 712.
[986] BÖRNER, Jan *et al*, The Effectiveness of Payments for Environmental Services, **World Development**, v. 96, p. 359–374, 2017, p. 359.
[987] GOODWIN, Barry K; SMITH, Vincent H, An Ex Post Evaluation of the Conservation Reserve, Federal Crop Insurance, and Other Government Programs: Program Participation and Soil Erosion, **Journal of Agricultural and Resource Economics**, v. 28, n. 2, p. 201–216, 2003, p. 202, 204.
[988] GÓMEZ-BAGGETHUN, Erik *et al*, The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes, **Ecological Economics**, v. 69, n. 6, p. 1209–1218, 2010, p. 1209.
[989] *Ibid*.

wildlife services are popular in Bolivia and Zimbabwe, and bioprospecting is in Costa Rica. The Global North, especially the United States and the European Union, developed many agro-environmental schemes.[990] These are rural schemes, and the next section will investigate the two main theories about PES that allowed developing these programs—the market-based PES and the social-based PES in Sections 4.1.2 and 4.1.3, respectively—and their influence in Brazil.

4.1.2 The Market-Based PES

Although it was created among a set of other supportive and economic mechanisms, PES is unique. Other incentives, such as state subsidies, subsidise sustainably produced products through the existing commodity markets, whereas PES creates separate markets for the direct purchase of ecosystem and environmental services.[991]

PES originated from what can be considered the central paradigm in environmental discussions.[992] The literature has suggested there is a trend towards commodification and monetisation of nature,[993] established by a parallel rise of neoliberalism on a global scale.[994] In this setting, PES is Global North-based, and Redford and Adams described PES as less than an innovative instrument, but a theory and practice that mirrors the old reasoning on the human–nature relationship, previously discussed in this thesis as mechanistic (see Chapter 2, Section 2.1 'The Parallel Evolution of Scientific and Legal Thought in the Western World'), reshaped for the current political debate.[995] Similarly, Kolinjivadi et al. argued that PES scholarship fails to see its function as a 'performative act', thus lacking a comprehension of how PES limits itself and hindering the construction of new, plural socio-nature articulations.[996] In this context, PES has placed instrumental values as the best strategy to promote environmental protection; simply

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[990] *Ibid*., p. 1214.
[991] WEGNER, Payments for ecosystem services (PES), p. 618.
[992] The insertion of nature into the market to minimise overexploitation and foster human wellbeing was initially performed by combining the theories of Ronald Coase and Arthur C. Pigou. They proposed the correction of negative externalities ('social costs') in the economic sphere, albeit in different formats. Coase suggested market extension, seeking to transform the common property into private property and to assign a price to natural resources. Pigou supported the performance of the State in the economy, intending to correct the market imbalance concerning the use of ecosystems (taxes/'Pigouvian tax') and so that the Public Power could act in a subsidiary way with the costs of external effects. See DERANI, **Direito ambiental econômico**, p. 112.
[993] GÓMEZ-BAGGETHUN *et al*, The history of ecosystem services in economic theory and practice, p. 1216.
[994] SHAPIRO-GARZA, Elizabeth *et al*, Beyond Market Logics: Payments for Ecosystem Services as Alternative Development Practices in the Global South, **Development and Change**, v. 51, n. 1, p. 3–25, 2020, p. 4.
[995] REDFORD; ADAMS, Payment for Ecosystem Services and the Challenge of Saving Nature, p. 785.
[996] KOLINJIVADI, Vijay *et al*, Neoliberal performatives and the 'making' of Payments for Ecosystem Services (PES), **Progress in Human Geography**, v. 43, n. 1, p. 3–25, 2019, p. 5.

put, 'selling nature to save it'.[997] Therefore, valuation serves to make values and externalities visible, capturing and internalising them.[998]

PES is considered problematic for its neoliberal roots. This critique is based on the inconsistencies with institutional contexts and the gap between theory and practice. In particular, a key concern is its association with the conventional economic thought, also known as neoclassical economics, and its subfield, environmental economics.

The original theoretical foundations of the first PES approach emanated from neoclassical environmental economics. Neoclassical economics is the dominant school of economics, which sees the economy as an independent entity. It focuses on the market as the mechanism of allocation[999] and divides nature into sectors, such as forests, mines and fisheries.[1000] As a rule, this school ignores ecological principles, leading to the development of ecologically unsustainable policies. Whereas neoclassical economics concentrates on allocating the cargo[1001] efficiently,[1002] environmental economics emerged as the subfield recognising that welfare relies on ecosystem services[1003] and suffers from pollution. Environmental economists remain dedicated to efficiency and apply techniques to assign a market value to ecosystem services, incorporating them into the market model.[1004]

Modern economics can have a diffuse and diverse influence on programs and policies.[1005] In general, economics discusses how to use means in the service of ends, which involves policies. Meanwhile, policy development requires intelligence on ends and means. Although this science can reach high levels of abstraction, concisely, economics is about policy.[1006]

Juridical policies and instruments can connect with environmental economics in many ways, mainly when the primary goals are optimisation and efficiency. Experiences that allot a

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[997] *Ibid*., p. 17.
[998] MURADIAN, Roldan; PASCUAL, Unai, A typology of elementary forms of human-nature relations: a contribution to the valuation debate, **Current Opinion in Environmental Sustainability**, v. 35, p. 8–14, 2018, p. 8.
[999] DALY; FARLEY, **Ecological Economics: Principles and Applications**, p. 3. Allocation is the main study of economics, and is the process of designating resources to the production of different goods and services.
[1000] *Ibid*., p. 15.
[1001] In economics, cargo implies goods or products being transferred.
[1002] Efficiency is when resources are allocated optimally, serving each individual in the best way while minimising waste and inefficiency.
[1003] The term ecosystem services refers to various interactions in ecosystems that are of use to humans, many of which are essential to human survival. For example, watersheds stabilise the climate, prevent droughts and floods and offer spaces for leisure.
[1004] DALY; FARLEY, **Ecological Economics: Principles and Applications**, p. 5.
[1005] HIRSCHMAN, Daniel; BERMAN, Elizabeth Popp, Do economists make policies? On the political effects of economics, **Socio-Economic Review**, v. 12, n. 4, p. 779–811, 2014, p. 801–802.
[1006] DALY; FARLEY, **Ecological Economics: Principles and Applications**, p. 37.

central role to the commodification of natural resources in the search for infinite growth are related to environmental economics. In other words, mechanisms solely based on these mindsets are not an alternative discourse to economic growth but an alternative growth discourse.[1007]

Since the 1990s, market-based policy approaches have been progressively developed, and PES appeared among them.[1008] A market is a group of buyers and sellers (e.g. individuals, firms and public bodies) involved in voluntary transactions, in which goods and services are exchanged for monetary payments or in-kind arrangements. In this picture, various types of intermediaries exist and require a high level of commoditisation, and the good/service is provided if the payment occurs and vice-versa (conditionality).[1009]

The market-based PES introduced nature and its environmental services to the market as a new commodity.[1010] Here, the trade of environmental services is argued as the solution for market failures that caused these services' undersupply. This approach is a typical neoclassical environmental economics approach since it aims to 'get the price right' for environmental assets and services.[1011]

Under the neoclassical environmental economics and governance template, Wunder developed the original PES prototype. He defined PES as a voluntary transaction in which at least one buyer buys a well-defined environmental service from at least one provider, and this operation is conditional to the service provision.[1012] In theory, PES reflects the scarcity of services and internalises the external costs of ecosystem degradation.[1013]

The market-based definition mainly seeks to recognise the benefit of environmental services by external beneficiaries. Thus, they make direct and contractual payments to the

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[1007] CHARONIS, Degrowth, steady state economics and the circular economy: three distinct yet increasingly converging alternative discourses to economic growth for achieving environmental sustainability and social equity., p. 5.
[1008] The specialised literature emphasised that there is a discussion whether PES is a market or an economic instrument. In Brazil, payments in PES schemes often do not reflect the price of the environmental service provided, but an amount that remunerates the provider's conduct. In this sense, PES is an economic instrument. PES is also argued to be an economic instrument of the market because it creates transactional rights between service users and service providers. In this thesis, the expression market-based PES will be applied because both of the main theories—environmental economics championed by Wunder, and ecological approaches led by Muradian—are based on economics. For more information about the concepts of market and economic instruments, see DERANI; JODAS, Pagamento por serviços ambientais (PSA) e racionalidade ambiental, p. 19; NUSDEO, **Pagamento por Serviços Ambientais. Sustentabilidade e disciplina jurídica.**, p. 103.
[1009] MURADIAN *et al*, Payments for ecosystem services and the fatal attraction of win-win solutions, p. 276.
[1010] KOSOY; CORBERA, Payments for ecosystem services as commodity fetishism, p. 1234.
[1011] MURADIAN *et al*, Reconciling theory and practice, p. 1203.
[1012] WUNDER, Payments for Environmental Services: Some Nuts and Bolts, p. 3.
[1013] ENGEL, Stefanie; PAGIOLA, Stefano; WUNDER, Sven, Designing payments for environmental services in theory and practice: An overview of the issues, **Ecological Economics**, v. 65, n. 4, p. 663–674, 2008, p. 664.

people who provide the services by adopting actions that assure ecosystem conservation and restoration.

This approach created a prescriptive definition of PES because it demands the coexistence of many aspects. These include i) voluntary transactions, ii) at least one buyer, iii) at least one seller, iv) a well-defined environmental service and v) conditionality.[1014] This simple five-element proposal served as a guide to evaluate whether proposals fit the PES prototype.

The market-based concept of PES became well known but was also criticised. Objectors argued that it does not contest the *status quo* of the economic system, where everything is for sale, representing 'a symptom and a consequence of commodity fetishism in the context of market-based environmental governance'.[1015] Subsequently, PES became a much-debated policy,[1016] leading to a revision of the chief concept. PES was described as 'voluntary transactions between service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services'.[1017] Ten years after its publication, the leading theory was re-formed to characterise PES as 'an integration of a user fee with a targeted, conditional subsidy'.[1018] This revision is important because it aimed at distancing the language of PES from its neoliberal roots; however, it did not challenge the vision of the narrow human–nature relationship.[1019]

4.1.3 The Social-Based PES

Empirical research revealed a mismatch between PES theory and practice. Very few programs were close to the ideal five-element model,[1020] and most did not use pure markets or market-based mechanisms.[1021] An example is the PES watershed-level model used in Honduras and Costa Rica in which land managers receive rewards for enhancing their practices, where

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[1014] *Ibid*.
[1015] KOSOY; CORBERA, Payments for ecosystem services as commodity fetishism, p. 1204.
[1016] BARTON, David N. *et al*, Payments for Ecosystem Services as a Policy Mix: Demonstrating the institutional analysis and development framework on conservation policy instruments., **Environmental Policy & Governance**, v. 27, n. 5, p. 404–421, 2017, p. 406.
[1017] WUNDER, Revisiting the concept of payments for environmental services, p. 241.
[1018] *Ibid*., p. 236.
[1019] KOLINJIVADI *et al*, Neoliberal performatives and the 'making' of Payments for Ecosystem Services (PES), p. 4.
[1020] BARTON *et al*, Payments for Ecosystem Services as a Policy Mix: Demonstrating the institutional analysis and development framework on conservation policy instruments., p. 405.
[1021] SHAPIRO-GARZA *et al*, Beyond Market Logics, p. 8.

most users were not aware of the scheme or paid higher water fees because of it.[1022] As a rule, PES practices do not follow the original strict criteria, often because socio-ecological systems are more complex and the transactions costs become high.[1023] Moreover, environmental matters can only be adequately addressed when coupled with social concerns,[1024] which means that instruments claimed to be innovative, such as PES, should shift from market-driven values based on the mechanistic scientific thinking, discussed in Section 2.1 of Chapter 2 ('The Parallel Evolution of Scientific and Legal Thought in the Western World'), to a network approach that promotes the practices bonding people and nature.

The inconsistencies between theory and practice became notorious among academics. Most ecosystem services are public goods or common-pool resources, which, by nature, obstructed their commodification.[1025] This is in tune with the critique that the market-based PES is a simplistic answer to complex socio-environmental interactions, reflecting Kosoy and Corbera's critique of commodity fetishism.[1026] Putting environmental services into a market requires an oversimplification of the complex connections between land use and ecological functions and services because they are multidimensional, non-linear and multiscale[1027] (geographical and temporal). Moreover, even if possible, this commodification could generate unacceptable outcomes, depending on the idea of the fairness of the place in which it occurs,[1028] which is vital for policymakers and practitioners.[1029] Equity issues are particularly relevant for practitioners owing to legitimacy concerns.[1030]

When put into practice well, PES acted as a governance intervention that aligned natural resource management with human wellbeing improvement by providing incentives.[1031] In this context, PES was widely implemented because of its attractiveness as a possible 'win–

[1022] KOSOY, Nicolas *et al*, Payments for environmental services in watersheds: Insights from a comparative study of three cases in Central America, **Ecological Economics**, v. 61, n. 2–3, p. 446–455, 2007, p. 451.
[1023] MURADIAN *et al*, Reconciling theory and practice, p. 1203.
[1024] DERANI, **Direito ambiental econômico**, p. 125.
[1025] FARLEY; COSTANZA, Payments for ecosystem services, p. 2062, 2066.
[1026] KOSOY; CORBERA, Payments for ecosystem services as commodity fetishism, p. 1228.
[1027] MURADIAN, Roldan; RIVAL, Laura, Between markets and hierarchies: The challenge of governing ecosystem services, **Ecosystem Services**, v. 1, n. 1, p. 93–100, 2012, p. 94–95.
[1028] PASCUAL, Unai *et al*, Exploring the links between equity and efficiency in payments for environmental services: A conceptual approach, **Ecological Economics**, v. 69, n. 6, p. 1237–1244, 2010, p. 1239.
[1029] MURADIAN *et al*, Payments for ecosystem services and the fatal attraction of win-win solutions, p. 276.
[1030] SWALLOW, Brent *et al*, Compensation and rewards for environmental services in the developing world: framing pan-tropical analysis and comparison., **Ecology and Society**, v. 14, n. 2, p. 26, 2007, p. 8; KOLINJIVADI, Vijay *et al*, Capabilities as justice: Analysing the acceptability of payments for ecosystem services (PES) through 'social multi-criteria evaluation', **Ecological Economics**, v. 118, p. 99–113, 2015, p. 111.
[1031] KOLINJIVADI *et al*, Capabilities as justice, p. 99.

win' solution,[1032] mainly because the geographical areas considered most suitable for the instrument are often marginalised, impoverished regions in the Global South. Consequently, vulnerable people became co-beneficiaries of the services they provided, and concern over social equity dominated the debates about PES in the 2010s.[1033] This substantial social aspect was not part of the market-based theory, which strengthened the criticism over the gap between that theory and practice.

Therefore, a new, more pragmatic definition of PES was created that subsequently influenced the nature of the model. In contrast to the market-based definition, the new definition describes PES as 'a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land-use decisions with the social interest in the management of natural resources'.[1034] This definition is based on ecological economics and referred to as social-based PES, pro-poor PES or equity-driven PES.

Ecological economics is a response to the failure of the economic system to address ecological matters. Despite its development as a reaction to neoclassical economics and environmental economics, it has as many common features with both as it has disagreements.[1035] It also studies the allocation of scarce means amid opposing ends. The differences relate to the notion of scarcity, the proper mechanisms for allocating resources (means) and the hierarchy of relevance between competing ends. Efficient allocation continues to be necessary; however, it is no longer an end in itself.[1036]

This new vision stresses the concern with economic policies within the social and ecological reality. It has a more inclusive position, highlighting that many of the scarcest and most vital resources are public goods provided by nature in a complex society. Meanwhile, traditional economic thinking focuses solely on market goods, individual commodities and atomistic individuals. Consequently, the mechanisms created under ecological economics aim for efficient allocation in a 'social context, of just distribution and sustainable scale'.[1037]

Under ecological economics, the PES conception uses different terminology and aims at different outcomes to connect theory and practice. In this sense, transfers can be monetary or non-monetary and they should happen according to social context, which interferes with the

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[1032] MURADIAN *et al*, Payments for ecosystem services and the fatal attraction of win-win solutions, p. 275.
[1033] MCDERMOTT, Melanie; MAHANTY, Sango; SCHRECKENBERG, Kate, Examining equity: A multidimensional framework for assessing equity in payments for ecosystem services, **Environmental Science & Policy**, v. 33, p. 416–427, 2013.
[1034] MURADIAN *et al*, Reconciling theory and practice, p. 1205.
[1035] DALY; FARLEY, **Ecological Economics: Principles and Applications**, p. 4, 37.
[1036] *Ibid*.
[1037] *Ibid*., p. 181, 231.

instrument design. For instance, this means adapting the scheme to areas with difficult access to banks, as is often the case in the Amazon region.[1038] Transfers can take place in markets or through other mechanisms, such as incentives or public subsidies determined by regulation. PES is no longer an instrument created to solely guarantee environmental protection in the most efficient way—it is also a tool to assist social needs.[1039] The close connection between social interests and the function of PES is a central aspect.[1040] Thus, the focus is on the *outcomes* of PES, that is, what PES does for individuals and their communities, and not simply on the mechanics of the model.

The inclusion of the social element initiates a shift from a Global North-based perspective to a Global South-based one. The acknowledgement of the inseparable bond between social and environmental factors, by the targeting of vulnerable communities, turns PES into a more legitimate mechanism for the Global South.

Despite elevating PES to be more contextually relevant and inductive, the social-based model is not without limitations. Although the market-based concept is criticised for its distance from practice, the social definition is considered too distant from the original template. For example, Wunder highlighted that, arguably, this model can 'accommodate just about every environmental policy instrument with an economic component under this umbrella: ICDPs, ecocertification, subsidies, tax exemptions, "co-investments" and co-management agreements (as for "rewards and compensations"), and cap-and-trade schemes'.[1041] Thus, PES gained a more comprehensive concept covering an extensive list of environmental policy instruments.[1042]

The social-based PES is denounced as an unrealistic approach for its 'win–win' approach, becoming a one-size-fits-all panacea. Muradian et al recognised that the 'win–win' stance already has a negative record in environmental policy because, in practice, there can be conflicting interests and trade-offs between economic efficiency and other elements. They suggested that academics and practitioners learn from previous mistakes, advocating for a more context-specific PES.[1043] This suggests a connection with propositions such as the ecolaw-informed PES tailored for the organised waste pickers in Brazil developed in Chapter 5, which

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[1038] TEJEIRO; STANTON; LAVRATTI (orgs.), **Sistemas Estaduais de Pagamento por Serviços Ambientais. Diagnóstico, lições aprendidas e desafios para a futura legislação.**, p. 113.
[1039] MURADIAN *et al*, Reconciling theory and practice, p. 1205.
[1040] For more information about PES and social justice, *see* BÉTRISEY, Florence; BASTIAENSEN, Johan; MAGER, Christophe, Payments for ecosystem services and social justice: Using recognition theories to assess the Bolivian Acuerdos Recíprocos por el Agua, **Geoforum**, v. 92, p. 134–143, 2018.
[1041] WUNDER, Revisiting the concept of payments for environmental services, p. 238.
[1042] *Ibid*.
[1043] MURADIAN *et al*, Payments for ecosystem services and the fatal attraction of win-win solutions, p. 277.

defines basic elements for PES, while leaving room for adaptations to each context in the country.

The social-based model is too broad and risks becoming another environmental panacea, where the theory is promising, but the reality is chaotic. The mere targeting and access of vulnerable groups and poor people to PES are not enough; they need to participate in the development and execution processes.[1044] This way, the participants can recommend realistic strategies for achieving ecological sustainability. In short, the social-based model is more in tune with practice than the market-based model, but it still has the limitation of being too broad. This limitation can be overcome through PES schemes focused on specific activities, stakeholders and outcomes, such as the ecolaw-informed PES for waste pickers further discussed in Chapter 5.

However, the success of any PES model depends on the political, sociocultural and institutional contexts in which it operates. The conditions of where a PES scheme will perform need to inform its design. PES is not a universal policy. Context-specific policy framing, through which payments constitute but one among a diverse set of potential solutions, might lead to a more effective way to tackle social and environmental problems.[1045] Thus, although there should be a PES scheme focusing on organised waste pickers because of the environmental services they provide, other policies should address other problems faced in this context, such as the poverty of disorganised waste pickers and environmental issues at landfills.

Some case studies demonstrate how program design, contextual knowledge and participation have improved social outcomes from PES. In Mexico[1046] and Guatemala,[1047] participants in local PES schemes detected inequitable distribution of costs and benefits in the system's operation and advocated for change. This eventually led to the modification of the design and execution of national-level programs. In Vietnam, participants' objections against unfair conditionality burdens led to the conception of a new set of arrangements.[1048]

[1044] PASCUAL *et al*, Exploring the links between equity and efficiency in payments for environmental services, p. 1034.
[1045] MURADIAN *et al*, Payments for ecosystem services and the fatal attraction of win-win solutions, p. 277.
[1046] SHAPIRO-GARZA, Elizabeth, An Alternative Theorization of Payments for Ecosystem Services from Mexico: Origins and Influence, **Development and Change**, v. 51, n. 1, p. 196–223, 2020, p. 219–220.
[1047] VONHEDEMANN, Nicolena, Transitions in Payments for Ecosystem Services in Guatemala: Embedding Forestry Incentives into Rural Development Value Systems, **Development and Change**, v. 51, n. 1, p. 117–143, 2020, p. 135–136.
[1048] MCELWEE, Pamela; HUBER, Bernhard; NGUYỄN, Thị Hải Vân, Hybrid Outcomes of Payments for Ecosystem Services Policies in Vietnam: Between Theory and Practice, **Development and Change**, v. 51, n. 1, p. 253–280, 2020, p. 276.

Those examples show that to secure positive outcomes, PES programs should be responsive to participants' needs and desires and that incremental reform should be undertaken when necessary. The targeted people are already performing sustainable activities, which are beneficial and desired by society. To promote the maintenance and increase of these practices, policies must contemplate the necessities of the service providers. The next chapter develops the ecolaw-informed PES model for waste pickers in Brazil, analysing the advocacy of these workers as well as government reports.

The social-based or equity-driven PES is not a perfect theory, given that it cannot answer all socio and environmental problems, as discussed by Muradian et al.[1049] However, the social-based model's strength is that it can function as a socio-environmental policy that, when inclusive of participant needs, can create a policy in accordance with the local context. To this end, as a policy initiative it has the potential to increase its success rate, because the people who will conduct the sustainable activities will have assisted in shaping the goals and desired outcomes. The broader vision of PES can be used to include the complexity that policies are embedded in, such as political systems and policy subsystems. However, each policy can only capture one piece of the puzzle.[1050] Thus, a social-based PES design will be most effective when it is attentive to local context.

Although there is still room for improvement, studies have shown that to be sustainable over time PES programs must put equity concerns at the centre of their design and implementation.[1051] A PES scheme created to work towards social equity must have a well-tailored design and goals. In short, the social aspect cannot be an expected side effect of the program; it has to inform its development jointly with the environmental objective.

4.2 DOMINANT PES NARRATIVES IN BRAZIL: MARKET-BASED, SOCIAL-BASED OR SOMETHING ELSE?

Following the trend in the Global South, during the past decade, Brazil has progressively applied economic instruments, including PES. The failures of the command-and-control approach revealed by the disproportional use of nature enabled the adoption of these

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[1049] MURADIAN *et al*, Payments for ecosystem services and the fatal attraction of win-win solutions, p. 277.
[1050] CAIRNEY, Paul; WEIBLE, Christopher M., The new policy sciences: combining the cognitive science of choice, multiple theories of context, and basic and applied analysis, **Policy Sciences**, v. 50, n. 4, p. 619–627, 2017, p. 625.
[1051] BÖRNER *et al*, The Effectiveness of Payments for Environmental Services, p. 13.

new instruments.[1052] This is because command-and-control instruments did not stop environmental problems, such as pollution and deforestation. To develop an ecolaw-informed PES model for waste pickers in Brazil, as in Chapter 5, it is critical to identify the model that the country has adopted thus far, its success and its limitations.

4.2.1 PES in Brazil

Brazil has followed the global trend of PES schemes, which are particularly prevalent in rural areas.[1053] In 2019, the country had 316 ongoing PES schemes, with 52.2 per cent located in the Southeast region, and 18.8 per cent in the South region. [1054] In the Southeast, 66 per cent of the schemes focus on environmental services provided by watersheds, and in the South 55 per cent are for carbon sequestration.[1055]

The country is a leading figure in terms of PES programs. The Brazilian case of PES for slowing down the deforestation process in the Amazon region is growing, which is linked with the unconditional payments to poor households independently of their actions regarding the forest, causing overall compliance.[1056] Likewise, the 'Bolsa Floresta'[1057] program in the Brazilian Amazon Region, which assembles the 'Bolsa Floresta Renda', 'Bolsa Floresta Social',' Bolsa Floresta Associação'[1058] and 'Bolsa Floresta Familiar'[1059] programs, is one of the biggest PES schemes in the world, if not the biggest, working with over 39,000 people on 11 million hectares.[1060]

[1052] DERANI; JODAS, Pagamento por serviços ambientais (PSA) e racionalidade ambiental, p. 10.
[1053] GONCALVES, Ana Paula Rengel *et al*, Payment for Environmental Services to Promote Agroecology: The Case of the Complex Context of Rural Brazilian, **Sustainable Agriculture Research**, v. 7, n. 2, p. 56, 2018, p. 64.
[1054] JODAS, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**, p. 165.
[1055] *Ibid*., p. 174–175.
[1056] FAO, Food and Agriculture Organization, **Expert Meeting on Climate Change, Land Use and Food Security: Final Meeting Report.**, Rome: FAO and IPCC, 2017, p. 28.
[1057] 'Bolsa Floresta'—in English, 'Forest Grant'—is a program that contains a set of integrated interventions aimed at conserving forests and improving residents' welfare.
[1058] 'Bolsa Floresta Associação', or 'Association Forest Grant', remunerates residents' associations in environmental conservation areas, requiring a community assembly to deliberate on expenditures.
[1059] 'Bolsa Floresta Familiar', or 'Family Forest Grant', consists of payments in kind to the mothers living in environmental conservation areas who voluntarily participate in the program and sign a term of environmental conservation commitment. Some of the requirements are residency at the site for at least two years, restriction of the size of the plantation field, children remaining in school and participation in the community residents' association.
[1060] FAS. FUNDAÇÃO AMAZONAS SUSTENTÁVEL., **Relatório de Atividades 2018**, Manaus: FAS. Fundação Amazonas Sustentável., 2018, p. 41.

Despite the growing number and relevance of PES programs in Brazil, the country did not have specific federal legislation for PES until 2021.[1061] Therefore, subnational instruments were developed without a common framework or guidelines on governance, design, categories, funding, access to benefits and social equity matters. For many years, the Union abstained from its role as the articulator of all initiatives, which resulted in the proliferation of many different PES programs with different goals and results.

Brazil's interest in PES called for federal legislation, but the National Congress deferred legislation on this matter for more than a decade. Legislative Bill n. 792/2007 defined environmental services, allowing cash and other transfers for those who assist in producing or maintain these services.[1062] Legislative Bill n. 5.487/2009 created the National Policy for Environmental Services.[1063]

The many years of lack of federal legislation providing guidelines on governance, design, modalities, funding, access to benefits and social equity and other aspects has meant that the characteristics of the existing PES programs in Brazil differ. There are private initiatives, public initiatives (with all the federation members) and public–private partnerships for implementing PES schemes. The programs are created to attend various beneficiaries and objectives, and the most common sectors are the watershed, biodiversity and forest, and land-use carbon sectors.[1064]

In 2021, the National Policy for Payment for Environmental Services, regulated under Law n. 14.119 from 13 January 2021, entered into force.[1065] This law represents an important

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[1061] BRASIL, Lei nº 14.119, de 13 de janeiro de 2021.
[1062] BRASIL, CÂMARA DOS DEPUTADOS. Projeto de Lei nº 792/2007. Dispõe sobre a definição de serviços ambientais e dá outras providências.
[1063] In Portuguese: *Política Nacional dos Serviços Ambientais.*
[1064] JODAS, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**, p. 166; NUSDEO, Ana Maria de Oliveira; JODAS, Natália, Pagamento por Serviços Ambientais (PSA) no Brasil e sua governança: Experiências e reflexões, *in*: CARLI, Ana Alice de; AYDOS, Elena; AVZARADEL, Pedro Curvello Saavedra (orgs.), **O Estado Regulador no Cenário Ambiental**, São Paulo: Planeta Verde, 2017.
[1065] BRASIL, Lei nº 14.119, de 13 de janeiro de 2021.

step forward in regulating PES in Brazil and addressing its objectives[1066] and directives.[1067] The new policy is in line with the Brazilian PES context and the specialised literature since, for instance, it allows PES schemes to make cash and in-kind payments[1068] and to be public or private schemes,[1069] and it highlights the role of PES in working with communities, especially Indigenous peoples, families[1070] and farmers.[1071] Although it mentions the possibility of implementing PES in urban areas,[1072] the PES policy focuses on rural PES and is often linked

[1066] Under article 4, the policy has 14 objectives: (I) to guide the PES in Brazil; (II) to foster the conservation of the ecosystems, hydric resources, biodiversity, genetic patrimony and traditional knowledge; (III) to value the ecosystem services in economic, social and cultural terms; (IV) to reduce the loss of native vegetation and processes that degrade native ecosystems; (V) to encourage measures to guarantee water security in regions subject to scarcity of water for human consumption and to desertification processes; (VI) to contribute to climate regulation and the reduction of emissions from deforestation and forest degradation; (VII) to recognize individual or collective initiatives that favour the maintenance, recovery or improvement of ecosystem services, through monetary or non-monetary retribution, service provision or other form of reward, such as the supply of products or equipment; (VIII) to stimulate the elaboration and the execution of voluntary private projects of provision and payment for environmental services, which involve the initiatives of companies, Civil Society Organizations of Public Interest (OSCIP) and other non-governmental organizations; (IX) to encourage scientific research related to the valuation of ecosystem services and the development of methodologies for the execution, monitoring, verification and certification of payment projects for environmental services; (X) to ensure the transparency of information related to the provision of environmental services, allowing the participation of society; (XI) to establish mechanisms for data and information management necessary for the implementation and monitoring of actions for the full execution of environmental services; (XII) to encourage the private sector to incorporate the measurement of losses or gains from ecosystem services in the production chains linked to its businesses; (XIII) to encourage the creation of a market for environmental services; and (XIV) to foster sustainable development.

[1067] Under article 5, the policy has 12 directives: (I) compliance with the principles of the provider-receiver and user-payer; (II) the recognition that the maintenance, recovery and improvement of ecosystem services contribute to the population's quality of life; (III) the use of PES as an instrument to promote the social, environmental, economic and cultural development of populations in rural and urban areas and of rural producers, especially traditional communities, Indigenous peoples and family farmers; (IV) the complementarity of PES in relation to the command-and-control instruments related to the conservation of the environment; (V) the integration and coordination of policies for the environment, water resources, agriculture, energy, transport, fishing, aquaculture and urban development, among others, to maintain, recover or improve ecosystem services; (VI) the complementarity and coordination between payment programs and projects for environmental services implemented by the Union, the States, the Federal District, the Municipalities, the River Basin Committees, the private initiative and other non-governmental organisations, considering the environmental and socio-economic specificities of the different biomes, regions and hydrographic basins, and observing the principles established in this Law; (VII) the recognition of the private sector, and other non-governmental organisations, as organisers, financiers and managers of PES projects, alongside with the public sector, and as inducers of voluntary markets; (VIII) advertising, transparency and social control in the relationship between the payer and the provider of the environmental services provided; (IX) the adequacy of rural and urban property to environmental legislation; (X) the improvement of the methods of monitoring, verification, evaluation and certification of the environmental services provided; (XI) the protection of proportionality in the PES provided; (XII) the socio-economic inclusion and environmental regularisation of rural populations in vulnerable situations, in line with the provisions of Law No. 12,512, of 14 October 2011.

[1068] Brasil, 'Lei Nº 14.119, de 13 de Janeiro de 2021' (n 112). art. 3.I.

[1069] Ibid, art. 2.V.IV.

[1070] In Brazil, family farming is any form of land cultivation that is managed by a family and employs its members. Food production takes place on small landholdings and is intended for the subsistence of the rural producer and the country's domestic market.

[1071] Ibid, art. 5.III.

[1072] Ibid, art. 3.II.

to agricultural processes. In this sense, there is no mention of other services, such as sustainable waste management or waste pickers.

The new PES policy distinguishes ecosystem services and environmental services, which are different concepts used continuously as synonymous by academics, as discussed in Chapter 1.[1073] In summary, ecosystem services are the relevant benefits of ecosystems to maintain, recover and enhance the environment.[1074] In contrast, environmental services are activities favouring the maintenance, recovery and enhancement of these ecosystem services,[1075] following the trend of connecting environmental services as human activities,[1076] and ecosystem services as more nature-related.[1077]

Another significant point is the connection of the national PES policy with the elements of the market-based PES. The policy establishes that PES is a voluntary transaction in which a payer for an environmental service transfers financial resources, or another type of compensation, to a provider of such a service, respecting the agreed conditions and the relevant legislation.[1078] The policy clearly follows the market-based PES concept.

The years without a specific legislative framework did not restrain the boom in PES schemes in Brazil. An empirical study conducted in multiple Brazilian states argued that PES presents benefits for Brazilian society.[1079] According to the study, conducted by Tejeiro, Stanton and Lavratti, PES induces positive attitudes towards the environment and maintains existing protection practices. It also provides socio-economic benefits to the participants, who are often vulnerable people. Moreover, well-structured programs strengthen environmental services, resulting in climate change alleviation. Last, PES programs enhance the surveillance of protected areas and build partnerships between the public and private sectors.[1080] The growth of PES in Brazil leads to question of which model—market-based or social-based—was applied, which will be discussed in the following section.

[1073] WUNDER, Revisiting the concept of payments for environmental services, p. 234.
[1074] Brasil, 'Lei Nº 14.119, de 13 de Janeiro de 2021' (n 112), article 2.II.
[1075] Ibid, article 2.III.
[1076] MURADIAN *et al*, Reconciling theory and practice, p. 1202.
[1077] BULTE, Erwin H. *et al*, Payments for ecosystem services and poverty reduction: concepts, issues, and empirical perspectives, **Environment and Development Economics**, v. 13, n. 3, p. 245–254, 2008, p. 245.
[1078] Brasil, 'Lei Nº 14.119, de 13 de Janeiro de 2021' (n 112), article 2.IV.
[1079] TEJEIRO; STANTON; LAVRATTI (orgs.), **Sistemas Estaduais de Pagamento por Serviços Ambientais. Diagnóstico, lições aprendidas e desafios para a futura legislação.**, p. 108.
[1080] *Ibid*.

4.2.2 Rationales for the Structure of PES in Brazil: Mistrust and Mixed Messages?

PES schemes were created to fill a policy gap and have achieved a few successful outcomes.[1081] However, it is essential to perceive that they have limitations, and often, they are considered inadequate. This is because PES in Brazil has important shortfalls since programs fail to contribute significantly to protect nature and to increase sustainable behaviour by the stakeholders or do not meet the scheme objectives.[1082] The Brazilian case is unique for creating an inadequate hybrid of the market-based and social-based PES. Its social aspect is minor because it focuses on vulnerable people (social-based PES), while still largely following the perspective of neoclassical and environmental economics (market-based PES).

A fair amount of analytical research on PES cases and experiences in Brazil has been conducted in the past decades to analyse the juridical, sociological and economic effects of PES.[1083] This literature has revealed that although it commonly targets marginalised communities, overall, PES has failed in fulfilling its objectives related to nature and people in Brazil because its design is based on the market-based approach. In this context, Mamed argued that private financial agents often enter PES programs as a way to continue to be able to pollute, now by funding a PES scheme.[1084] Packer criticised schemes targeting traditional peoples and marginalised communities, particularly Indigenous peoples, such as private sector programs that allow agents to use Indigenous land, thus threatening important Indigenous rights.[1085] The social-based PES and ecological economics is argued to be more in tune with the country's context.[1086]

[1081] For example, the watershed scheme 'conservador das águas', in the city of Extrema, state of Minas Gerais, presented sucessful socio-environmental outcomes, as argued by JODAS, **Pagamento por Serviços Ambientais no âmbito do Projeto "Conservador das Águas" (Extrema/MG): uma análise da efetividade socioambiental**, p. 217–220.
[1082] JODAS, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**, p. 178.
[1083] JODAS, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**; GONCALVES, Ana Paula Rengel, **Agroecologia e Pagamentos por Serviços Ambientais: Lições e Perspectivas.**, 1. ed. São Paulo: Ed. Planeta Verde, 2017; MELO, **Pagamento por Serviços Ambientais (PSA): entre a proteção e a mercantilização dos serviços ecossistêmicos no contexto de crise ambiental.**; MAMED, **Pagamento por Serviços Ambientais e Mercantilização da Natureza na Sociedade Moderna Capitalista.**; PACKER, **Novo Código Florestal & Pagamento por Serviços Ambientais. Regime proprietário de bens comuns.**; PACKER, Pagamento por "Serviços Ambientais" e flexibilização do Código Florestal para um capitalismo "verde".
[1084] MAMED, **Pagamento por Serviços Ambientais e Mercantilização da Natureza na Sociedade Moderna Capitalista.**, p. 210.
[1085] PACKER, **Novo Código Florestal & Pagamento por Serviços Ambientais. Regime proprietário de bens comuns.**, p. 151.
[1086] MELO, **Pagamento por Serviços Ambientais (PSA): entre a proteção e a mercantilização dos serviços ecossistêmicos no contexto de crise ambiental.**, p. 425–426.

The primary literature is unanimous in highlighting that the lack of federal legislation, which only changed in 2021, caused PES practice to be problematic. In particular, projects have been creating negative socio and environmental effects.[1087] The diversity among PES schemes demonstrates that whereas some frameworks are more concerned with socio and environmental topics—and hence, their outcomes are successful—others are more inclined to fulfil the market's needs and thus exploit vulnerable people and nature.[1088]

A review of the key literature about PES in Brazil revealed the main challenges proposed by specialised researchers. Coincidently, these insights show how the Brazilian case presents some criticised points of the market-based approach, as explained in Section 4.1.2. 'The Market-Based PES'. The first issue is the market as the solution to environmental problems, leading to a possible commodification of nature. The second issue is the correlation of PES theory with neoclassical economics and environmental economics, which has also drawn severe criticism.[1089] The third is that PES project metrics privilege forestry quantification over socio and environmental quality. The last criticism is that there is a lack of structures informing the population and the authorities about the data captured by surveillance, as well as the projects' (partial and total) results.[1090]

The first two criticisms relate to a conceptual and theoretical issue, whereas the last two are pragmatic. The initial two points indicate the need to have a conceptual framework that aligns PES theory with empirical experiences. In that sense, PES is a type of public policy, which works with vulnerable peoples, and is not necessarily a market mechanism. Practice shows that PES schemes, particularly their design and goals, must consider the cultural and historical background of the people who will take part in the programs.[1091] In short, participation is vital.

The third challenge sheds light on the complexity of nature, which is often overlooked by PES. Ecosystem services interact in a holistic system. This observation derives from challenges generated by some Carbon PES schemes under which vast eucalyptus forests were planted. However, this exotic tree does not relate to traditional peoples' culture, and it also

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[1087] MAMED, **Pagamento por Serviços Ambientais e Mercantilização da Natureza na Sociedade Moderna Capitalista.**, p. 182.
[1088] JODAS, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**, p. 117.
[1089] GONCALVES, **Agroecologia e Pagamentos por Serviços Ambientais: Lições e Perspectivas.**, p. 183; GONCALVES *et al*, Payment for Environmental Services to Promote Agroecology, p. 60.
[1090] JODAS, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**, p. 180.
[1091] *Ibid*., p. 181; GONCALVES, **Agroecologia e Pagamentos por Serviços Ambientais: Lições e Perspectivas.**, p. 173.

negatively affects local biodiversity.[1092] Thus, the incentive to create extensive forests can result in adversities, and PES designs must consider the broad impact when establishing its goals.

The last criticism highlights the lack of information regarding the effectiveness of environmental law mechanisms. This deficiency constitutes a recurring problem for environmental policies in Brazil. The scarcity of public knowledge about PES data leads to failure in providing ideas on how to enhance it.[1093] In short, there are no indicators to analyse the performance of PES programs in Brazil, which hinders data collection on their efficiency and their fulfilment of the conditionality requirement.[1094]

In terms of resources regarding surveillance and information, it is crucial to have transparency around the measurement of environmental services. Many variables can strongly influence the provision of an environmental service, such as the climate or soil conditions. The extent to which the service has been supplied is also challenging to evaluate;[1095] thus, the need to prove which action led to the provision of which service inside a PES scheme is questionable. This suggests that in many cases, surveillance would be important to guarantee the stakeholders' overall compliance; however, it would not offer exact numbers on the extent of the environmental benefits they provided.

The two most prominent theories endorse the need to have measurement mechanisms for PES to facilitate monitoring programs. The market-based approach portrays conditionality as the most significant feature.[1096] However, payments connect to the compliance with the established rules of natural resource management, rather than to specific measurements for each service because they fluctuate and can be risky.[1097] The social PES does not give conditionality a prominent position, because monitoring a specific environmental service provision is virtually impossible and imposing strict conditionality can raise the transaction costs and disturb the purpose of the instrument.[1098]

PES is problematic when it becomes a costly instrument, particularly for the Global South and Brazil. Although monitoring, data collection and information are crucial, they can significantly increase costs. The structure and scientific knowledge needed to obtain

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[1092] JODAS, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**, p. 181.
[1093] *Ibid*.
[1094] MELO, **Pagamento por Serviços Ambientais (PSA): entre a proteção e a mercantilização dos serviços ecossistêmicos no contexto de crise ambiental.**, p. 422.
[1095] MURADIAN; RIVAL, Between markets and hierarchies, p. 96.
[1096] WUNDER, Revisiting the concept of payments for environmental services, p. 242.
[1097] *Ibid*.
[1098] FARLEY; COSTANZA, Payments for ecosystem services, p. 2063.

information about the connection between land-use practices and the provision of a specific environmental service require significant investments. This setting can increase the transaction costs to the point that the benefit–cost ratio turns negative, which contradicts the PES objectives.

The requisite scientific knowledge is difficult to obtain; consequently, transaction costs could become unfeasible. In practice, full information is rarely obtained, especially in the Global South.[1099] However, this does not mean that no data should be collected and analysed, but that the goals should reflect the possibilities of each context.

Another limitation encountered in the Brazilian case, which negatively affects programs, is the stakeholders' mistrust. Most schemes are public, and governments figure as payers. Local authorities and the State, in general, are not perceived as partners, but as inspectors. The communities justify their mistrust in the standard practice of imposing top-down, centralised and authoritarian policies.[1100]

Therefore, the Brazilian case demonstrates a series of requirements that PES needs to meet to be successful. First, it needs to decouple from the market-based vision and the commoditisation of nature. Transitional costs and conditionality are controversial topics, and context must lead the discussions. PES in Brazil should have the social-based PES as an inspiration since it is a member of the Global South; however, the mere targeting of vulnerable communities is insufficient. PES must create space for participation, acting as an inclusive, bottom-up approach. These issues could be overcome with legislation by reflecting on these lessons, following a conception proven fit for Brazil.

4.3 ECOLAW-INFORMED PES IN BRAZIL FOR WASTE PICKERS

Three decades of theories and two of experience with PES have demonstrated that few initiatives conform to the original market-based model. The social-based PES vision emerged from analysing existing programs and has challenged the old logic. The dominant visions disagree on many issues, particularly regarding the five-element features of conditionality and well-defined environmental service, and the role of markets/commoditising.

Brazil is one place where PES has prospered, developing a unique context. Its distinctive case of PES proved that the market-based approach is unsuitable. The social-based

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[1099] MURADIAN *et al*, Reconciling theory and practice, p. 1204.
[1100] TEJEIRO; STANTON; LAVRATTI (orgs.), **Sistemas Estaduais de Pagamento por Serviços Ambientais. Diagnóstico, lições aprendidas e desafios para a futura legislação.**, p. 113.

theory is preferable but is still too broad, with the risk of being an impractical instrument. The situation is aggravated by the years without federal legislation to provide direct guidance on matters such as PES governance, design, modalities, funding, access to benefits and social equity.

The waste pickers' advocacy for PES is a new opportunity to learn from previous mistakes. In this context, it means to regard the empirical evidence that shows the significance of social and equity concerns, characterised by structure. It is a chance to use the best of both alternatives—the market-based five elements for a clear setting and the social-based attentiveness to social issues and empirical research.

Brazil is an ideal actor to lead PES into a contextually relevant, inclusive format. Not only does it have many PES schemes in place, but it also has been at the forefront of progressive legislation for waste pickers.[1101] However, it is crucial to reflect on past experiences to overcome problems and create an effective template, with social concerns at its core, and clear guidelines.

For this reason, a model of an ecolaw-informed PES for waste pickers is proposed in this section, underpinned on the ecolaw-informed criteria and the five-elements proposal. The social-based PES is strongly opposed to three elements of the market-based model, namely, conditionality, a well-defined environmental service and the idea of commoditising nature. However, the ecolaw-informed framework and the focus on waste pickers decouple PES from these elements. This is because the model becomes independent of neoclassical economics, deriving from the ecolaw-informed approach. The exclusive characteristics of the ecolaw-informed prototype created for waste pickers prevent PES from connecting with market-based problems, tailoring it to be socially attentive. Thus, the five-element setup is first tested against the ecolaw-informed criteria, and then, in the next chapter, it is used to establish a design so that the scheme is not too broad.

The three fundamental values of an ecolaw-informed criteria, already outlined in Chapter 2 and revisited here, are:

- Sovereign communities
- Generative ownership
- Ecodesign

[1101] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 1.

In short, this section develops an innovative PES model, building from the previous discussions. The development pathways and the importance of taking a contextualised, inductive strategy are recorded. This section articulates the content of an ecolaw-informed PES, in line with the complexity and the dynamic system that a PES for waste pickers will implement.

4.3.1 The Criterion of Making Communities Sovereign for the Ecolaw-Based PES

Neoclassical economics considers the economy as a closed system,[1102] and PES seeks to generate financial transactions for those promoting environmental services through sustainable activities. The economy is an open system, and so is nature that depends on a vast river of energy flowing through it.[1103] Further, nature is suboptimal at every level of organisation, and hence, efficiency and optimised conditions for environmental services are impracticable.[1104] Therefore, nature and the neoclassical economy work in opposite directions. In this sense, the market-based approach fails to make communities sovereign, and it boosts the connection between violence and the dominance of nature, and violence and the domination of people, ultimately distancing people from nature. Conversely, the social-based PES understands that the social element is just as important to environmental services provision as nature itself. Thus, the social-based PES has greater resonance with an ecolaw-informed approach than does the market-based PES.

For Brazil, the need for the strong presence in PES of social concerns is evident. The leading author on PES in Brazil explained that the social dimension and equity concerns are compulsory.[1105] Human dignity is a Constitutional principle, a fundamental part of the Brazilian Republic[1106] and an objective of the economic order.[1107] In the Brazilian context, human dignity covers individual, community and environmental matters.[1108] Therefore, PES in Brazil must seek the dignity of its participants[1109] and equity in its contracts; hence, social-based PES is favoured over the strict market approach.

[1102] MUNDA, Environmental Economics, Ecological Economics, and the Concept of Sustainable Development, p. 213.
[1103] DALY; FARLEY, **Ecological Economics: Principles and Applications**, p. 490.
[1104] SKENE, Circles, spirals, pyramids and cubes: why the circular economy cannot work, p. 488.
[1105] NUSDEO, **Pagamento por Serviços Ambientais. Sustentabilidade e disciplina jurídica.**, p. 139.
[1106] BRASIL, Constituição da República Federativa do Brasil de 1988. Article 1, III.
[1107] *Ibid*. article 170.
[1108] SARLET, Ingo Wolfgang; FENSTERSEIFER, Tiago, **Princípios de Direito Ambiental.**, 1. ed. São Paulo: Saraiva, 2014, p. 47–48.
[1109] NUSDEO, **Pagamento por Serviços Ambientais. Sustentabilidade e disciplina jurídica.**, p. 139.

To discuss the community's sovereignty further, a brief assessment of the element 'buyer' or 'social actor making the transfers' is critical. These terms were debated between the dominant visions, up to the point that the primary author on market-based PES changed it to 'service users'. Regardless of the term, this controversy is not only irrelevant to the ecolaw-informed PES analysed in this thesis but also assists the criterion of making communities sovereign.

It is important to contextualise the problem. In Brazil, municipalities are legally responsible for waste management.[1110] Thus, a PES scheme where the municipality figures as the actor supporting waste management is not controversial; in fact, it only follows the legal system. In the ecolaw-informed PES for waste pickers, the municipality will compensate waste pickers' enterprises for taking over a task for which it is accountable. In this context, PES can make communities sovereign since, at last, they will be fulfilling their obligation towards waste management through a public contract.

By directing the model to waste pickers' enterprises, the ecolaw-informed PES helps promote workers' organisations, boosting bottom-up approaches and their sovereignty. The formation of such organisations leads to the emergence of networks, social movements, activism, trade unionism and federations, which strengthen the social security of the working class. It also encourages independent waste pickers to join a cooperative or association, fostering the creation of new enterprises and ultimately expanding the number of organised waste pickers.

The creation of job opportunities contributes to the local economy. Organised waste workers promote local employment, which significantly affects individuals with less traditional employable skills, such as formal education.[1111] Jobs, wages, income and taxes are examples of the ongoing exchange between local employment, particularly cooperatives, and the local economy.[1112]

The inclusive waste management tactic of the ecolaw-informed PES projects social benefits without a direct economic impact. For this reason, local governments often overlook them. The active presence of organised waste pickers working as recognised environmental

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[1110] Although there is no specific provision about waste management, the Brazilian Constitution provides for the Union's competence to create general national laws relative to urban development, including basic sanitation, in article 21.XX.

[1111] GUTBERLET, Jutta, **Urban Recycling Cooperatives: Building Resilient Communities.**, New York, NY: Routledge Taylor & Francis Group, 2016, p. 58.

[1112] ZEULI, Kimberly; DELLER, Steven, Measuring the Local Economic Impact of Cooperatives, **Journal of rural cooperation**, v. 35, n. 1, p. 1–17, 2007, p. 13.

stewards fosters social cohesion in the community. The perception of the local environment as clean assists in creating a sense of place and belonging. The streets, the neighbourhoods and the community are more attractive, desirable and respected.[1113]

Identifying the organised waste pickers as a driving force behind the improvement of the communal space is another positive impact of the proposed PES model. As discussed in Chapter 3, waste pickers are marginalised from society, which often leads to emotional distress. By including them, the local government would acknowledge their role as environmental agents, thus reducing their social stigma and strengthening their connection with communities.

Further, as previously explained, economic efficiency is not absent in the framework of ecological economics and in the social-based PES; thus, it is not overlooked by the ecolaw-informed PES. Waste pickers' enterprises aim to achieve efficiency in their line of work. PES rewards efficiency and productivity, given that the results influence the payments. Therefore, PES serves as a stimulus for the enterprises to adopt rational practices to generate economic outcomes. This encouragement can assist their expansion and sovereignty.

The discussions about whether PES is a voluntary transaction are relevant for the ecolaw-informed PES for waste pickers. Enterprises will remain free to choose whether to work with the City Council or the private sector. Nevertheless, voluntariness is a complex matter and must be enacted only regarding the waste pickers' side, as investigated in Chapter 5, Section 5.3.2.3.

4.3.2 The Criterion of Making Ownership Generative for the Ecolaw-Informed PES

The market-based PES is less suitable for generative ownership than the social-based PES. Neoclassical economics and its subfield of environmental economics are criticised for focusing only on economic aspects at the expense of environmental and, particularly, social goals. This economic perspective influences PES to prioritise economic features, such as efficiency, which benefit the environment. This approach attracts policymakers with the promise of a solution for economic and environmental issues and largely disregards other issues, such as generative property.

In the original template, social matters are only present as an economic side effect of providing extra earnings to the people generating environmental services. The lack of a social dimension that allows people to participate in developing programs that will affect their lives

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[1113] GUTBERLET, **Urban Recycling Cooperatives: Building Resilient Communities**, p. 58.

causes problems. The rejection by the market-based PES of a holistic strategy can jeopardise all economic, environmental and social aspects, hindering the achievement of sustainability. Simultaneously, the disconnection between a project and its participants often generates scepticism and questions over its legitimacy, which threaten its continuity.

These criticisms do not imply that PES should be abandoned, given that it has shown its unique power in attracting various sectors and organisations to become involved in sustainable practices. However, a social-based PES scheme through the ecolaw-informed criteria dictates that production processes should not only be oriented to be profitable but to also emphasise environmental sustainability and social desirability. It offers an appropriate lens through which initiatives can be assessed. In this perspective, PES works towards making ownership generative since properties would have a purpose beyond financial gains and dominance.

As regards generative ownership, the element of service providers reveals the improvement of the ecolaw-informed PES. The generative and non-extractive aspect of ownership/property is satisfied by waste pickers' cooperatives or associations serving as sellers or service providers. As explained in Chapter 3, these business models are not limited by the pursuit of financial gains. Although they depend on financial trades to pay their workers, they also serve the greater purposes of social and environmental protection by seeking to promote sustainable waste management and solidarity among waste workers, as well as between vulnerable groups, such as homeless people.[1114]

In terms of safe labour, as argued in Chapter 3, waste pickers have poor working conditions, owing to which they face health and safety issues. When they receive minimal assistance from local governments in a context of dealing with chemical and biological hazards, often without protective equipment, such as gloves and masks, they feel disempowered and demoralised, and their health is endangered. In contrast, by formally including them, the ecolaw-informed PES moves towards decent working conditions in its ecodesign. The promotion of the organisation and collective work denotes adequate working tools, capacity development, health and safety improvement, and educational opportunities.[1115]

Waste pickers' enterprises can be life-transforming spaces and produce social capital. At the communal level, social capital is a decisive factor towards resilience; however, decision-

[1114] MNCR, **Programa Nacional de Luta**.
[1115] GUTBERLET, **Urban Recycling Cooperatives: Building Resilient Communities.**, p. 60.

makers often ignore it.[1116] As explained in Chapter 3, in cooperatives and associations, waste pickers create social bonds, providing each other with various resources, including information, as well as emotional and psychological support. By encouraging collective work, the ecolaw-informed PES has the effect of creating social capital and resilience in the workspace.

The ecolaw-based PES perceives PES as the political instrument that it is, allowing it to be a generative owned policy. PES is a part of a broader structure of power. The organised waste pickers as an interest group should significantly influence its design and implementation, shaping its effectiveness and distributional outcomes. The ecolaw-informed format gives them access to this public policy, requesting them to participate in its creation and performance. Waste pickers can inform policymakers about realistic waste management strategies to achieving ecological sustainability and social equity.

The lesson learned from empirical research is that the techniques applied to develop a PES scheme are just as important as the final product. That is, the process of creating a new policy is as relevant as the end goal. Although it is easier to redeploy other PES projects, ecolaw-informed PES scheme designers should consider that each context is different and accordingly make adjustments.

The reason that the ecolaw-informed PES can be successful, as regards any policy design, relies on 'know your audience and their context'.[1117] There is no one better to shed light on inclusive waste management and waste pickers' realities than waste pickers themselves. Participation allows the stakeholders' preferences to be recognised, creating connection and interest in the established obligations.

For the provisions giving detailed orientations, ecolaw-informed PES needs to be flexible and fill the gaps with context-specific perception beyond the five elements. Practitioners must explore opportunities and challenges by talking to the potential participants, the community, peer government agencies, researchers and others in collaborative events.

Regardless, the disadvantages of participatory approaches cannot be overlooked. These include the high demand for time and money, the conflicting views and the sometimes-unsatisfactory participant experiences.[1118] Empirical research has demonstrated that despite the limitations, participation is a key element for PES success, since experiences without

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[1116] ALDRICH, Daniel P.; MEYER, Michelle A., Social Capital and Community Resilience, **American Behavioral Scientist**, v. 59, n. 2, p. 254–269, 2015, p. 263.
[1117] CAIRNEY; WEIBLE, The new policy sciences, p. 625.
[1118] MENZEL, Susanne; TENG, Jack, Ecosystem Services as a Stakeholder-Driven Concept for Conservation Science: Participative Ecosystem Services, **Conservation Biology**, v. 24, n. 3, p. 907–909, 2009, p. 908.

participation tend to discourage negotiation between stakeholders and intensify conflicts between them.[1119]

The ecolaw-informed PES can establish a bond between local governments and organised waste pickers through an inclusive, participatory approach. Preferably, their connection should go beyond the formalism of the law and thus avoid situations of mistrust. When a relationship of mutual trust is created, conditions of hostility and uncertainty are less frequent because the common end remains clear. Ensuring stakeholders' influence on the policy to be established is another positive tactic, which would also minimise litigation. In short, participation creates generative ownership of the policy.

In policymaking, it is essential to learn and adapt strategies in seeking to achieve goals more effectively.[1120] It is vital to understand who the participants are, what they need and what they can do for inclusive and sustainable waste management. Through a people-centric design approach, the ecolaw-informed PES can develop unique functional insights.

The debate about monitoring, conditionality and ecodesign leads to discussions over transparency and the provision of truthful information about PES. The ecolaw-informed PES should have transparency as a high priority. This goal can be achieved by publishing information about the program's rules, the participants[1121] and the ways in which sustainable waste management benefits the community. Transparency is especially important in the context of collective practices,[1122] which is the case of an ecolaw-informed PES in which multiple waste pickers' enterprises figure as service providers.

4.3.3 The Criterion of Ecodesign for the Ecolaw-Informed PES

PES needs ecodesign, context and perspective, which deal with existing societal issues. Discussions around minimising adverse environmental outcomes in value chains, diversity and governance systems exist, and PES must regard these as essential points of environmental services provision. Hence, it should aspire to promote fair transactions and activities. This objective calls for more cooperation, ensuring a more suitable environment for cultivating both

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[1119] *Ibid*., p. 909.
[1120] CAIRNEY; WEIBLE, The new policy sciences, p. 625.
[1121] TACCONI, Luca, Redefining payments for environmental services, **Ecological Economics**, v. 73, p. 29–36, 2012, p. 33.
[1122] MURADIAN *et al*, Reconciling theory and practice, p. 1207.

biophysical resources and human interventions. That is, PES must be more equitable, and between the two main models, the social-based PES is more suitable for ecodesign.

Ecodesign features are also present because organised waste pickers frequently work in small enterprises using local technology. Their local technology and knowledge derive from human capital and are their chief assets in the struggle to remain in business. This context includes local resources, skills and experiences, enacted to maintain and improve their livelihoods. However, as analysed in Chapter 3, this technique is threatened by the intrusion of foreign technologies, such as incineration.

The ecolaw-informed PES model design enables the waste management system to be a local environmental and health force. Waste pickers educate and generate not only community environmental awareness but also local information on handling the spread of disease vectors, such as dengue.[1123] PES becomes a facilitator of local environmental and wellness information, endorsing ecodesign by collaborating with these local workers.

Moreover, ecodesign prospers with the PES for waste pickers because it avoids the debates about the commodification of nature. Here, there are two chief elements of PES, which are both linked to recycling: labour and sustainability. In other words, ecolaw-informed PES hinges on paying waste pickers' enterprises for their recycling, without pursuing external recognition for the value of environmental services, such as biodiversity conservation, to secure a price on the market.

The service provided is recycling, which generates various environmental benefits. However, the metrics of these gains are not in question. Payments will be a recognition of the waste pickers' environmental services, and the amount of waste recycled resulting from the labour of waste pickers. For instance, recycling assists in protecting watersheds, yet this specific protection will not be the only base of the payment. Overall, the precise extent of the contribution through recycling towards improving the quality of nature is not at issue. Concurrently, agreements should remain flexible to add efficiency and productivity bonuses.

The fact that the environmental service provided is recycling disassociates the controversy over conditionality. As long as the contracted waste pickers' enterprise continues to operate and recycle waste, it will enact conditionality. Specialised complex technical assistance is not required, as often is the case in a rural context.

The elimination of conditionality as a problem contributes to overcoming the lack of structure. The measurement of the service is clear because it involves labour and not the

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[1123] GUTBERLET, **Urban Recycling Cooperatives: Building Resilient Communities.**, p. 58.

evaluation of environmental services provided by nature. PES for waste pickers requires measuring the amount of recycling materials and calculating the contracted price per tonne of products. Thus, the structure is also simpler since it requires measuring machines, transportation vehicles and other tools that City Councils already use for sending waste to landfills.

The targeting and participation of waste pickers enable PES to disengage from the one-size-fits-all panacea criticised in the social-based PES. It has a direct rule about the expected stakeholders: waste pickers' enterprises providing sustainable waste management and recycling. This notion excludes other groups that provide other environmental services, and other agents in the local waste management chain, such as intermediaries, deposit owners and non-governmental organisations. The selection of one distinctive group departs from the one-size-fits-all argument that various actors can benefit.

Ecodesign requires respect for workers and nature, which is the primary goal of ecolaw-informed PES for waste pickers. Environmental and social issues are both at the core of the instrument. Thus, ecodesign is intrinsically part of PES for waste pickers.

The fact that the ecolaw-informed PES focuses on recycling disconnects it from the one-size-fits-all issue. This framework specifies the service that the agreement covers, namely, recycling provided by the labour of the waste pickers. This direct instruction transforms PES into a well-defined instrument suitable for its proposed purpose, and not a universal remedy for environmental matters.

4.4 CONCLUSION

After more than 20 years of creation and implementation, PES is adopted worldwide, particularly in the Global South. Most prior studies have focused on the dichotomy between market-based and social-based PES. Critics primarily debate how PES represents the hegemonic, Global North-centric and market-based economic project, or how it overstretched by deviating from the original template. The related literature has indicated that although the social-based vision is a better fit for the Global South, its one-size-fits-all policy risks effectiveness in a panacea-like formula. The Brazilian case validates these discussions since PES design in the country has followed the market-based strategy, generating adversities and demonstrating the need to have a social-based approach. The years without federal regulation, which only entered into force in 2021, aggravated the situation, with a multitude of PES designs and features developed that lack clear guidelines.

This chapter argued that the waste pickers' advocacy for a tailored PES has created a unique opportunity. Brazil can take the lead on this issue, and by analysing past experiences and the related research, it has the potential to achieve social and environmental goals. This chapter used an ecolaw-informed approach as a strategic criterion to test the controversial five-element framework of the original PES, as well as the characteristics of the PES for waste pickers. It demonstrated that the social-based PES offers greater resonance with an ecolaw-informed approach. The ecolegal code interventions and the waste pickers' distinct settings decouple PES from the problematic market prototype.

Two main points distinguish the ecolaw-informed PES for waste pickers from other models, which also challenge the main criticism. These factors are the type of service provided and conditionality.

First, an apparent difference between rural and urban PES is the environmental or offsite service provided. Here, it is recycling. This activity leads to many environmental benefits, and its valuation does not challenge the holistic interaction of ecosystems.

The faulty commodification of nature is not at issue. Nature, its functions and its services are not measured or evaluated. The only metrics considered are the amount of recycling conducted; thus, labour, not nature, determines the metrics of PES, as further explained in Section 5.3.3 of Chapter 5.

The disassociation with the commodification of nature allows conditionality to be direct. The agreement requires the provision of sustainable waste management and recycling, which are expected to cause positive environmental outcomes. However, this consequence is not a condition of the agreement. Simply put, it is unnecessary, even irrelevant, to to match an action to an environmental gain.

The ecolaw-informed PES takes the learnings from prior models and research to create an evidence-based, inductive approach. This arrangement disengages it from the Global North colonial perspective, maturing PES as an authentic instrument for the Global South. The ecolaw-informed PES uses the original template to give a social-based inspired PES the structure that it needs. This way, it respects the ecolegal criteria, launches the social aspect to the core of the framework and not only targets organised waste pickers but also partners with them. It also has a well-defined format that avoids the repercussion of a market-based PES of being unfit and the one-size-fits-all panacea controversy of the social-based PES.

This chapter analysed the competing models of PES in the literature and the Brazilian case, and it proposed a new approach to PES in Brazil for waste pickers. It argued that the ecolaw-informed PES is the most suited narrative for waste pickers because this PES builds on

previous research and connects with their specific context. The next chapter cohesively sets out the model created from the research conducted for this thesis.

5 THE ECOLAW-INFORMED PES MODEL IN BRAZIL

As Chapter 4 explained, PES can be a suitable tool for waste pickers and promote an end to their sidelining by the formal waste management sector. Supported by the rise of environmental governance, PES was initially created in the North-centric modes of the market. After years of real-life experience with these instruments, a series of studies have already indicated that few, if any, programs match this initial model, leading to a conceptualisation aligned with empirical evidence, which positions the social aspect at the core of PES. Chapters 2 and 4 demonstrated that this positioning is a first step towards PES becoming a legitimate mechanism for the Global South, and that PES matures through conformation with the ecolaw-informed criteria. This way, PES can serve as a socially inclusive, ecologically sustainable instrument that has clear guidelines and goals.

Brazil is in a unique position in the Global South to take the lead on the matter of using PES to support and compensate the activities of waste pickers. As investigated in Chapter 3, the country has many organised waste pickers with a history of campaigning for inclusive waste management. During the past decade, the Brazilian National Waste Pickers' Movement has been explicitly advocating for a tailor-made PES.[1124] As argued in Chapters 3 and 4, the waste picking sector connects well with ecolegal settings, and the waste pickers are suited to the ecolaw-informed PES.

Concurrently, Brazil has progressive social and environmental legislation, making it a fertile ground for the ecolaw-informed PES, as it will be analysed in this chapter. The Brazilian Constitution of 1988 has laid the foundation for a legal order decoupled from the Global North's tradition, emphasising communities and nature, which is addressed in collective rights to the environment, also known as socio-environmental rights.[1125] Thus, it has connections with ecolaw; however, it is still far from the pure ecolegal approach articulated by Capra and Mattei. This is because the Brazilian Constitution updated the legal order with a socio-environmental approach, but it did not pursue a revolution. This recent tradition has influenced different branches of environmental law,[1126] engaging waste management as an environmental issue connected with the waste pickers' social rights.

[1124] MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**, p. 1; MNCR, Carta de Princípios e Bases de Acordo do MNCR, 2015.
[1125] SOUZA FILHO, A Essência Socioambiental do Constitucionalismo Latino-Americano, p. 199, 212, 213.
[1126] LEUZINGER; VARELLA, O Meio Ambiente Na Constituição Federal E Na Legislação Infraconstitucional: Avanços Ou Retrocessos (1988 A 2014)?, p. 302.

Building on this approach and informed by the ecolaw framework, this chapter proposes a model of PES to integrate the Brazilian waste pickers into the formal waste management systems. In this sense, the ecolaw-informed model aims to recognise waste pickers as environmental stewards, compensate them for their services and promote sustainable waste management. Consequently, the waste value chain becomes fairer and more ecological.[1127]

The model's essential conceptual elements are developed by examining specialised literature, particularly reports from waste pickers and the government about best practices. IPEA's[1128] documents chiefly address the Federal Administration's concerns. Although this model adopts the original structure of the market-based PES—voluntary transactions,[1129] service providers, service users, provision of offset environmental services and conditionality[1130]—it differs from it in many significant aspects. This different articulation reflects the critical global scholarship on PES analysed in Chapter 4 upon which this thesis is built—the need to structure initiatives squarely around social inclusion,[1131] carefully formulating a strategy to avoid being a one-size-fits-all panacea.[1132] Last, this alternative scheme's anticipated benefits for the waste pickers' organisations and the environment are inspected through the ecolaw-informed theoretical foundations, developed in Chapter 2.

Section 5.1 of this chapter, entitled 'The Ecolaw-Informed PES Operating under the Brazilian Constitution', analyses the Brazilian legal system defined in the Constitution. First, Section 5.1.1 focuses on the federal structure of government, which is an essential consideration in the structuring of any mechanism for Brazil,[1133] but one that has yet to be explored in

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[1127] A fair value chain protects the environment and secures human and labour rights throughout the operating chain. As explained in Chapter 3, waste pickers are at the bottom of the waste management value chain, despite being the majority of workers operating in different stages of the chain and significantly adding value to products.

[1128] IPEA, or the Institute of Applied Economic Research, is a Brazilian government-led research organisation that produces macroeconomical, sectorial and thematic studies for governmental planning and policymaking. In Portuguese: *Instituto de Pesquisa Econômica Aplicada (IPEA)*.

[1129] Voluntariness is a complicated subject and must be limited to the providers' side. See Chapter 5, Section 5.3.2.3.

[1130] ENGEL; PAGIOLA; WUNDER, Designing payments for environmental services in theory and practice, p. 664.

[1131] MCDERMOTT; MAHANTY; SCHRECKENBERG, Examining equity.

[1132] MURADIAN *et al*, Payments for ecosystem services and the fatal attraction of win-win solutions, p. 277.

[1133] ANTUNES, Paulo de Bessa, **Direito Ambiental**, 16. ed. São Paulo: Atlas, 2014; AYALA, Patryck de Araújo, **Devido processo ambiental e o direito fundamental ao meio ambiente**, Rio de Janeiro: Lumen Juris, 2011; CANOTILHO, José Joaquim Gomes; LEITE, José Rubens Morato, **Direito constitucional ambiental brasileiro.**, 6. ed. São Paulo: Saraiva, 2015; FIORILLO, Celso Antonio Pacheco, **Curso de direito ambiental brasileiro**, 18. ed. São Paulo: Saraiva, 2018; LEITE, **Dano Ambiental: do individual ao coletivo extrapatrimonial**; LEITE; AYALA, **Direito ambiental na sociedade de risco**; LEITE, José Rubens Morato; AYALA, Patryck de Araújo, **Dano ambiental: do individual ao coletivo extrapatrimonial: Teoria e prática**, 7. ed. São Paulo: Revista dos Tribunais, 2015; MACHADO, Paulo Affonso Leme, **Direito Ambiental Brasileiro**, 26. ed. São Paulo: Malheiros, 2018; PADILHA, Norma Sueli, **Fundamentos constitucionais do**

connection with waste pickers and PES. Second, Section 5.1.2 explores socio-environmental rights in light of the ecolaw-informed PES model.

Section 5.2 of this chapter examines the ecolaw-informed PES as a model contributing to Brazil's existing integrative waste management approaches. Section 5.2.1 starts by exploring the model as an articulation of the Brazilian National Solid Waste Policy. Next, Section 5.2.2 investigates how the model contributes to the existing good practices and the remaining integrative waste management challenges.

In Section 5.3, the central elements of the ecolaw-informed PES are proposed, focusing on the key themes of stakeholders, targeted services and payments. The connections with the ecolaw-informed framework are highlighted, and the argument is put forward that the ecolaw-informed criteria refine PES, transporting it to the urban context and enabling the integration of the organised waste pickers, ultimately representing the Brazilian progressive legislation. Section 5.4 concludes the chapter.

5.1 THE ECOLAW-INFORMED PES OPERATING UNDER THE BRAZILIAN CONSTITUTION

The ecolaw-based PES model is fit to operate under the Brazilian Constitution. It respects the Federative System and advances the two main Constitutional provisions on nature, the fundamental right to a healthy environment[1134] and the socio-environmental rights perspective. The selected elements are fundamental for the ecolaw-informed PES for two reasons. First, the ecolaw-informed model will be situated in the Federative System that addresses the environment as a fundamental right; consequently, its command and compliance are vital. Second, the ecolaw-informed PES joins existing socio-environmental law and policy in Brazil; therefore, it is crucial to respect the vision of environmental law dictated by the Constitution.

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direito ambiental brasileiro, 1. ed. Rio de Janeiro: Elsevier, 2010; SARLET, Ingo Wolfgang; FENSTERSEIFER, Tiago, **Direito Constitucional Ambiental: Constituição, Direitos Fundamentais e Proteção do Ambiente**, 5. ed. São Paulo: Revista dos Tribunais, 2017.

[1134] Brasil, 'Constituição Da República Federativa Do Brasil de 1988.' http://www.planalto.gov.br/ccivil_03/Constituicao/ Constituicao.htm, article 225.

5.1.1 The Ecolaw-Informed PES Model within the Brazilian Federation

This thesis argues that federal legislation should create a national policy to implement the ecolaw-informed PES for waste pickers. The model is required to be written legislation because Brazil is a civil law country. The civil law tradition follows a codified law system, which is a comprehensive, organised order based on written legal codes and legislation. [1135]

In terms of the entity that is best suited to develop the model, it is crucial to understand that, much like the United States, Brazil is a Federal Republic, also called a federation.[1136] The Republic is politically and administratively organised between the Union, the states, the Federal District[1137] and the municipalities.[1138] The Union is the Federal Government of Brazil, the federal entity formed by the association of the other entities.[1139] All of these federation entities are autonomous and can create law and policy. To systematise political authorities, there is a division between national and subnational sets of government. For that reason, the Constitution created a distribution of competencies among the entities, which is an essential characteristic of the Brazilian Federal State.[1140]

Although all entities have the competence to legislate, the Brazilian federation is more centralised than others, such as the United States.[1141] This structure means that the Union's competence area is broad, and it exercises authority over the integral national territory, with a limited scope of action by the states and municipalities that rule over their respective territories. In search of a federative balance,[1142] the Constitution elected the Union's competencies,[1143] gave residual powers to the states[1144] and indicated the competences of municipalities.[1145] The Federal District accumulates the heads of capabilities of both states and municipalities.[1146] There are matters of common or concurrent competencies between the federation entities.[1147]

[1135] WATKIN, Thomas Glyn, **An Historical Introduction to Modern Civil Law**, 5. ed. New York: Routledge, 2017, p. 3.
[1136] SILVA, José Afonso da, **Curso de Direito Constitucional Positivo**, 25. ed. São Paulo: Malheiros, 2005, p. 99.
[1137] Located in the Federal District, Brasília is the federal capital of Brazil.
[1138] Brasil, 'Constituição Da República Federativa Do Brasil de 1988.' http://www.planalto.gov.br/ccivil_03/Constituicao/ Constituicao.htm, article 18.
[1139] SILVA, **Curso de Direito Constitucional Positivo**, p. 100.
[1140] *Ibid*., p. 471.
[1141] *Ibid*., p. 477.
[1142] *Ibid*., p. 479.
[1143] Brasil, 'Constituição Da República Federativa Do Brasil de 1988.' (n 13), articles 21 and 22.
[1144] Ibid, article 25.
[1145] Ibid, article 30.
[1146] Ibid, article 33.
[1147] Ibid, article 23.

In this context, the ecolaw-informed PES should be implemented at the federal level for three reasons. First, the organised waste pickers in Brazil advocate for a federal PES legislation,[1148] an idea already considered and studied by federal institutions.[1149] Thus, the main stakeholders conform to having a national policy that implements PES for waste pickers in Brazil. As discussed in Chapter 4, recently, the National Policy for Payment for Environmental Services entered into force.[1150] Although a significant step forward, this legislation addresses PES in broad terms, without mentioning waste management, recycling or waste pickers. A more refined PES is required to integrate waste pickers into formal waste systems, which will promote sustainable waste management while improving their livelihoods.

Second, the Brazilian Constitution gives power to the Union to create law and policy addressing environmental concerns. The Brazilian Constitution establishes that environmental protection and pollution control[1151] are concurrent competencies of the Union, the Federal District and the states. Municipalities have the power to create supplementary legislation concerning environmental and pollution control[1152] and have exclusive competence over local interests,[1153] such as waste collection. Thus, it is permissible to argue that although federal legislation is needed to articulate consistent PES projects for waste pickers, the municipalities are the entities that will put this policy into practice.

As federal legislation, the model will guide other PES schemes addressing waste pickers at local government levels. There is a hierarchical order in Brazil where the Constitution is at the top of the legislative hierarchy, followed by federal legislation, lower levels of legislation[1154] and municipal supplementary legislation at the bottom. Any legislation violating federal norms is automatically void,[1155] ensuring that any subnational PES policy, program or contract towards waste pickers would be briefed on ecolaw.

Third, federal power holds the competence to develop national policies. The Brazilian Constitution provides that the Union has the competence to create general national laws relative to urban development,[1156] with the exclusive competence to create national and regional plans

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[1148] MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**.
[1149] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**
[1150] BRASIL, Lei nº 14.119, de 13 de janeiro de 2021.
[1151] Chapter 3 further explains the connection between waste management strategies and pollution control.
[1152] BRASIL, Constituição da República Federativa do Brasil de 1988, article 24.VI.
[1153] Ibid, article 30.
[1154] WATKIN, **An Historical Introduction to Modern Civil Law**, p. 3.
[1155] GRECO, Leonardo, Competências constitucionais em matéria ambiental, **Revista de informação legislativa**, v. 29, n. 116, p. 135–152, 1993, p. 142–143.
[1156] Brasil, 'Constituição Da República Federativa Do Brasil de 1988.' (n 8), article 21.XX.

for socio-economic development.[1157] By organising waste management and fostering the recycling value chain in Brazil, the ecolaw-informed PES interacts with urban development and socio-economic development.

Overall, as discussed in Chapter 4, the years without a federal policy for rural PES has created significant problems for the existing schemes. The absence of a federal norm tailored for waste pickers that guarantees the essential elements, such as schemes exclusively for waste pickers' cooperatives and associations, and the right to active participation, may leave waste pickers vulnerable when negotiating local programs. In some contexts—small cities or cities without a strong tradition of waste picking advocacy—organised waste pickers may not have significant political power. The introduction of a federal PES policy will thus ensure that all projects have similar designs and will guarantee important claims of the workers, such as the amount and the frequency of payments, as further discussed in Section 5.3.3 'Payment'.

Notably, the Brazilian Constitution does not have a specific provision for waste management or waste pickers. Nevertheless, the proposed ecolaw-informed PES model is grounded in Constitutional provisions. The provision of environmental law in the Brazilian Constitution will now be considered.

5.1.2 The Ecolaw-Informed PES Model Advancing the Fundamental Right to a Healthy Environment and Socio-Environmental Rights

In an unprecedented approach, the Brazilian Constitution[1158] qualified the environment as a fundamental right.[1159] Moving towards an ecolegal order, this provision addresses a healthy environment as the right of individuals, communities and future generations.[1160] The literature has qualified this approach as extended anthropocentrism, where nature is protected for the people's benefit; nonetheless, it has recognised that nature has intrinsic[1161] values.[1162]

The ecolaw-informed PES model advances the Constitutional provision because it promotes recycling and sustainable waste management. As analysed in Chapter 3, Section 3.3 'Organised Waste Pickers', the waste pickers' practices contribute to maintaining a healthy

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[1157] Ibid, article 21.IX.
[1158] *Ibid*., article 5, § 2º and 225.
[1159] LEITE *et al*, Direito e política constitucional ambiental, p. 50.
[1160] Brasil, 'Constituição Da República Federativa Do Brasil de 1988.' (n 8), article 225.
[1161] The concept of intrinsic values of nature means that nature has values on its own, independent of direct or indirect human benefits.
[1162] LEITE; AYALA, **Direito ambiental na sociedade de risco**, p. 49.

environment because they decrease greenhouse gas emissions, the need for raw materials and the overall pollution. The proposed model, particularly the criterion of sovereign communities, secures the people's fundamental right to a healthy environment in a waste management scheme with a bottom-up approach.

In this sense, environmental protection has become a fundamental objective of the Brazilian State.[1163] The Public Power administrates the environment, which is collectively owned by the population; thus, the Public Power must have a committed management.[1164] The public duty towards a healthy environment englobes the administrative, legislative and judicial institutions of government.[1165] Society and private citizens must respect environmental law and policy, potentially being called upon to fulfil broader obligations, such as active participation in managing the natural patrimony,[1166] and sustainable waste management.

The Brazilian Constitution also championed the socio-environmental rights' perspective,[1167] progressively followed by most South American countries,[1168] thus articulating the Global South's voice. This vision entails an undivided bond between social and environmental rights, communities and nature, social diversity, and biodiversity.[1169] Environmental rights are aligned with the objectives of wellbeing and social justice,[1170] making social justice and environmental sustainability the essence of the Brazilian legal system and justice itself.[1171]

The ecolaw-informed PES model acknowledges socio-environmentalism since it has a double focus on nature and waste pickers. As analysed in Chapter 3, the ecodesign criterion is respected by the waste pickers' enterprises because they provide sustainable waste management and are socially marginalised workers. Following socio-environmentalism, socially just and environmentally sustainable waste management policies and programs must oversee waste pickers' wellbeing and practices to conserve natural resources.

[1163] Brasil (n 8), article 225.
[1164] Paulo Affonso Leme Machado, *Direito Ambiental Brasileiro* (Malheiros, 26th ed, 2018) 163.
[1165] LEUZINGER; VARELLA, O Meio Ambiente Na Constituição Federal E Na Legislação Infraconstitucional: Avanços Ou Retrocessos (1988 A 2014)?, p. 303.
[1166] LEUZINGER, Márcia Dieguez; CUREAU, Sandra, **Direito ambiental**, Rio de Janeiro: Elsevier, 2013, p. 66–67.
[1167] SOUZA FILHO, **O renascer dos povos indígenas para o direito**, p. 72.
[1168] SOUZA FILHO, A Essência Socioambiental do Constitucionalismo Latino-Americano, p. 199.
[1169] SOUZA FILHO, **A liberdade e outros direitos: ensaios socioambientais.**, p. 9, 10.
[1170] BENJAMIN, Antônio Herman, O Meio Ambiente na Constituição Federal de 1988., **Informativo Jurídico da Biblioteca Ministro Oscar Saraiva**, v. 19, n. 1, p. 37–80, 2008, p. 41; DERANI, **Direito ambiental econômico**, p. 125.
[1171] LEITE *et al*, Direito e política constitucional ambiental, p. 52.

As discussed in Chapter 2, Brazil's socio-environmental perspective strength is based on the connection between environmental issues and social movements. The National Waste Pickers' Movement is among the leading groups advocating for socio-environmental rights. This group seeks to organise waste pickers and petitions for inclusive and sustainable waste management programs in cities[1172] and is particularly interested in having a PES scheme for waste pickers.[1173] The ecolaw-informed criterion of making communities sovereign, developed under the ecological approaches to environmental law framework, values instruments that are built from the basics, rather than dictated by experts in the top-down approach. The ecolaw-informed PES fulfils this requirement by working with waste pickers' and acknowledging their claims.

As addressed in Chapter 4, the ecolaw-informed model is a PES scheme that focuses on waste-related socio-environmental aspects. The proposed PES is an environmental law and economics instrument in tune with the Brazilian economic order, since the Constitution determines that economic agents must work in favour of socio-environmental rights.[1174] The Constitution advises that there can be no sustainable economy without respect for social justice, which cannot be done without recognising nature's importance.[1175] This perspective does not allow a divided approach.[1176]

The National Environmental Policy had linked economic activity to environmental protection.[1177] It determined that national environmental policies must assemble structured legal and economic instruments to guide economic agents.[1178] Conforming to the legislative hierarchy, this provision applies to waste management norms.

In this context, Brazil is fertile ground for the ecolaw-informed PES because the Constitution is progressive as it represents a first step away from the main flaws of environmental law. First, it has an extended and enhanced approach to anthropocentrism.[1179] Second, it moves away from fragmentation by securing the fundamental right to a healthy

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[1172] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 30.
[1173] See MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**.
[1174] Brasil, 'Constituição Da República Federativa Do Brasil de 1988.' (n 8), article 170. The article states that the economic order must ensure a dignified existence for all in the pursuit of social justice.
[1175] GRAU, Eros Roberto, **A ordem econômica na Constituição de 1988: Interpretação e crítica.**, 19. ed. São Paulo: Malheiros, 2018, p. 218.
[1176] DERANI, **Direito ambiental econômico**, p. 69.
[1177] Brasil. Lei Nº 6.902, de 31 de Agosto de 1981. http://www.planalto.gov.br/ccivil_03/LEIS/L6938compilada.htm accessed 10 June 2020.
[1178] DERANI, Cristiane; SOUZA, Kelly Schaper Soriano de, Instrumentos Econômicos Na Política Nacional Do Meio Ambiente: Por Uma Economia Ecológica, **Veredas do Direito**, v. 10, n. 9, p. 247–272, 2013, p. 258–259.
[1179] LEITE; AYALA, **Direito ambiental na sociedade de risco**, p. 49.

environment. Third, the socio-environmental perspective dissociates any trace of compartmentalisation since it has an inclusive take on environmental issues.

5.2 HOW THE ECOLAW-INFORMED PES MODEL CAN ADVANCE THE SUCCESSES AND ADDRESS THE CHALLENGES OF EXISTING POLICIES AND PROGRAMS

Building on the Constitution's socio-environmental perspective, the Public Power began integrating the organised waste pickers into waste management systems.[1180] Brazil can be regarded as the trailblazer of waste pickers' programs, since efforts to improve their livelihoods have progressively emerged over the past 30 years.[1181] These schemes are an acknowledgement of the leading role of these workers in sustainable waste management.

The integration began in the 1990s with municipal schemes because, as explained, municipalities have the Constitutional duty to address matters of local interest and are the local level of government, having a closer contact with waste pickers than the federal or the state government. The Belo Horizonte case[1182] is well suited to exemplify this type of waste pickers' inclusion. In 1990, the Belo Horizonte's 'Municipal Organic Law'[1183] prioritised waste pickers' cooperatives in the collection and sale of recyclable materials. This arrangement was an innovative legislative determination[1184] in a municipality with a significant engagement of organised waste pickers[1185] and a recognition of waste pickers' enterprises.[1186] The broader point

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[1180] RENGEL-GONÇALVES; AYDOS, No Time To Waste: Payment For Urban Environmental Services As A Tool To Support Invisible Recyclers In Brazil.
[1181] Sonia Dias and Ana Carolina Ogando, 'Engendering Waste Pickers Cooperatives in Brazil' in *Cooperatives and the World of Work* (ILO, 2015) 27, 8 https://www.wiego.org/publications/engendering-waste-pickers-cooperatives-brazil.
[1182] There are other early municipal legislation recognising the role of informal waste pickers in Brazil. For instance, Porto Alegre with Law n. 234 of 1990, and Diadema with Law n. 1921 of 2000. For more information, see DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**; RENGEL-GONÇALVES; AYDOS, No Time To Waste: Payment For Urban Environmental Services As A Tool To Support Invisible Recyclers In Brazil.
[1183] The Municipal Organic Law is the superior law of a municipality. This legal provision constitutes a general law forming the foundation of the municipal government.
[1184] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 2.
[1185] OGANDO, Ana Carolina; BRITO, Marina, **Estudo de Monitoramento de Economia Informal: Catadoras e Catadores em Belo Horizonte, Brasil.**, Manchester, UK: Women in Informal Employment Globalizing and Organizing WIEGO, 2013, p. 2.
[1186] Instituto de Pesquisa Econômica Aplicada IPEA, 'Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa Com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis' (IPEA 2015) 41.

raised by this example is that municipalities have been pioneers in promoting inclusive legislation, indicating that waste pickers have a significant public profile and recognition.[1187]

After a decade of policies and programs emerging at municipal levels, later accompanied by different government levels,[1188] schemes started to appear at the federal level. In 2002, waste picking was formally recognised as a professional[1189] category,[1190] acknowledging waste pickers as professional workers. This provision led to data collection by national databases, making Brazil the only country to systematically publish official statistical data and reports on waste pickers.[1191] In 2007, a federal law facilitated the direct hiring of waste pickers' associations and cooperatives to provide selective waste picking to municipalities, with a waiver of bidding requirements.[1192]

Standardised national databases are crucial to collect quality data to inform the development of sound policies for waste pickers. The Brazilian Institute of Geography and Statistics[1193] is the most important the agency responsible for official collection of statistical, geographic, cartographic, geodetic and environmental information in the country.[1194] However in recent times, the current administration and National Congress cut 90 per cent of its investments[1195] in this institute.[1196] Researchers have denounced the cuts, arguing that it is vital for the Brazilian people, democracy and academia. These researchers stated that the cuts have resulted in practical difficulties in determining the demographics of municipalities, frustrating the planning for vaccination programs and analysis.[1197]

This raises concerns about the future of waste pickers' policy, as it hinders the collection of important data that in the past has fostered the strengthening of their claims. These

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[1187] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 7.
[1188] See RENGEL-GONÇALVES; AYDOS, No Time To Waste: Payment For Urban Environmental Services As A Tool To Support Invisible Recyclers In Brazil.
[1189] Brasil, 'Classificação Brasiliera de Ocupações CBO - 5192 Trabalhadores Da Coleta e Seleção de Material Reciclável' (*Classificação Brasiliera de Ocupações CBO*, 2002) http://www.mtecbo.gov.br/cbosite/pages/pesquisas/BuscaPorTituloResultado.jsf accessed 8 December 2019.
[1190] The Brazilian Occupation Classification, which is a document issued by the Federal Government, recognised waste picking as a professional category and waste pickers as professionals who collect, sort and sell recyclable materials, such as paper, cardboard, glass, ferrous and other reusable materials, either working individually or in associations or cooperatives.
[1191] DIAS; OGANDO, Engendering Waste Pickers Cooperatives in Brazil, p. 8.
[1192] Brasil. Lei Nº 11.445, de 5 de Janeiro de 2007. http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2007/lei/L11445compilado.htm accessed 15 July 2018.
[1193] In Portuguese: *Instituto Brasileiro de Geografia e Estatística, IBGE.*
[1194] BRASIL, Lei nº 6.183, de 11 de dezembro de 1974, article 6.
[1195] BBC BRASIL, **Censo 2021: Congresso corta 90% da verba e IBGE diz que medida torna operação inviável**, available at: <https://www.bbc.com/portuguese/brasil-56490188>. acessed: 12 set. 2021, p. 1.
[1196] BRASIL, Lei nº 14.144 de 22 de abril de 2021.
[1197] Diretoria Abep, Gestão 2021-2022, Carta aberta em defesa do IBGE e do Censo, 2021, p. 1.

cuts support the notion that the current administration disregards socio-environmental matters and waste pickers. In short, significantly reducing the investments in data collection is a danger to society and social movements, and jeopardizes the future of socio-environmental issues in Brazil.

Although the schemes mentioned are relevant, waste pickers' most crucial legal recognition came in 2010 with Law n. 12.305 that implemented the National Policy for Solid Waste Management (National Waste Policy).[1198] This policy was first debated in Congress in 2007 and was a historical claim of the organised waste pickers.[1199] It is a vital legal tool that organises disordered government policies and a landmark for waste pickers' recognition. This policy demonstrates the relevance of waste pickers' activities, and the possibility of integrating them into formal waste systems managed by municipalities, as strategised by the ecolaw-informed PES for waste pickers in Section 5.3 'Articulating the Model: The Elements of the Ecolaw-Informed PES'.

[1198] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm accessed 15 July 2020.
[1199] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 3.

5.2.1 The Model Articulating the National Waste Policy

The National Waste Policy advanced because waste pickers and allies, such as supportive governmental officials, seized a favourable political opportunity to campaign for inclusive legislation.[1200] Thus, waste pickers are part of Brazil's most crucial waste legislation, which is anchored in the Constitution and previous federal environmental law legislation.[1201] The main innovations of the National Waste Policy are the determination of waste pickers' integration in the reverse logistics for products[12021203] and the sharing of responsibilities towards waste.

In this sense, it is possible to argue that the National Waste Policy is the opening move to an ecolaw vision for the Brazilian waste management system. However, it is still embedded in the traditional context of environmental law. Hence, although this Policy represents a way forward, it still needs other initiatives that foster more reforms.

The National Waste Policy provides a set of more than 10 principles governing the interpretation of the statute; most of them are fundamental principles of Brazilian environmental law.[1204] It also presents multiple interconnected and complementary objectives, providing readers with the framework and direction of the desired outcomes. To achieve the objectives, the National Waste Policy assembles directives, associating goals and inspirations with plans, responsibilities and instruments.

The ecolaw-informed PES model is aligned with the National Waste Policy's principles, objectives, directives and instruments. How the proposed model can advance the statute is organised in the three main threads—sustainable waste management, the integration of waste pickers' organisations and the sharing of responsibilities—that unite the statute's principles, objectives, directives and instruments, as discussed next.

[1200] *Ibid*., p. 5.
[1201] Article 5 of the National Waste Policy integrates it with the National Environmental Policy (Brasil. Lei Nº 6.902, de 31 de Agosto de 1981, n 42), the National Environmental Education Policy (Brasil. Lei Nº 9.795, de 27 de Abril de 1999. http://www.planalto.gov.br/ccivil_03/leis/l9795.htm, the Federal Policy for Basic Sanitation (Brasil. Lei Nº 14.026, de 15 de Julho de 2020. http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2020/lei/l14026.htm#view., and the Law n. 11.107 of 2005, which facilitates hiring public consortia. See RENGEL-GONÇALVES; AYDOS, No Time To Waste: Payment For Urban Environmental Services As A Tool To Support Invisible Recyclers In Brazil.
[1202] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 33.3.III.
[1203] Reverse logistics is a National Waste Policy instrument for applying shared responsibility of all waste generators. It is a small-scale circular economy mechanism that calls for systems promoting the collection, reuse, recycling, treatment and/or final disposal of waste.
[1204] For more information about fundamental principles of Brazilian environmental law, see LEITE, José Rubens Morato *et al*, Princípios fundamentais do Direito Ambiental, *in*: LEITE, José Rubens Morato (ed.), **Manual de Direito Ambiental**, 1. ed. São Paulo: Saraiva, 2017, p. 89–126; SARLET; FENSTERSEIFER, **Princípios de Direito Ambiental.**

5.2.1.1 The Focus on Waste and its Hierarchy

The ecolaw-informed PES builds on the concepts and definitions of the National Waste Policy. In this sense, the proposed model focuses on the urban solid waste[1205] generated from urban households and urban cleansing.[1206] The municipal government can consider waste from commercial and service establishments as household waste,[1207] as long as it is non-hazardous.[1208]

The National Waste Policy guides the ecolaw-informed PES to address waste not as a problem but as an opportunity. The statute provides the principle of recognition of reusable and recyclable waste as goods with economic and social value that generate work and income and promote citizenship.[1209] Waste pickers petitioned for this principle. It acknowledges their participation in the reverse logistics of products[1210] and their integration in actions related to the shared responsibility for the life cycle[1211] of products.[1212] This perspective connects with the ecolaw-informed criteria, since it fosters community participation (sovereign communities), promotes organisation focusing on the common needs (generative ownership) and addresses the waste hierarchy in the value chain (ecodesign).

Reuse and recycle are part of any waste hierarchy,[1213] which is repeated throughout the National Waste Policy. However, the scholarship focused on inclusive waste management flags that the statute mentions waste hierarchy but lacks a clear articulation, as done by other directives[1214] on waste.[1215] Researchers and organised waste pickers fear that this void enables the development of incineration plants,[1216] which can have a 'vacuum cleaner effect' over waste pickers' activities and the rest of the recycling value chain, as discussed in Chapter 3.

[1205] Article 13 also explains items that constitutes waste, such as medical, civil construction and transportation waste, which are not the subject of this chapter.
[1206] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 13.I.a.b.c.
[1207] Ibid, article 13.
[1208] Article 13.II.a establishes that hazardous waste is waste that presents a significant risk to public health or environmental quality, because of its characteristics of flammability, corrosivity, reactivity, toxicity, pathogenicity, carcinogenicity, teratogenicity and mutagenicity. Article 13.II.b informs that non-hazardous waste is all those items not covered under the description of hazardous waste.
[1209] Ibid, article 6.VIII.
[1210] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 41), article 33.3.III.
[1211] Article 3.IV of the National Waste Policy defines the product life cycle as the set of actions that involve product development, raw materials and inputs sourcing, the production process, consumption and final disposal.
[1212] Ibid, article 7.XII.
[1213] See Chapter 3.
[1214] The example given in the literature is the take of the European Union Framework Directives on waste hierarchy.
[1215] GUTBERLET, Social aspects of solid waste in the global South., p. 328.
[1216] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 3; GUTBERLET, Social aspects of solid waste in the global South., p. 328.

This issue was aggravated by a last-minute alteration to the National Waste Policy text. The original text had a clause restricting incineration, allowing it expressively only as a last resort, which was later omitted at the Senate House.[1217] In a move to draw the policy back to its foundation, the organised waste pickers requested a presidential veto on the clause that established incineration as an environmentally viable option for waste.[1218] The veto was denied, and waste-to-energy became permitted,[1219] as long as it follows environmental policies, particularly emission restrictions, and is approved by the competent environmental agency. This authorisation threatens the livelihoods of the waste pickers and promotes an environmentally and financially risky technology, unsuitable to the Brazilian context, as further explained in Chapter 3, Sections 3.3 ('Organised Waste Pickers') and 3.2 ('Waste-to-Energy Incinerators'), respectively.

The ecolaw-informed PES addresses the incineration issue as ill-suited for ecolegal-informed approaches, as explained in Chapter 3. Therefore, in those municipalities with waste pickers' organisations, incineration should be made illegal because it disrespects the a priori waste hierarchy. There is a federal bill that proposes a change in the National Waste Policy, thus prohibiting incineration of urban solid waste in Brazil.[1220] This bill, which is still to be voted, relates to ecolaw-oriented concerns and should enter into force.

The ecolaw-informed PES model of this thesis emphasises recycling conducted by waste pickers' enterprises in tune with the National Waste Policy. This focus entails the integration of these workers into the waste management systems, as per the statute. Moreover, incineration poses a risk to this integration because it often disrupts the waste hierarchy, prevailing over recycling and reuse due to economic reasons, as explained in Chapter 3, which suggests that it should be banned.

5.2.1.2 Integrating Waste Pickers' Organisations

[1217] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 3.
[1218] MNCR, MNCR pede veto à incineração na Política Nacional de Resíduos Sólidos.
[1219] Article 9 of the National Waste Policy allows technologies aiming to recover energy from urban solid waste, provided that their technical and environmental feasibility has been proven and a toxic gas emission monitoring program approved by the environmental agency will be implemented.
[1220] See Brasil. Projeto de Lei n. 4.980 de 2020 https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2264536.

What distinguishes the National Waste Policy from other laws and policy, and is of interest to this chapter, is the inclusion of the receiver-protector principle.[1221] This principle rose to prominence in the recent environmental law literature, and the National Waste Policy is the first federal law to include it.[1222] The receiver-protector principle links environmental protection and compensation for such protection, rewarding those who protect nature. In short, much like the idea behind PES, the community and the public authorities recognise the benefits generated by those who carry on sustainable activities, which in the ecolaw-informed model are the organised waste pickers, a perspective aligned with the view of waste as an opportunity.

The proposed ecolaw-informed PES model serves the National Waste Policy's objective to integrate the waste pickers into waste management systems.[1223] By targeting waste pickers' enterprises to be compensated for the services they provide, recycling and sometimes selective collection, the model puts the National Waste Policy into action. This integration leads to the fulfilment of other important objectives, such as incentivising the recycling industry,[1224] adopting and enhancing clean technologies to minimise environmental effects[1225] and protecting environmental quality.[1226]

Here, the ecolaw-informed PES is precisely aligned with the National Waste Policy. The goal is to incentivise recycling and waste pickers' enterprises. In summary, by promoting these enterprises, such policies attract individual waste pickers into collective organisations. Considering that waste pickers are currently responsible for 90 per cent of recycling conducted in Brazil,[1227] when they become more organised, they will recycle more. As investigated in Chapter 3, the organised waste pickers perform recycling and other sustainable waste management activities that minimise environmental effects and protect environmental quality. In other words, by promoting the organised waste pickers, the ecolaw-informed PES consequently advances the objectives of the National Waste Policy.

The novel inclusion—relevant for the ecolaw-informed PES—can foster the growth of waste pickers' enterprises. In addition to achieving efficiency in productive activities, it encourages instruments for promoting socially and environmentally responsible practices,[1228]

[1221] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 6.II.
[1222] MACHADO, Paulo Affonso Leme, Princípios da política nacional de resíduos sólidos, v. 24, n. 7, p. 9, 2012, p. 28.
[1223] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 7.XII.
[1224] Ibid, article 7.VI.
[1225] Ibid, article 7.IV.
[1226] Ibid, article 7.I.
[1227] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 19.
[1228] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 30.

such as that provided by the organised waste pickers. Adopting this approach can facilitate the implementation of the environmental targets of the Constitution, ensure the fair distribution of profits in the sector and support the recognition of the waste pickers' role in the recycling value chain.

The ecolaw-informed PES aims to compensate waste pickers' enterprises for their services via monetary compensation and in-kind payments. These payment types are based on the National Waste Policy support of credit lines to foster infrastructure and the purchase of equipment for waste pickers' cooperatives,[1229] and financial, fiscal and credit incentives.[1230] In fact, the statute provides the development of incentives to cultivate waste pickers' organisations,[1231] rules to give incentives to recycling facilities[1232] and programs to provide infrastructure and equipment to waste pickers' enterprises.[1233]

That sounds simple—yet, in practice, it has been controversial. Before being a legal matter, environmental protection is an ethical duty. The protector-receiver principle and the integration of organised waste pickers aim to encourage sustainable practices through specific legislation without imposing an unfair burden on protectors. Nevertheless, it cannot encourage selfish or antisocial behaviour, such as people protecting the environment only when they receive a reward immediately.[1234]

Although an important reflection, this criticism does not apply to the ecolaw-informed PES. This is because the model proposed in this chapter aims to compensate the socio-environmental benefits resulting from waste pickers' labour. A policy promoting sustainable waste management and paying for the services waste pickers provide is neither selfish nor antisocial. On the contrary, it will pay these workers for what they can trade and in recognition of the social good that they contribute to society, as further examined in Chapter 3, Section 3.3 'Organised Waste Pickers'. In any case, the literature has demonstrated that transparency and information are essential to alleviate payment-related controversies,[1235] which, as explained in Chapter 2, is encouraged in sovereign communities.

5.2.1.3 Sharing Responsibilities

[1229] Ibid, article 42.III.
[1230] Ibid, article 8.IX.
[1231] Ibid, article 8.IV.
[1232] Ibid, article 44.I.
[1233] Ibid, article 42.III.
[1234] MACHADO, Paulo Affonso Leme, Princípios da Política Nacional de Resíduos Sólidos, **Revista do Tribunal Regional Federal da 1ª Região**, v. 24, n. 7, p. 25–33, 2012, p. 28.
[1235] *Ibid*.

The receiver-protector principle and the waste pickers' integration raise the critical question of who pays the protectors, which is a significant matter for the ecolaw-informed PES. In this sense, the National Waste Policy advances the production and consumer standards, chiefly with the principle of shared responsibility for the products' life cycle.[1236] This principle establishes that all actors involved in waste generation—the public and the private sectors, and society in general—are responsible for its environmentally adequate disposal, and therefore are responsible for covering the costs of preventing and managing waste. This vision is in line with the polluter-pays principle[1237] and PES,[1238] also present in the statute. For the ecolaw-informed PES, this means municipalities must identify the private sector entities involved in waste production and must take part in compensating the waste pickers who often if not always have been ensuring sustainable waste management alone.

In this regard, the ecolaw-informed PES fulfils the National Waste Policy objectives in pursuit of sharing responsibility. The statute targets the promotion of integrated waste management,[1239] and the articulation by the different spheres of Public Power, along with the business sector, to create technical and financial cooperation.[1240] The National Waste Policy indicates ways in which these objectives can be pursued, and the ecolaw-informed PES is a mix of the instruments of reserve logistics[1241] and financial incentives.[1242] In short, the Public Power must articulate means to fund and finance the implementation of schemes, such as the ecolaw-informed PES.

Within the scope of the shared responsibilities, the Public Power as a whole is accountable for waste management. At the organisation level, the Union must make and update the National Plan for Solid Waste,[1243] attending to the social inclusion and the economic emancipation of waste pickers.[1244] Although the Union is responsible, ultimately, waste management is of local interest, and municipalities have essential duties. For example, all municipalities that have waste pickers' cooperatives should create PES programs to support them.[1245]

[1236] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010 (n 56), article 6.VII.
[1237] Ibid, article 6.II.
[1238] *See* MAUERHOFER; HUBACEK; COLEBY, From Polluter Pays to Provider Gets.
[1239] Ibid, article 7.VII.
[1240] Ibid, article 7.VIII.
[1241] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 8.III.
[1242] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 8.IX.
[1243] Ibid, article 15.
[1244] Ibid, article 15.V.
[1245] Ibid, article 19.II.XI.

In Brazil, numerous municipalities experience the effects of income constraints and rely on fund transfers from the Federal Government. To expand sustainable waste management adherence by the municipalities, the National Waste Policy has adopted a 'carrots and sticks' tactic.[1246] The exchange of funding for urban cleaning and waste management from the Union to the municipalities became conditional on the development of integrated municipal management plans for solid waste, concentrating on municipalities that include waste pickers into their plans.

Further, in terms of the municipalities' responsibility, the National Waste Policy provides another way to overcome constricted budgets. Article 16 addresses incentives to be given to municipalities working together as micro-regions.[1247] These micro-regions will be prioritised in accessing the Union's resources for funding sustainable waste management schemes.

The answer to the question of who pays the organised waste pickers, protectors of sustainable waste management, is all stakeholders who transform products into waste. The municipality, which is the local public entity and serves as the representative of the community, should allocate funds to support schemes and foster micro-regions so they can access federal funding. Municipalities should also create contracts of sectoral agreements with the leading local importers, traders, vendors and producers, such as shopping centres and manufacturers. This would enforce the shared responsibility principle enshrined in the statute and decrease the financial burden of the municipalities.

5.2.2 The Model and the Lessons from Existing Inclusive Programs

In the 10 years following the introduction of the National Waste Policy, many programs were developed focusing on waste pickers. The federal level of government has created important programs, pushing municipalities, creating successful cases and revealing the remaining challenges. Schemes headed by municipalities are still uncommon considering the number of municipalities in Brazil; however, some of the existing programs report good practices. The lead of the Federal Government and the struggles of the municipalities in creating programs demonstrate the importance of having a federal policy that designs PES for waste pickers, to be implemented by municipalities. As explained below, a central problem facing the

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[1246] See RENGEL-GONÇALVES; AYDOS, No Time To Waste: Payment For Urban Environmental Services As A Tool To Support Invisible Recyclers In Brazil.
[1247] Ibid, article 16.

local levels of government is the lack of structure and funds to plan schemes; thus, federal legislation providing structure and guidance should lessen the burden.

5.2.2.1 Federal Programs

In addition to the enactment of the National Waste Policy, and in line with the Union's responsibilities provided in article 8.IV of the National Waste Policy, other programs were implemented. This section will focus on two main federal programs, the Pro-Waste Picker Program[1248] and the Cataforte Program, although there have been many others,[1249] particularly capacity-building programs. The selected programs are justified by their impact and relevance to the relationship between the organised waste pickers and municipalities.

In 2010, the Pro-Waste Picker Program entered into force, aiming to articulate all Federal Government actions towards supporting waste pickers' organisations and improving working conditions.[1250] The program sought to support waste pickers[1251] through measures such as training, technical advice, research and studies on products' life cycle and shared responsibility, equipment acquisition and infrastructure implementation.[1252] Prior studies revealed that the program failed to meet expectations chiefly because municipalities, the entities responsible for the implementation process, did not include waste pickers into planning

[1248] In Portuguese: *Programa Pró-Catador*.
[1249] Other examples of federal programs are "Coleta Seletiva Solidaria" – Decreto 5.940, de 26 de outubro de 2006, "Programa Nacional de Acesso ao Ensino Técnico e Emprego (Pronatec) – Modalidade Pronatec Catador"; "Prêmio Cidade Pró-Catador"; and the "Comitê Interministerial para Inclusão Social e Econômica dos Catadores de Materiais Reutilizáveis e Recicláveis (CIISC)" - Decreto 7.405 de 23 de dezembro de 2010.
[1250] Within the scope of the Pro-Waste Picker Program, the Federal Government and the National Secretariat for Solidarity Economy (in Portuguese: *Secretaria Nacional de Economia Solidária – SENAES*), one of the entities responsible for implementing the program, collaborated with waste pickers, state governments, municipalities, universities and civil society entities.
[1251] Most of the resources (70 per cent) were allocated to actions for independent/autonomous waste pickers, and the rest to cooperatives and associations.
[1252] Brasil. Decreto Nº 7.405, de 23 de Dezembro de 2010. http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/decreto/d7405.htm.

activities.[1253] Therefore, the cases often presented a mismatch between the services provided and the waste pickers' needs, and failed to integrate waste pickers into waste collection.[1254]

The Pro-Waste Picker Program provides essential lessons for the ecolaw-informed PES. The main take on the case is that success depends on waste pickers' participation and the connection between planning and execution.[1255] Even when the Federal Government has developed an adequately written program, it does not work without the local waste pickers' active participation.

The Pro-Waste Picker Program led to the creation of one of the most effective Federal Government projects, Cataforte.[1256] Cataforte aimed to organise the distribution of financial and human resources, such as consultancy and training, to cooperatives and networks of waste pickers' cooperatives.[1257] The network strategy was promoted by the Federal Government in accordance with the National Waste Pickers' Movement and was justified since cooperatives and associations operating in isolation struggle to survive in a highly competitive market that is manifestly exploitative of waste pickers.

Cataforte is a success case, recognising the role of waste pickers in sustainable waste management. In total, Cataforte invested more than half a million Brazilian Reais into capacity building and delivering machinery and equipment.[1258] The lessons taken from this program are the importance of focusing on waste pickers' cooperatives and associations, professionalising them and ensuing a fair recycling value chain.

[1253] These studies found that because of the lack of participation, programs in many municipalities, such as Camaçari, Contagem and Rio Claro, did not deliver the desired equipment. However, municipalities with waste pickers' participation were successful in delivering infrastructure, for instance, Osasco. The programs in Contagem, Osasco and Joinville aimed to integrate waste pickers into the waste collection systems, but instead generated more exclusion. The Campinas case was one of the few success cases, which was able to expand the city's recycling industry. The success is linked to the strong presence of organised waste pickers and networks in Campinas. *See* FERREIRA, Tainá Labrea, **A geografia da reciclagem popular: o espaço e a política municipal no Programa Pró-Catador.**, PhD Thesis, Universidade de Brasília - UNB, Brasília, 2019, p. 324–330.

[1254] *Ibid*.

[1255] *Ibid*., p. 330.

[1256] Cataforte was a federal program developed in three phases. In the first phase, it first aimed to build capacity and facilitate the organisation of waste pickers, promoting agreements with non-governmental organisations and entities supporting waste pickers, making them beneficiaries. Next, it sought to foster the recycling value chain, logistics and infrastructure, and provide equipment, such as trucks, press machines, conveyors and safety gear. In the second phase, contracts were signed directly with waste pickers' organisations and networks and supporting entities. In the third phase, Cataforte 3 aimed to professionalise waste pickers' organisations; however, they often lacked capacity. In this final stage, the agreements were signed with waste pickers' organisations and supporting entities.

[1257] See Diogo de Sant'Ana and Daniela Metello, 'Reciclagem e Inclusão Social No Brasil: Balanço e Desafios' in *Catadores de Materiais Recicláveis: Um Encontro Nacional* (IPEA, 2016) 21.

[1258] *Ibid*., p. 42.

It is notable that the Pro-Waste Picker Program lasted for ten years, being revoked in 2020.[1259] This is an important indicator of the lack of support of the Bolsonaro administration to the waste pickers. As previously argued in this thesis, the actions of the current administration jeopardises the future of waste pickers, the people who are part of social movements and, consequently, environmental protection.

5.2.2.2 Programs Headed by Municipalities

As previously mentioned, municipalities often struggle to work with waste pickers owing to budget restrictions. The Union has struggled to get organised and allocate funds to support municipalities.[1260] However, even with funding possibilities by the Federal Government, programs created take an average of 57 months to produce any results, often not even transitioning from project to practice.[1261]

The low level of engagement by the Federal Government has had a snowballing effect on the lower levels of government. In terms of states,[1262] less than half of the Brazilian states have developed Plans for Solid Waste.[1263] This lack of commitment escalates to municipalities, resulting in approximately 60 per cent[1264] of municipalities lacking a Municipal Plan for Solid Waste.[1265] According to article 18 of the National Waste Policy, without the development of such plans, municipalities are unable to access funds from, or controlled by, the Union.

Despite a decade of the National Waste Policy, and funding possibilities, municipalities do not follow the federal guidelines. A series of IPEA studies indicated that municipalities struggle with planning and financing, and that structural, technical and economic issues hinder the development and enforcement of waste management policies.[1266] As examined

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[1259] BRASIL, Decreto nº 10.473 de 24 de agosto de 2020, inciso CCXXXV.
[1260] Part of the problem is due to the Union's inconsistent update of the National Plan for Solid Waste, which hinders its ability to address the states and municipalities. According to article 15 of the National Waste Policy, the Union must update the National Plan for Solid Waste at least every four years.
[1261] BRASIL, **Relatório de avaliação por área de gestão nº 9 Resíduos sólidos**, Brasília: Ministério da Transparência e Controladoria-Geral da União, 2017, p. 10, 11, 36.
[1262] According to article 16 of the National Waste Policy, states must create Plans for Solid Waste in order to access funding from the Union.
[1263] BRASIL, **Relatório de avaliação por área de gestão nº 9 Resíduos sólidos**, p. 46.
[1264] In 2015, a total of 2,325 municipalities declared they had Municipal Plans for Solid Waste, whereas 3,245 confirmed they did not have such Plans. Therefore, 97 million people or 48 per cent of Brazilians are living in municipalities lacking the essential Plans.
[1265] BRASIL, **Resíduos Sólidos.**, Ministério do Meio Ambiente, Disponível em: http://www.mma.gov.br/mma-em-numeros/residuos-solidos, acesso em: 17 out. 2019.
[1266] IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 17.

in Chapter 3, open dumps are still a reality in Brazil despite the National Waste Policy's provisions to close them.[1267] It can be suggested that municipalities struggling with final waste disposal facilities would hardly be able to promote waste prevention and recycling activities.

The impact of the progressive federal and state body of legislation promoting waste pickers in municipalities—relevant for the ecolaw-informed PES—is still limited. Only approximately 8.5 per cent of municipalities have incorporated waste pickers into their selective waste collection.[1268] Even with inclusion, often there are no stable contracts or employment relationships,[1269] and these systems do not reduce the marginalisation of waste pickers.

Some studies suggest that certain municipalities properly integrate organised waste pickers, highlighting that they are limited initiatives. For example, a report published by a public institute analysing the involvement of waste pickers' enterprises in municipal schemes has provided evidence that 35 Brazilian municipalities have implemented good practices[1270] that can attain significant results.[1271] Studies regarding one of the most successful cases,[1272] the Belo Horizonte's[1273] Recycling Bonus,[1274] revealed that enterprises view it as a very positive incentive.[1275] In short, the literature on waste pickers' inclusion in Brazil has strongly suggested that contracts between municipalities and waste pickers' enterprises to provide sustainable waste management are effective in diverting significant volumes of waste from disposal in dumps and landfills.[1276] Therefore, PES can be a driver of sustainable waste management.

[1267] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 15.V and article 17.V.
[1268] Most of the integration cases are in the Southern and South-eastern regions of Brazil. See IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**.
[1269] *Ibid*., p. 42.
[1270] The report used 11 indicators of good outcomes, or good practices, such as infrastructure and access to adequate work conditions according to occupational health and safety standards, made possible by the municipalities, inclusion of waste pickers' expertise to conduct environmental and educational awareness, cooperation between the municipality's public policies for waste pickers and other governmental public policies.
[1271] IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 14, 19, 31, 32, 37, 40, 41.
[1272] Another successful case is the Program for Recycling PES in the state of Rio de Janeiro, in *Portuguese Programa Estadual de Pagamentos por Serviços Ambientais de Reciclagem*. It follows the trend to pay waste pickers for the amount of waste collected and separated.
[1273] It is a state program, which has been particularly successful in Belo Horizonte because of its history with waste pickers' inclusion. See Minas Gerais. Lei Estadual Nº 19.823, de 22 de Novembro de 2011. Dispõe Sobre a Concessão de Incentivo Financeiro a Catadores de Materiais Recicláveis – Bolsa Reciclagem.' http://www.siam.mg.gov.br/sla/download.pdf?idNorma=19694.
[1274] In Portuguese: *Bolsa Reciclagem.*
[1275] DIAS, Waste pickers and cities, p. 380; OGANDO; BRITO, **Estudo de Monitoramento de Economia Informal: Catadoras e Catadores em Belo Horizonte, Brasil.**, p. 3; RIBEIRO; REIS, Pagamento Por Serviços Ambientais Urbanos - Psau: Criação E Implementação Do Bolsa Reciclagem, p. 129.
[1276] RUTKOWSKI, Jacqueline E; RUTKOWSKI, Emília W, Expanding worldwide urban solid waste recycling: The Brazilian social technology in waste pickers inclusion, **Waste Management & Research**, v. 33, n. 12, p. 1084–1093, 2015, p. 1091.

Three decades since the early municipal schemes and one decade after the National Waste Policy entered into force, waste pickers still find themselves underutilised and undersupported providers of environmental services. Programs are rare and insufficient, waste pickers are widely marginalised and health and safety settings, as well as social protection and labour rights, are still deficient.

The enhancement of the body of legislation is apparent—most of the enhancements are because of the advocacy of the organised waste pickers. Although there is progressive legislation, a legislative gap persists because there is no national law that recognises and regulates waste picking as an essential public activity and service provided to the State.

The municipal experience reveals the need for federal legislation that implements a national PES policy to target the organised waste pickers through the ecolaw-informed PES. As municipalities struggle to create inclusive waste management programs, the model proposed next provides essential guidelines on how to proceed. The next section discusses the basic elements of the ecolaw-informed PES and a framework of required themes to be addressed; however, as participation and local context are vital, it leaves room to tailor the model to best meet local concerns.

5.3 ARTICULATING THE MODEL: THE ELEMENTS OF THE ECOLAW-INFORMED PES

Although many authors have studied the integration of waste pickers into the formal waste management sector and PES programs involving these workers,[1277] the problem of how to achieve inclusion is still insufficiently explored. To fill this gap, this section identifies the basic elements necessary to articulate a model for creating an ecolaw-informed PES for waste pickers. This section considers previous cases, specialised literature, IPEA's reports

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[1277] ALTMANN, Pagamento por Serviços Ambientais Urbanos como instrumento de incentivo para os catadores de materiais recicláveis no Brasil; ANDRADE, Marconi Tabosa de, **O programa CATAFORTE e o trabalho dos catadores de recicláveis: As ambivalências da economia solidária no limiar da precarização.**, Ph.D. Thesis, Universidade Federal de São Carlos - UFSCar, São Carlos, 2017; DIAS, Waste pickers and cities; GUTBERLET, Jutta *et al*, Waste Picker Organizations and Their Contribution to the Circular Economy: Two Case Studies from a Global South Perspective, **Resources**, v. 6, n. 4, p. 52, 2017; IJGOSSE, Jeroen, Paying Waste Pickers for Environmental Services: A Critical Examination of Options Proposed in Brazil., **WIEGO Technical Brief (Urban Policies)**, n. 6, 2012; JAMMI; OLIVEIRA, **Integrated Solid Waste Management and Carbon Finance Project in Brazil**; RIBEIRO; REIS, Pagamento Por Serviços Ambientais Urbanos - Psau: Criação E Implementação Do Bolsa Reciclagem; RUTKOWSKI; RUTKOWSKI, Expanding worldwide urban solid waste recycling; VELIS, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era.; YATES, Julian S; GUTBERLET, Jutta, Reclaiming and Recirculating Urban Natures: Integrated Organic Waste Management in Diadema, Brazil, **Environment and Planning A**, v. 43, n. 9, p. 2109–2124, 2011.

representing the Federal Administration views and concerns and the documents by the organised waste pickers. These documents are analysed and operationalised in the context-based practice of the Brazilian waste system, that is, promoting change via an ecolegal transition without completely disrupting the legal system and in tune with the key players. The legislation in force is also addressed, namely, the National Waste Policy, and the Constitution, which represent first steps towards a more ecologically centred law in Brazil; however, they are still embedded in the environmental law approach. These are key legislative instruments to observe when developing a reform, a model for waste management in Brazil. In addition, this section briefly addresses the new PES policy in order to show that the proposed ecolaw-informed PES for waste pickers does not collide with the in-force legislation.

The themes of key stakeholders, targeted services, payment and new risks are used to organise the discussion that follows. These themes must be considered for an ecolegal-informed PES. However, the model proposed is not overly prescriptive, which is important to ensure that the model can be developed and tailored further with the participation of municipality leaders and the organised waste pickers.

5.3.1 Key Stakeholders

The two main stakeholders are the organised waste pickers, who provide the services, and the Public Power, as the program's user representing the local society that is the beneficiary. As analysed in the sections that follows, the selection of these stakeholders recognises their claims and limitations. The ecolaw-informed PES moves beyond the five-element design of the original PES, creating an administrative body to manage the programs. In short, the model aligns the stakeholders' visions, bringing them closer to an ecolaw practice.

5.3.1.1 Waste Pickers' Enterprises

In terms of service providers, the ecolaw-informed PES targets waste pickers working in collective organisations, particularly waste pickers' enterprises. As explained in Chapter 3, these enterprises must have generative ownership, that is, they must be cooperatives, associations and other social and solidary economy-based enterprises.[1278] These business

[1278] The International Labour Organisation (ILO) has defined the Social and Solidary Economy as a 'concept designating enterprises and organizations, in particular cooperatives, mutual benefit societies, associations, foundations and social enterprises, which have the specific feature of producing goods, services and knowledge

models are often called cooperative and mutual enterprises, accredited for having a long history of research that reveals results about poverty alleviation, local development and the resilience of their members.[1279] The focus on organised waste pickers follows the provisions of the National Waste Policy, the example given by Cataforte and the good practices of municipal schemes.

This choice does not diminish the provision of the new PES policy in Brazil, but it updates it. The policy establishes that the environmental service providers can be people or companies from the public or the private sectors, family groups or community groups that maintain, recover or enhance the environmental conditions of ecosystems.[1280] In this sense, the waste pickers' enterprises are in tune with the federal PES policy.

The emphasis on waste pickers' enterprises aims to encourage autonomous workers to join such companies, transitioning from the informal to the formal sector. The specialised research shows that waste pickers working in collective work organisations have better work conditions, which ultimately promote health and safety improvements, including emotional support and legal benefits.[1281] The National Waste Pickers' Movement estimates that a PES program would engage between 120,000 and 150,000 workers.[1282]

Critics of the application of PES for waste pickers argue that most of these workers operate informally.[1283] The majority of Brazilian waste pickers are not members of a cooperative or association, which means a policy targeted at enterprises excludes this majority.[1284] It is imperative to recognise the validity of this concern and the fact that transforming autonomous workers into formal service providers is a process that requires assistance and time. However, it is hoped that more waste pickers will become members of formal organisations and that the existence of a PES model may encourage this transition.

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while pursuing both economic and social aims and fostering solidarity'. For more information, see ILO, Plan of action for the promotion of Social Economy Enterprises and Organizations in Africa, *in*: **The Social Economy – Africa's Response to the Global Crisis**, Johannesburg: ILO, 2009, p. 1–6.

[1279] MAZZAROL, Tim *et al*, Developing a conceptual framework for the co-operative and mutual enterprise business model, **Journal of Management & Organization**, v. 24, n. 4, p. 551–581, 2018, p. 551.

[1280] Brasil, 'Lei Nº 14.119, de 13 de Janeiro de 2021' (n 25), article 2.V.

[1281] ILO, *Waste Pickers' Cooperatives and Social and Solidarity Economy Organizations* (No 12, ILO, 2019) 5, 3 http://www.jstor.org/stable/10.13169/workorgalaboglob.9.2.0051 ('*Rethinking Gender and Waste*'); ILO and WIEGO, *Summary of Key Findings from Cooperation Among Workers in the Informal Economy: A Focus on Home-Based Workers and Waste Pickers* (ILO, 2017) 1, 2–4 https://www.wiego.org/publications/summary-key-findings-cooperation-among-workers-informal-economy-focus-home-based-worker.

[1282] MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**, p. 2.

[1283] IJGOSSE, Paying Waste Pickers for Environmental Services: A Critical Examination of Options Proposed in Brazil., p. 10.

[1284] *Ibid*.

Independent waste picking has more vulnerabilities than its organised counterpart. Commonly, waste pickers have close relationships with scrap dealers, who provide them equipment just to keep them dependent or in debt.[1285] These intermediaries also impose price policies that particularly disadvantage women.[1286] As a rule, informal waste pickers do not have access to water, food and toilets, and they work long hours in these conditions.[1287] Gangs and cartels may be involved in the informal recycling value chain or open dump operations.[1288]

In this context, the vision behind the ecolaw-informed PES is to provide structure and avoid unfair practices. The intensification of an already exploitive system by intermediaries and corrupt leaders[1289] is significantly reduced by cooperatives, which have more power negotiating with suppliers, intermediaries and governments.[1290] In addition, when public money is involved, it is administratively safer to work with legally formed enterprises.[1291] In short, waste pickers' cooperatives and similar enterprises give the workers social visibility and empowerment, facilitating transparency for the public.

As previously explained, the focus on cooperatives and similar organisations is under the determinations in the National Waste Policy,[1292] which explicitly mentions them, and not individual waste pickers. This selection is recommended by IPEA,[1293] a representative of the government, which has added that such contracting should be without public bidding. The organised waste pickers also champion the focus on cooperatives and associations.[1294]

As previously analysed in Chapters 3 and 4, cooperatives, associations and other similar enterprises connect with the ecolaw-informed settings. They conform to the criterion of making communities sovereign, because they contribute to the local economy, and encourage workers' organisation in different networks. These organisations also have an affinity with ecodesign, because they seek to provide decent and safe work conditions, promote social capital

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[1285] *See* RENGEL-GONÇALVES; AYDOS, No Time To Waste: Payment For Urban Environmental Services As A Tool To Support Invisible Recyclers In Brazil.
[1286] DIAS; FERNANDEZ, Waste Pickers - A gendered perspective, p. 154.
[1287] GUTBERLET *et al*, Participatory Research Revealing the Work and Occupational Health Hazards of Cooperative Recyclers in Brazil, p. 4615.
[1288] UN-HABITAT, **Module 5 - Solid Waste Management in Cities**, p. 18.
[1289] MEDINA, Living off Trash in Latin America: Debunking the Myths, p. 21.
[1290] ILO; WIEGO, **Summary of Key Findings from Cooperation Among Workers in the Informal Economy: A Focus on Home-Based Workers and Waste Pickers**, p. 4.
[1291] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, p. 35.
[1292] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 36.
[1293] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, p. 8; IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 27.
[1294] MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**.

at the communal level and are articulated in small businesses with local technology. Last, cooperatives are a prime example of generative ownership enterprises, which applies to other workers' organisation with similar settings. This is because these enterprises promote social inclusion through collective action and are drivers of social change.

5.3.1.2 The Public Power

On the other side of the program, the ecolaw-informed PES addresses the Public Power as the service user. To clarify, the municipalities create their local ecolaw-informed PES programs based on the federal ecolaw-informed PES legislation, with their City Councils signing contracts and agreements with the organised waste pickers. As the Pro-Waste Picker Program has shown, municipalities need to enable waste pickers' participation in the planning and the implementation phases of local programs.

As previously explained, municipalities have exclusive competence over local interests,[1295] such as waste management. Therefore, in the contracts, City Councils, as the local governmental figure, are service users who represent the local community that benefits from sustainable waste management schemes. Municipalities are encouraged to articulate micro-regions to have priority in accessing the Union's resources, as determined in article 16 of the National Waste Policy. This choice updates the legal provision of the new PES policy, which allows the Public Power and the private sector to be the payer of environmental services. As previously argued, the new PES policy is limited to rural areas and embedded in a traditional environmental law approach; however, it has entered into force and the ecolaw-informed PES is a reform of the existing system, not a revolution.

By working with the Public Power, the ecolaw-informed PES follows the existing Brazilian trend of public PES. In Brazil, the government commonly is the buyer of offsite environmental services.[1296] This practice is supported by prior research, which suggests that the public modality is better suited than the private one when dealing with organisations and social movements that distrust the private sector's interests.[1297]

The two main stakeholders—the organised waste pickers and the Public Power—endorse contracts between waste pickers' cooperatives and associations with municipalities to

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[1295] Brasil, 'Constituição Da República Federativa Do Brasil de 1988.' (n 8), article 30.
[1296] PACKER, **Novo Código Florestal & Pagamento por Serviços Ambientais. Regime proprietário de bens comuns.**, p. 88.
[1297] GONÇALVES, **Agroecologia e Pagamentos por Serviços Ambientais: Lições e Perspectivas**, p. 168.

provide sustainable waste management. A report ordered by the Brazilian Ministry for the Environment identified that the Federal Government should have significant[1298] participation.[1299] Nevertheless, the direct presence of the City Councils in inclusive waste management policies is indispensable.[1300] The organised waste pickers agree that it is the Public Power's responsibility,[1301] although arguing that public and private resources must finance PES towards inclusive waste management.[1302] The element of payment is discussed in Section 5.3.3.

In terms of the ecolegal settings, the National Waste Policy is marked by a recognition of the responsibility of communities and the Public Power in compensating sustainable practices under the receiver-protector principle.[1303] Therefore, the ecolaw-informed PES can increase community sovereignty by fulfilling the community's duty concerning waste and waste pickers. It enhances how waste management is experienced by people in a system currently characterised by its multiple layers of exploitation.

5.3.1.3 Administrative Body

Beyond the five-element designed in the original PES concept, the ecolaw-informed PES proposes the creation of an independent administrative body to manage the programs and link them to other initiatives. This creation is justified by the voluntariness and the conditional elements of PES since they require information, transparency, monitoring and dialogue. The connection to other initiatives is crucial because the Constitution and the National Waste Policy have integrated and coordinated approaches.

The government reports do not mention creating an administrative body; however, it is common practice that policies and programs make one. For instance, since more than a

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[1298] The federal administration can be present in the ecolaw-based PES to assist in strengthening the programs and provide financial resources.
[1299] IPEA, 'Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.' (n 18) 35.
[1300] IPEA, 'Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa Com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis' (n 31) 8, 40.
[1301] MNCR, *NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais* (n 1) 1; MNCR, 'Modelo de Contrato Desenvolvido Durante Reunião Técnica Do IV Encontro Nacional de Mulheres Catadoras − Paraná 2013' (MNCR, 2013) 1 http://www.mncr.org.br/biblioteca/legislacao/contratos-de-prestacao-de-servicos-para-coleta-seletiva/modelo-contrato-de-prestacao-de-servicos-para-prefeitura/view.
[1302] See MNCR, 'Catadores Entregam Proposta Do PRONAREP Ao Governo Federal', *MNCR Movimento Nacional dos Catadores de Materiais Recicláveis* (21 August 2014) http://www.mncr.org.br/noticias/noticias-regionais/catadores-entregam-proposta-do-pronarep-ao-governo-federal.
[1303] MACHADO, Princípios da Política Nacional de Resíduos Sólidos, p. 28.

decade, the Federal Government[1304] has an Inter-ministerial Committee for the Social and Economic Inclusion of Waste Pickers,[1305] which assists in programs concerning waste pickers at the federal level. This committee must take part in the ecolaw-informed PES, which must also have representatives of the local government where the programs occur and the organised waste pickers.

The administrative body of the ecolaw-informed PES must be attentive to the historical exclusion faced by waste pickers.[1306] As discussed in Chapter 3, they have been denied participation as political actors.[1307] The progressive body of legislation in Brazil has resulted from many years of hardships and the advocacy of the organised waste pickers to sympathetic government officials.[1308] Given the past and the bottom-up approach of this policy, the administrative body cannot have more governmental representatives—counting both federal and local authorities—than waste pickers, at the risk of repeating the ongoing authoritarian and exploitative conditions.

Gender is another imperative aspect that the administrative body must be attentive to in creating a gender-proportional composition. This proposition corresponds with the push by the National Waste Pickers' Movement for gender awareness.[1309] The specialised literature argues that women waste pickers feel discouraged from participating at formal levels due to gender stereotypes,[1310] the sexual division of labour[1311] and hegemonic masculinities.[1312] The ecolaw-informed PES respects the need to increase women's formal participation and hence aims to increase their representation on decision-making bodies; for example, if are 70 per cent of the service providers are women, 70 per cent of the members representing the organised waste pickers in the administrative body must be women.

[1304] Brasil, Decreto Nº 7.405, de 23 de Dezembro de 2010. http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2010/Decreto/D7405.htm.
[1305] In Portuguese: *Comitê Interministerial para Inclusão Social e Econômica dos Catadores de Materiais Reutilizáveis e Recicláveis (CIISC)*.
[1306] DIAS, Sonia; MATOS, Marlise, Fórum Lixo e Cidadania - Inovação institucional na formulação de políticas públicas de resíduos sólidos, *in*: KEMP, Valéria Heloisa; CRIVELLARI, Helena Maria Tarchi (Eds.), **Catadores na cena urbana: construção de políticas socioambientais**, 1. ed. Belo Horizonte: Autêntica Editora, 2008, p. 250.
[1307] DIAS; OGANDO, Engendering Waste Pickers Cooperatives in Brazil, p. 3.
[1308] DIAS, **Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil**, p. 5.
[1309] MNCR, 'Mulheres São Maioria Entre Catadores de Materiais Recicláveis', *MNCR* (21 March 2014) http://mncr.org.br/noticias/noticias-regionais/mulheres-sao-maioria-entre-catadores-organizados-em-cooperativas.
[1310] DIAS; OGANDO, Engendering Waste Pickers Cooperatives in Brazil, p. 10.
[1311] Sonia Dias and Ana Carolina Ogando, 'Rethinking Gender and Waste: Exploratory Findings from Participatory Action Research in Brazil' (2015) 9(2) *Work Organisation, Labour & Globalisation* 51, 7 http://www.jstor.org/stable/10.13169/workorgalaboglob.9.2.0051 ('Rethinking Gender and Waste').
[1312] NUNN, 'It can be dangerous for the uterus', p. 798.

The administrative body's attentiveness to vulnerabilities is consistent with the ecolaw-informed vision of the law as a common, long-term collective practice with communities. The pursuit of ecodesign determines the respect for diversity and social inclusion, which are also essential aspects of sovereign communities. This social sensitivity enables the ecolaw-informed PES to recognise that people create legal rules, agreements and principles that will affect other people, and they should reflect the best interest of those affected by them, with the possibility of reforms and adaptations.

5.3.2 Targeted Services

Participation in the ecolaw-informed PES is voluntary for the waste pickers' cooperatives and associations that provide sustainable waste management services, including, but not limited to, recycling, as further discussed below. The service providers are not required to provide more than one service; for instance, a cooperative can sort and recycle waste, but not necessarily collect it. Nevertheless, payments are linked and conditional to the service provided.

5.3.2.1 Offsite Environmental Services

Chapters 1 and 3 examined the environmental services produced by the waste pickers and how they relate to ecolegal criteria. The new PES policy did not innovate in its definition of environmental services;[1313] thus, it does not conflict with this research. In short, they create multiple benefits for nature and are a local technology, conforming to ecodesign. The waste pickers' activities decrease water and energy consumption and the need for renewable and non-renewable virgin raw materials, such as cellulose, iron ore, bauxite and oil. The decline of landfilling reduces water pollution and the size of urban areas used for those sites. Last, the lower emission of greenhouse gases causes greater climatic stability.

Waste pickers' services include collecting, transporting, sorting, beneficiating, processing and ensuring adequate final disposal of recyclable and reusable waste. The focus of the ecolaw-informed PES is urban solid waste. However, it is up to each local context—the municipalities and the waste pickers' organisations—to discuss the possibility of covering services regarding organic recyclable waste, except for incineration. This provision is in tune

[1313] See Chapter 3.

with the cooperative principle of concern for communities, which states that their work must aim for their communities' sustainable development.[1314]

None of the key stakeholders regard the mentioned sustainable waste management practices as the offsite environmental services to be controversial. The IPEA report on good practices regarding inclusive waste management recommends them,[1315] as does the National Waste Pickers' Movement, which pushes for including sustainable organic waste management as well.[1316] The National Waste Policy supports the activities of collecting, transporting, recycling and, ultimately, disposing waste in an environmentally adequate way, as well as other measures leading to reinsertion of materials into productive chains.[1317]

5.3.2.2 Waste Hierarchy and Incineration

Just as important as establishing the targeted services of ecolaw-informed PES is to determine the activities excluded from it. This chapter previously addressed the National Waste Policy's weak incorporation of the a priori waste hierarchy. This deficiency results from the Brazil's historical approach in which waste managers commonly follow the North-centric standard of emphasising the technical vision, prioritising engineers and other high-level industry workers' perspectives.[1318] Although this strategy has made some positive contributions to society, it is based on a rationalist and mechanistic understanding of the world that conflicts with the ecolaw-informed framework.

The a priori waste hierarchy must be embedded in the ecolaw-informed PES. As analysed in Chapter 3, waste pickers' activities are crucial; however, non-generation and reduction in the use of materials take precedence to the actions of reuse and recycle. A PES scheme for waste pickers should engage with initiatives seeking to decrease product generation and usage, for instance, through education courses about waste management by waste pickers to the public.

[1314] ICA, **Guidance Notes to the Co-operative Principles**, Brussels: International Co-operative Alliance - ICA, 2015, p. 47.
[1315] IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 27.
[1316] MNCR, Modelo de Contrato Desenvolvido Durante Reunião Técnica do IV Encontro Nacional de Mulheres Catadoras − Paraná 2013, p. 2.
[1317] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 3.V,VII,X,XII,XIV.
[1318] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, p. 32.

Chapter 3 investigated the disconnection between incineration and the ecolaw-informed framework. Incineration is at the bottom of the a priori waste hierarchy, and it prevents communities from advancing to more socially just and ecologically sustainable contexts. It also competes with the precedent activities of the hierarchy because it requires materials to be burned continuously. Therefore, in the ecolegal framework, there is no scope for waste-to-energy incineration. Hence, communities that can create PES schemes for waste pickers should be prohibited from fostering incineration. This prohibition is justified by the inevitable tension between waste-to-energy incineration and waste picking.

5.3.2.3 Non-Compulsory Participation and Information

The beginning of this section explained that participation in the ecolaw-informed PES is voluntary for waste pickers' cooperatives and associations that provide one of the targeted offsite services. The aspect of voluntary transactions[1319] can only exist with transparency and access to useful information. Waste pickers' organisations have the right to choose whether to get involved with PES or remain independent. This provision follows the first principle of cooperatives that states the voluntary nature of their memberships.[1320]

Non-compulsory participation requires informed decisions, and the members of the enterprises have the right to active participation. This approach entails receiving information about all program aspects—risks, assumptions, principles and the overall set of rules—to negotiate and be included. The execution needs to be consistent with the agreed rules. Without these measures, whether the transaction is voluntary is questionable.

In the ecolaw-informed PES, the information aspect of voluntariness is attached to not only suppliers but also users. In other words, the right to information applies to society, in the programs represented by the Public Power, as ordered by the National Waste Policy's principle of the right to information and social control.[1321] Community members must be familiar with the ecolaw-informed PES program. They must be given the opportunity of understanding its motivation and their common responsibility towards the waste they generate. Society should also be allowed to follow the processes regarding PES, as ultimately, it at least partially pays for it with public resources.

[1319] Voluntarity or voluntary transactions is one element in the five-element structure of the original or market-based PES.
[1320] ICA, **Guidance Notes to the Co-operative Principles**, p. 5.
[1321] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 6.XX.

However, voluntariness itself is a complex issue and must be enacted only regarding the providers' side. When broadly implemented, non-market institutional measures, for instance, taxes are excluded.[1322] Such exclusions would be inconsistent with the National Waste Policy's identification of shared responsibilities, which determines that the governments and the producers of waste, such as manufacturers, must financially cooperate to guarantee sustainable waste management. Therefore, following the federal legislation, and PES literature,[1323] the voluntariness of the transactions only applies to service providers.

Voluntary transactions demand information and transparency about sustainable waste management. It empowers the participants, including society members, to move forward from a repressive to an inclusive system and thus furthers community sovereignty and generative ownership of the waste pickers' organisations. As a result, the element of voluntary transactions strengthens ecolegal settings.

5.3.2.4 Conditionality

Conditionality mandates that payments are conditional upon the provision of at least one offsite environmental service, specifically recycling, by the waste pickers' organisations. Concurrently, the service provides continue to produce the agreed environmental service provided they receive payments. This imposition enables the incorporation of the National Waste Policy's principles of eco-efficiency[1324] and the systemic view in waste management[1325] into the ecolaw-informed PES. It also relates to the instrument of environmental and sanitary monitoring and inspection.[1326]

Equally important as the correlation to the National Waste Policy is the positive vision that the government representative and the organised waste pickers have on conditionality. The report produced by IPEA at the request of the Ministry for the Environment is primarily based on the original PES model, including conditionality as necessary to construct a PES policy.[1327]

[1322] PORRAS, Ina; GRIEG-GRAN, Maryanne; NEVES, Nanete, **All that glitters: a review of payments for watershed services in developing countries**, London: IIED - International Institute for Environment and Development, 2008, p. 76.
[1323] Ina Porras, Bruce Aylward and Jeff Dengel, *Monitoring Payments for Watershed Services Schemes in Developing Countries* (IIED - International Institute for Environment and Development, 2013) 36, 7 https://mpra.ub.uni-muenchen.de/47185/.
[1324] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 6.V.
[1325] Ibid, article 6.III.
[1326] Ibid, article 8.V.
[1327] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, p. 29–30.

The National Waste Pickers' Movement addressed this report, stating the need for service users to make direct, contractual and conditional payments to service providers, taking social justice and local context into consideration.[1328]

As explained in Chapter 4, Brazilian authorities often struggle to monitor programs, a problem that has been affecting the partial and final results of the existing PES.[1329] This challenge perceived in rural areas is not anticipated to disrupt the ecolaw-informed PES, since it emphasises the service produced by labour, not by nature. As long as waste pickers' organisations continue to shape their practices towards sustainable waste management—collecting, transporting, sorting, beneficiating, processing and ensuring environmentally adequate final disposal of recyclable and reusable waste—conditionality is fulfilled. The inspection only requires measuring the tonnes of waste that enter and leave the enterprises, with equipment that municipalities often have, since currently, they need to calculate the amount of waste (and payments) for landfills or dumps.

The way conditionality is defined in the ecolaw-informed PES reinforces the ecolegal framework, particularly regarding ecodesign. It ensures that the programs follow, and communities participate in, sustainable processes. As part of the ecolaw-informed approach, which seeks the long-term survival of the ecological community and the improvement of livelihoods, conditionality in the ecolaw-informed PES ensures that the social equity and environmental sustainability objectives yield desirable outcomes.

5.3.3 Payment

The establishment of the key stakeholders and the targeted services, particularly the conditionality component, bring into question the payment frequency and amount in the ecolaw-informed PES. Payment is arguably the most controversial issue in all PES' schemes, and it must be addressed with attentiveness. However, it is a particular political issue, which is not the line of the argument thus far conducted in this research. In addition, as discussed in the Chapter 1, the precise calculation of payments requires mapping the value chain in Brazil and in international trade where it is relevant. Moreover, such data are not available currently.[1330]

[1328] MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**, p. 1.
[1329] JODAS, **Diretrizes de sustentabilidade da Economia Ecológica para os projetos de Pagamento por Serviços Ambientais (PSA) no Brasil.**, p. 181.
[1330] RUTKOWSKI; RUTKOWSKI, Recycling in Brasil, p. 13; UN ENVIRONMENT, **Waste management outlook for Latin America and the Caribbean**, p. 201–203.

In this context, the proposition concerning payments argued here accompanies the theoretical framework that has guided this thesis, which is the ecolaw-informed framework.

In Brazil, the recycling market is segmented and oligopolistic. Waste pickers contribute expressively to the chain; however, intermediaries remain a significant part of the market. The chain is compromised because its strategic buyers are located in particular regions of Brazil, mainly in the state of São Paulo. In a continent-sized country, this means that the trading of small-profit products as recyclable materials is unfeasible. Therefore, intermediaries regulate the market and supply materials from the waste pickers to the industry.[1331]

As previously explained, the National Waste Policy establishes the vision of shared responsibility towards waste,[1332] which engages all waste generators, whether it is the public, the private or other social sectors. The National Waste Policy must create instruments for technical and financial cooperation between public and private sectors to foster new waste management methods, processes and technologies.[1333] The compensation applies to non-monetary measures as well, since the statute addresses financing infrastructure and equipment for cooperatives,[1334] as used by the Pro-Waste Picker Program and Cataforte. All these initiatives must prioritise hiring waste pickers' cooperatives or associations.[1335]

Proper payment implies recognising waste pickers as providers of an essential and public service. It also is a form of providing social protection and supports their transition to the formal economy. Waste pickers' lack of social protection violates their right to social security protected in the Universal Declaration of Human Rights[1336] and international labour standards by the International Labour Organisation (ILO), such as the ILO Convention 102 on Social Security,[1337] the ILO Recommendation 202 on Social Protection Floors[1338] and the ILO Recommendation 204 on the Transition from the Informal to the Formal Economy.[1339]

This section provides an overview of the IPEA propositions, here representing the formal position of the Federal Administration, as well as the organised waste pickers' perspective on payments. Then, it explains the ecolaw-informed PES model for payment,

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[1331] RUTKOWSKI; RUTKOWSKI, Recycling in Brasil, p. 12–13.
[1332] Brasil. Lei Nº 12.305, de 2 de Agosto de 2010. (n 56), article 8.III.
[1333] Ibid, article 8.VI.
[1334] Ibid, article 42.III.
[1335] Ibid, article 36.
[1336] UN General Assembly, 'Universal Declaration of Human Rights' (United Nations, 1948) https://www.un.org/en/universal-declaration-human-rights/, articles 22 and 23.
[1337] ILO, ILO Convention 102 on Social Security, 1952.
[1338] ILO, 'ILO Recommendation 202 on Social Protection Floors' (ILO, 2012) https://www.ilo.org/secsoc/areas-of-work/legal-advice/WCMS_205341/lang--en/index.htm.
[1339] ILO, ILO Recommendation 204 on the Transition from the Informal to the Formal Economy, 2015.

including that payment must be at least monthly because it influences the remuneration of these vulnerable workers and how they provide for their families.

5.3.3.1 IPEA's Payment Models

The IPEA report about PES for waste pickers focused on integrating and adequately paying waste pickers' enterprises for the sustainable waste management services they provide. Payments are a controversial topic, and the report suggested three models for it: payment based on productivity, regulated compensating increments and a cooperative fund. The first consists of a uniform payment to the waste pickers' enterprises commensurate with physical productivity; that is, the number of materials recovered.[1340] The justification of this model is the simplicity of the calculation, since it only requires weighing the materials, and the fact that productivity relies on the work and efforts of each organisation.[1341]

The report identified some possible limitations of such an approach. First, it does not allow differentiated payments per type of materials, which can be unfair because different products pose different environmental hazards, and the market already gives various incentives according to the material. Second, incentives for productivity can cause a boost in recycling without a corresponding market to purchase the materials, which can also cause a decline in the selling prices (too much supply, and too little demand). Third, prices can vary by region, which can lead to conflicts among waste pickers.[1342]

The second model, regulated compensating increments, creates a minimum price system for recycling materials. It aims to correct pricing in times of crisis and provides incentives for recycling products that generally have a low selling price. The report pointed to similar limitations as the productivity-based model, such as the problem regarding the supply and demand of materials, and regional pricing differences. Monitoring is another challenge because it would be costly to monitor the prices of all materials.[1343]

The cooperative fund model would complement the other two, seeking to minimise the vulnerability of waste pickers' enterprises. It aims to provide technical assistance, including training programs and equipment; to create commercial networks to strengthen waste pickers'

[1340] IPEA, **Relatório de Pesquisa: Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.**, p. 41.
[1341] *Ibid*., p. 42–43.
[1342] *Ibid*., p. 44.
[1343] *Ibid*., p. 47.

negotiation powers; and to provide stock financing opportunities, creating a working capital for the organisations.[1344] The several challenges described in the report would influence the element of payment, such as the creation of unified management involving waste pickers and the public sector. Second, in the suggested structure, payments can be lower or later than expected.[1345]

The IPEA report models for payment were based on the economic benefits of recycling, argued to be BRL8 billion per year.[1346] A specialised reviewer of the IPEA report claimed that the financial calculation is misleading because it focuses on the materials that are not recycled at present,[1347] and 93 per cent of the amount relates to only plastics and paper, which demonstrates a lack of understanding of the materials.[1348] Moreover, the amount of BRL8 billion is estimative; however, it does not exist in practical terms. In this sense, there is a lack of funds to finance the programs, so the industry would have to pay the same price for recycled products as it does for raw ones. The critics have stated that this prediction is unrealistic and that it would require public subsidies to cover the difference,[1349] which is difficult in the context of the Global South where public funds are scarce. The payment structure must be sustainable.

Thus, the specialised reviewer argued that rather than focusing on the potential economic benefits, it would be better to base PES on the service costs—simply put, the costs of recycling and producing environmental services. Between 700,000 and 5 million waste pickers may be needed to recycle all the materials available. To pay them minimum wage, plus legal provisions, the program cost would be BRL10.8 billion, which does not cover other operating costs.[1350] Other questions arise, such as how to transfer the money, who will control and be accountable for the fund and how can it overcome corruption.[1351] These concerns are important to bring the theory of PES for waste pickers into reality, particularly the knowledge of funding limitations. However, just as relevant is the workers' perspective, since these payments can promote an end to their sidelining by the formal waste management sector.

5.3.3.2 Waste Pickers' Take on Payments

[1344] *Ibid*.
[1345] *Ibid*., p. 49.
[1346] *Ibid*., p. 7.
[1347] IJGOSSE, Paying Waste Pickers for Environmental Services: A Critical Examination of Options Proposed in Brazil., p. 13.
[1348] *Ibid*., p. 20.
[1349] *Ibid*.
[1350] *Ibid*., p. 21.
[1351] *Ibid*., p. 22.

The organised waste pickers' movement in Brazil has advocated for proper payment for many years. They provide an essential and public service that fills the waste management gap neglected by municipalities. The movement emphasises the vulnerability of waste pickers and that the importance of the service provided is not translated into proper payments.[1352] Following the enactment of the National Waste Policy, the waste pickers have requested that the funding be secured from the public and private sectors, because both are responsible for sustainable waste management.[1353]

The organised waste pickers are claiming for a combination of monetary and non-monetary payments. Monetary payments are vital because they can lift waste pickers out of poverty, and even extreme poverty, a context analysed in Chapter 3. The movement advocates that these payments must cover a minimum amount of approximately BRL400,00 per month to be paid per tonne of collected material for the selective collection of waste. They also require a minimum amount to be paid for the waste processing service, to be measured per tonne sold, which can be determined according to the total value in the invoices issued. This payment, combined, cannot be less than the equivalent regional minimal wage or the regional minimum wage per member of the cooperative or association.[1354] By asking to be paid no less than the minimum wage when working for the government, waste pickers are asking to have their basic rights as workers respected as determined by the law[1355] and to change this exploitative relationship.

Non-monetary payments are requested in the form of social security, health and safety, and capacity-building provisions. This compensation is in conformity with the vision of the Inter-ministerial Committee for the Social and Economic Inclusion of Waste Pickers, which has argued in favour of an intersectional strategy because waste pickers' vulnerability requires different types of social assistance.[1356] In that sense, the organised waste pickers request that a minimum amount be paid to the National Security Institute for each member of the cooperative or association delivering the service, given that they will be formally recognised as public service providers. [1357]

[1352] MNCR, **NOTA PÚBLICA: Programa de Pagamentos de Serviços Ambientais**, p. 1.
[1353] MNCR, **Catadores entregam proposta do PRONAREP ao Governo Federal**.
[1354] MNCR, Modelo de Contrato Desenvolvido Durante Reunião Técnica do IV Encontro Nacional de Mulheres Catadoras − Paraná 2013, p. 4–5.
[1355] Brasil. Lei Nº 12.690, de 19 de Julho de 2012. http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2012/Lei/L12690.htm, article 7.
[1356] IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 26–27.
[1357] MNCR, Modelo de Contrato Desenvolvido Durante Reunião Técnica do IV Encontro Nacional de Mulheres Catadoras − Paraná 2013, p. 4.

In terms of compensation focused on enhancing waste pickers' health and safety, it is essential to remember that even when engaged in collective workers' organisations, which present better work quality than when working autonomously, waste pickers still face precarious work environments. Organised waste pickers often cannot afford to have adequate sorting infrastructure and protective equipment that conform to their context.[1358] They often lack ergonomic layouts and decent work conditions—work sites with bathrooms, proper ventilation, good lighting and lunchrooms—which could be at least partially provided by the private sector partners interested in having corporate social responsibility measures.[1359]

The organised waste pickers advocate for a public–private partnership to fund the enhancement of their work conditions, which fits the shared responsibilities principle of the National Waste Policy, as well as financial assistance to rent warehouses for sorting, processing, pressing, composting and storing waste. They also request assistance to cover operational expenses, such as lighting and water.[1360] Waste pickers' demands regarding improved infrastructure and access to health and safety measures match those mandated by best practices regarding waste management, according to one IPEA report.[1361]

Waste pickers desire to have capacity-building programs, through training and education, which is supported by the best practices vision of IPEA.[1362] This request is modelled on the fifth principle of the cooperative model; it is vital to the success and sustainability of these organisations.[1363] Empirical research showed that waste pickers want and would benefit from access to information, including about their legal rights and how to use the internet, and access to a range of training and courses, such as on Excel and PowerPoint. [1364] These initiatives must have gender-balanced participation, which is part of the international recommendation for cooperatives,[1365] as discussed earlier in relation to the proposed administrative body.

[1358] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 9.
[1359] *Ibid*.
[1360] MNCR, Modelo de Contrato Desenvolvido Durante Reunião Técnica do IV Encontro Nacional de Mulheres Catadoras − Paraná 2013, p. 4.
[1361] IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 27.
[1362] *Ibid*.
[1363] ICA, **Guidance Notes to the Co-operative Principles**, p. 57–58.
[1364] DIAS, Sonia; OGANDO, Ana Carolina, **Gender and Waste Recycling: Project Design, Tools and Recommendations**, Manchester, UK: WIEGO Women in informal employment globalizing and organizing, 2015, p. 24.
[1365] ICA, **Guidance Notes to the Co-operative Principles**, p. 9.

The scholars specialised in inclusive waste management,[1366] IPEA[1367] and organised waste pickers[1368] are all in favour of environmental education programs. Through these initiatives, the waste pickers can teach community members about recycling, which would improve its quality and ultimately result in less non-recyclable and hazardous waste going to their recycling enterprises.[1369] Waste pickers request a minimum amount to be paid per home visit (limited to 4 per month per household) of no less than BRL3.50.[1370] These programs can also be held in schools, businesses and public buildings, with proper payment.[1371]

5.3.3.3 The Ecolaw-Informed PES and Payment

Overall, payment is a controversial topic, and this thesis does not purport to solve all the issues around it. However, informed by the ecolegal settings, it is fair to argue that waste pickers deserve to receive monthly monetary and non-monetary payments, as per the national PES policy.[1372] The ecolaw-informed framework implies respect for the social and economic rights created in the Constitution, such as social security,[1373] decent work and health. Therefore, the ecolaw-informed PES must determine that each waste picker member of a cooperative or other enterprise figuring as the service provider must be paid at least minimum wage. Since they provide a service to society, service users must offer them a contribution to the National Security Institute.

The municipalities are advised to pursue strategies to articulate themselves and receive funding from the Federal Government. In addition, the shared responsibilities principle instructs municipalities to be the articulator of the local area and organise funding from the private sector—such as manufacturers, traders, importers and producers—in all levels of the waste chain. This means that the ecolaw-informed PES will secure the minimum wage of the waste

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[1366] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 9.
[1367] IPEA, **Relatório de Pesquisa: Boas Práticas de Gestão de Resíduos Sólidos Urbanos e de Logística Reversa com a Inclusão de Catadoras e de Catadores de Materiais Recicláveis**, p. 27.
[1368] MNCR, Modelo de Contrato Desenvolvido Durante Reunião Técnica do IV Encontro Nacional de Mulheres Catadoras − Paraná 2013, p. 4.
[1369] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 9.
[1370] MNCR, Modelo de Contrato Desenvolvido Durante Reunião Técnica do IV Encontro Nacional de Mulheres Catadoras − Paraná 2013, p. 4.
[1371] DIAS; OGANDO, **Cuidar Project: Waste Pickers' Health Risk Mapping**, p. 9.
[1372] Brasil, 'Lei Nº 14.119, de 13 de Janeiro de 2021' https://www.in.gov.br/en/web/dou/-/lei-n-14.119-de-13-de-janeiro-de-2021-298899394, article 3.I.
[1373] There is a Proposed Amendment to the Constitution (PEC 309/2013) to alter paragraph 8 of article 195 of the Brazilian Federal Constitution, to provide social security for waste pickers who carry out their activities in a family economy regime.

pickers and hold the municipalities accountable for their obligation as regards waste management, enforcing the National Waste Policy and other relevant legislation. However, the municipalities will have legal means to pursue funding from other sources.

The IPEA reports and the specialised literature have supported the waste pickers' requests, which are the bare minimum of their labour rights and respect the criterion of generative ownership. The National Waste Policy demands the creation of a fund financed through cooperation between the public and private sectors, and the national PES policy allows both'both sectors to participate.[1374] The alternative, to deny waste pickers inclusion in the formal waste management sector, means to continue an unfair and exploitive system, disrespecting all the ecolaw-informed criteria.

Waste pickers lack recognition, and the absence of fair payment at present is even more alarming when their intersectional forms of oppression, such as race, gender and social class, in blatant disrespect of sovereign communities, are considered. Brazilian waste pickers are mostly pardo[1375] or black[1376] women[1377] from vulnerable families.[1378] This is a result of historical exclusion, leading women in the waste picking sector to suffer two aspects of invisibility, economic marginalisation and social stigma.[1379] As investigated in Chapters 2 and 3, the sovereign communities and generative ownership criteria of ecolaw oppose strategies that benefit few and exclude many, particularly when diversity is not respected.

Decent work conditions are essential to have social justice and ecolegal settings.[1380] In terms of PES, the Public Power must partner with the most significant local waste generators—industry, shopping centres and other businesses—to arrange for adequate workspaces. Health and safety issues are equally important, and protective equipment suitable for waste pickers' activities must also be delivered, boosting generative ownership.

[1374] Brasil, 'Lei Nº 14.119, de 13 de Janeiro de 2021' https://www.in.gov.br/en/web/dou/-/lei-n-14.119-de-13-de-janeiro-de-2021-298899394, article 2.V.IV.
[1375] Pardo is an ethnicity/skin colour classification used by the Brazilian Institute of Geography and Statistics in the Brazilian censuses. It is a complex term, often referring to Brazilians of mixed ethnic ancestries, such as white, black and Indigenous.
[1376] IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 50.
[1377] There is a mismatch between waste pickers' national movement statistics, which state that 70 per cent of their group are women, and the official data, which argue that the majority of them are men. For more information, see MNCR, **Mulheres são maioria entre Catadores de Materiais Recicláveis**; IPEA, **Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável**, p. 49.
[1378] CHERFEM, Carolina Orquiza, Relações de Gênero e Raça em uma Cooperativa de Resíduos Sólidos: desafios de um setor, *in*: PEREIRA, Bruna Cristina Jaquetto; GOES, Fernanda Lira; INSTITUTO DE PESQUISA ECONÔMICA APLICADA (orgs.), **Catadores de Materiais Recicláveis: Um Encontro Nacional**, Rio de Janeiro: Instituto De Pesquisa Econômica Aplicada IPEA, 2016, p. 56.
[1379] DIAS; OGANDO, Engendering Waste Pickers Cooperatives in Brazil, p. 10.
[1380] CAPRA; MATTEI, **The Ecology of Law : Toward a Legal System in Tune with Nature and Community.**, p. 146.

The knowledge of the way that nature operates and of the importance of sustainable practices have benefited communities. The ecolaw-informed PES must strengthen this vision by education. First, the organised waste pickers are serving sustainability and should receive regular training and courses about their most pressing issues and about methods to improve their work. Education must be gender-aware, and women must have their balanced participation secured. The enterprises should suggest the theme of their training through voting by members.

In addition, waste pickers are specialists in sustainable waste management, and they have much to offer ecolegal communities about social equity and ecological sustainability. Thus, the ecolaw-informed PES should allow the creation of environmental education programs, in cooperation between the Public Power, the industry and the organised waste pickers. The service providers will be paid to educate the community—in households, schools, businesses and the local television and radio stations—about issues in sustainable and inclusive waste management.

This section discussed payments, a topic that is still in dispute, but that can be mediated through applying the ecolaw-informed criteria. Marginalisation and non-payment of black and pardo women for providing sustainable waste management is the antithesis of ecolaw. The provision of monetary payments of at least the minimum wage, social security and decent work conditions is the most basic effort to make cooperatives and associations generative. Without it, the pursuit of social justice and ecological sustainability in the foundation of organisational structures, which is demanded by an ecolaw-informed approach,[1381] is virtually impossible to achieve.

5.3.4 Risks and Resilience

As explained in chapter 3, waste pickers face severe health and safety issues. The ecolaw-informed PES will foster the organised work of waste pickers, and, as mentioned, working as a member of a cooperative tends to lessen health issues. However, the scheme cannot only depend on this tendency. Studies of waste pickers' health and safety problems are well documented, it is also well acknowledged that cooperatives need structure with equipment, machinery and workspaces.[1382]

[1381] *Ibid*.

[1382] MOURA, Laysce Rocha de; DIAS, Sylmara Lopes Francelino Gonçalves; JUNQUEIRA, Luciano Antonio Prates, Um Olhar Sobre A Saúde Do Catador De Material Reciclável: Uma Proposta De Quadro Analítico, **Ambiente & Sociedade**, v. 21, n. 2018, p. 1–20, 2018, p. 12.

The issue of health and safety must be a top priority during the planning and execution of ecolaw-informed PES schemes. Beyond only focusing on waste pickers' enterprises and gear, the administrative body should make sure that the other stakeholders are fulfilling the agreed conditions. This includes concerns over gender balance and health and safety affecting the overall health of the waste pickers' enterprises.

It is particularly important that a policy connect waste pickers and official waste management systems at the present time. The sitting President of Brazil, Jair Bolsonaro, has announced that he plans to revoke 90 per cent of the thirty six Regulatory Norms[1383] of workspace safety.[1384] Although the literature suggests that there is room to revise and refine these norms, the current narrative in Brazil indicates that the opposite will occur.[1385] Thus, the ecolaw-informed PES must accommodate health and safety concerns for waste pickers. This is important to guarantee that the waste pickers are not severely exploited by the system, especially if the Regulatory Norms are revoked.

The result of decades of marginalisation was emphasised during the coronavirus disease (COVID-19) global pandemic, which was a global illness, indicating new layers of the vulnerability of the human species.[1386] Chapter 3 investigated the context of the waste picking sector, which became even more dramatic with the pandemic, revealing their lack of decent work. The legal system's negligence resulted in new urgency to create more protective regulatory schemes for informal workers, including waste pickers.

During the pandemic, in general, people have been asked to do similar things, although their situations differ widely. Protective actions and the set of COVID-19 protocols are complex for informal waste workers. The instructions are based on good hygiene and social

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[1383] In Portuguese: *Normas Regulamentadoras (NR)*. These are complementary provisions to Chapter V (Safety and Occupational Medicine) of Title II of the Consolidation of Labor Laws (In Portuguese: *Consolidação das Leis do Trabalho - CLT*, which is the decree governing labour relations in Brazil), as amended by Law No. 6,514, of December 22, 1977. The Regulatory Norms address obligations, rights and duties to be fulfilled by employers and workers in order to guarantee safe and healthy work, preventing the occurrence of illnesses and accidents at work.

[1384] FELICIANO, Guilherme Guimarães; MORAES, Paulo Douglas De Almeida, Normas De Saúde e Segurança do Trabalho na Era Bolsonaro: Veleidades, Possibilidades, Constitucionalidade, *in*: GOES, Gisele Santos Fernandes; MARANHÃO, Ney; LEAL, Pastora do Socorro Teixeira (Orgs.), **Direitos Humanos E Relações Trabalhistas - Estudos Em Homenagem À Professora Rosita De Nazaré Sidrim Nassar**, São Paulo: LTr, 2021, p. 79.

[1385] *Ibid.*, p. 86.

[1386] ARIAS-MALDONADO, Manuel, COVID-19 as a Global Risk: Confronting the Ambivalences of a Socionatural Threat, **Societies**, v. 10, n. 4, p. 1–18, 2020, p. 1.

distancing,[1387] which are both effective but difficult to uphold in precarious waste management contexts.

At present, there is lack of clarity about the exact period up to which the virus that causes COVID-19 can survive on surfaces.[1388] The period varies significantly, depending on the type of material, the temperature and the humidity, and the virus can live on surfaces from two hours to up to nine days.[1389] The increase in people treated at home means that household waste collected and recycled by waste pickers can be contaminated with the coronavirus.

As previously explained in Chapter 3, waste picking is an informal, unprotected and unsecured work. It is a low-paying job to perform which workers cannot be home-based, and it is dependent on a market that fluctuates highly in crises. Waste pickers have the misleading option of whether to protect themselves from COVID-19 by abstaining from working, which can mean starving, or continue to work and be highly exposed to the virus.

The COVID-19 impact has been explored by organisations that research and advocate for informal workers' rights. One recommendation given for managers concerned about waste pickers is to continue paying those already under contracts with municipalities, even when they have to stay at home because they are sick or have contact with somebody that is sick.[1390] This applies to workers who are part of a risk group, such as elders or diabetics, and who need to provide care for family members,[1391] often women caring for young children. Waste pickers without contracts should receive social grants.[1392]

The ecolaw-informed PES target of waste pickers' enterprises, chiefly cooperatives, also assists in resilience building. The cooperative model calls for creating a surplus—the remaining profits after paying the expenses—which the workers will decide how to use.[1393] Commonly, after distributing patronage dividends to the workers, such as salaries, which are usually based on the hours worked, the cooperatives invest in community projects, education and building reserves.[1394] An ongoing scheme that pays the organised waste pickers fairly for

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[1387] WORLD HEALTH ORGANIZATION, **Water, sanitation, hygiene and waste management for the COVID-19 virus**, Geneva: World Health Organization WHO, 2020, p. 7.
[1388] *Ibid*., p. 2.
[1389] KAMPF, Günter *et al*, Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents, **Journal of Hospital Infection**, v. 104, n. 3, p. 246–251, 2020, p. 247.
[1390] WIEGO; UNIVERSITY OF BRASILIA; WWOSH, **Recommendations for the prevention of the spread of Coronavirus disease (COVID-19) among solid waste workers**, Manchester, UK: WIEGO, 2020, p. 3.
[1391] *Ibid*.
[1392] *Ibid*.
[1393] WEBB, Tom; CHENEY, George, Worker-owned-and-governed co-operatives and the wider co-operative movement: challenges and opportunities within and beyond the global economic crisis., *in*: **The Routledge companion to alternative organization**, [s.l.]: Routledge Taylor & Francis Group, 2014, p. 70.
[1394] *Ibid*.

their services will allow their enterprises to build a budget and thus foster resilience in times of crisis. In fact, many cases demonstrate that cooperatives are models capable of navigating economic turmoils.[1395]

The ecolaw-informed PES aims to bring security and protection to waste pickers, transitioning them from the informal to the formal economy. The recommendations given, such as continuous payment when they cannot provide services owing to unexpected events, can be unnecessary when the enterprises have been adequately paid for long periods, enabling surplus development. Nonetheless, this context is created with time and commitment.

5.4 CONCLUSION

This chapter argued that it is vital to explore the socially attentive and ecologically enduring nature of the Brazilian legal system to understand waste management fully. Progressive legislation started with municipalities and was later introduced at the federal level. The most important contribution is the National Waste Policy, which determined that waste pickers' cooperatives, associations and similar enterprises are to be integrated into formal waste management systems. The significance of this legislation has been illustrated by federal programs, particularly Cataforte, reflecting this thesis' argument that policies must have clear goals to be successful.

However, the legislative gap remains because instruments and policies have not regulated the organised waste pickers as providers of essential and public services. Clear legal rights encapsulated in the Constitution and the National Waste Policy are poorly executed, leaving waste pickers open to exploitation by the system and intermediaries. The alternative is the ecolaw-informed PES to enable socially just and environmentally set arrangements between the Public Power and the organised waste pickers. The ecolegal setting in PES for the inclusion of waste pickers allows communities to understand the function of sustainable waste management in the economic and legal systems better.

This approach entails moving beyond the dualistic picture of market-based and social-based approaches as a black-and-white photograph capturing PES in the past. Instead, this chapter transported PES to the present, as a photograph in colour, under the ecolaw-informed criteria to the urban context, finally integrating the organised waste pickers to accurately represent the Brazilian progressive legislation located in time and space in lived experiences.

[1395] *Ibid*., p. 80.

This involved using the clarity of the five elements proposed in the market-based PES in the more comprehensive social justice focus of the social-based PES.

This chapter ends by proposing the basic elements for the ecolaw-informed PES, a legal rule that binds the Public Power and the waste pickers. This proposition is embedded in the legislation, past experiences, the specialised literature and the visions of the main stakeholders. General guidelines were developed to build federal legislation for implementing a PES scheme for waste pickers in Brazil, a new legislation, founded on the recognition of these informal waste workers by the municipalities and adequate payment conditional to the provision of sustainable waste management services, generating a fair waste management value chain.

The themes investigated in this chapter, and their interaction, operate as a starting point for a model that can be further refined in line with local needs, following consultation between the organised waste pickers and the local government decision-makers. Its unfinished nature is its strength. As a policy commitment, the ecolaw-informed PES can become a more prosperous, more challenging and active, participative policy if an alignment with ecolaw occurs.

6 CONCLUSION

Sustainable waste management is a primary global concern that the UN has recognised as essential for sustainable development, with most recommendations under variations of recycling and upcycling.[1396] Worldwide, the urgency for action and policies is crucial, and more so in the Global South, which is the stage of the world's second urbanisation wave.[1397] In 2020, waste issues increased owing to the COVID-19 outbreak and the significant escalation of household waste due to hoarding, panic shopping and the increased use of single-use products for hygiene and convenience.[1398] In addition to its human impact, the pandemic aggravated the systemic work inequalities inherent in waste management in the Global South.

This research investigated the origins and development of these waste inequalities. In Chapter 5, it provides guidelines for a waste policy aimed at facilitating a more environmentally sustainable, socially just future. The investigation conducted in the four discussion chapters—Chapters 2 to 5—discussed distinctive and derivative questions, and their answers are this work's four main conclusions. The four main conclusions identified in the mentioned chapters are as follows: the ecolaw-informed approach is the best legal framework; the ecolaw-informed criteria show that organised waste pickers' practices are superior to incineration; PES connects with, and matures through, ecolaw settings; and the ecolaw-informed PES can challenge environmental law and improve environmental protection and waste pickers' livelihoods.

This thesis commenced by seeking to investigate the practical concerns about sustainability and effective waste management, which recognise the strengths of the informal sector. In this context, developing a PES model through the ecolaw-informed analytical framework assists in enforcing the waste pickers' inclusion as per the National Waste Policy through new legislation. It is argued that the connection between PES, recycling and the Global South's leading waste stewards makes it suitable for fulfilling this role of an innovative regulation. In this sense, waste pickers are the perfect case study for the way in which PES and environmental law can be productively drawn together with broader social objectives. In Chapter 2, thorough a theoretical, doctrinal and critical approach, this research came to its first result that policy entrepreneurs must use the three criteria of the ecology of law—ecodesign,

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[1396] UN ENVIRONMENT, **Global Environment Outlook - GEO-6**, p. 33.
[1397] SWILLING *et al*, **The Weight of Cities: Resource Requirements of Future Urbanization. A Report by the International Resource Panel.**, p. 35.
[1398] KALINA, Marc; TILLEY, Elizabeth, "This is our next problem": Cleaning up from the COVID-19 response, **Waste Management**, v. 108, p. 202–205, 2020, p. 202.

make communities sovereign and make ownership generative—to frame this policy. This concluding chapter will also place the research into a broader context and suggest a path for future research, including the analysis of the transplantability of the Brazilian case study to other contexts.

Chapter 1 provided an overview of the current and central waste management discussions and situated the waste management debate within the context of a clash between the Global South and the Global North. The Global North still holds power, and policymakers in the Global South are increasingly in the position of choosing between fostering foreign waste-to-energy incineration schemes or their local waste pickers. This thesis argues that the elaboration of legal structures is only appropriate when it conforms with the ecolegal's outlines of sustainability, grassroots, regeneration of resources on balance, networks and communitarian values. In other words, this framework legitimises policymaking processes. This vision led to the question of which waste management system—limited to the waste pickers' activities and waste-to-energy incineration—best fits the ecolaw-informed framework. The research developed in Chapter 3 demonstrated through doctrinal, empirical and realist approaches that policies predicated upon waste-to-energy incinerators are ill-suited to achieving an ecolaw-informed vision. Specifically, this type of incineration is at the bottom of the a priori waste hierarchy, but when implemented, it undermines favoured practices and local technologies. By contrast, the organised waste pickers have many connections with an ecolaw-versed approach because of their positive socio-environmental effects, as well as their collective ownership and communal values. This informs the thesis' second conclusion that the ecolaw-informed criteria support that organised waste pickers' practices are superior to incineration. It is compelling that, while providing essential and public services, waste pickers are still extremely marginalised and vulnerable.

To overcome perceptions of structural exclusion and to promote their work, the organised waste pickers advocate for a tailored PES policy recognising them as environmental agents and public service providers. They seek this recognition as a means to integrate them into the formal waste management systems, in a transition from the informal sector to the formal sector, which would thus provide them with security and protection. Therefore, this research investigated whether PES is an adequate instrument, analysing its theory and practice through the ecolaw-informed criteria. Based on theoretical and empirical research, Chapter 4 discussed the dominant narratives of PES, showing that the initial market-based model has failed to translate into practical schemes. Alternatively, the social-based model emerged in practice, putting the social aspect at the centre of PES, and revealing itself to be more aligned with the

Global South's context, including Brazil. Noting this fact, it was then questioned whether PES' past conceptions passing through the ecolaw-informed criteria could provide a structure adequate for the waste pickers. Chapter 4 demonstrated that the social-based PES matures through the conformation with these criteria, allowing it to retrieve and enhance market-based elements, which is the third conclusion of this research. This way, PES can be a socially inclusive and ecologically sustainable waste management instrument, with clear guidelines and goals.

The problems examined in Chapters 2, 3 and 4 found their culmination in Chapter 5, in which this research proposed an innovative structure for the ecolaw-informed PES for waste pickers. Under a situated and legally informed investigation, this chapter identified that the ecolaw-informed PES is able to put social concerns at the heart of PES, while being rooted in the five elements of the initial model but avoiding being a panacea or promoting commodity fetishism.[1399] This innovation is only possible because of the ecology of law framework. In short, the research developed in this thesis shows a way to overcome the ongoing limitations of environmental law and waste management regulation, which is the fourth conclusion. As a replacement, this study created the ecolaw-informed PES model for waste pickers that is part of the local, South-based agenda.

Thus, this thesis contributes to the extant literature in several ways. First, it demonstrated that PES could be reconstructed to include broader considerations—consistent with the SDGs—using the ecolaw-informed framework. These considerations involve the social aspects of equity and justice, particularly in communal living. Second, it showed the potential for waste management in Brazil to be configured in a socially positive manner using the cooperatives and associations of waste pickers.

The main contribution is the proposition of a new ecolaw-informed PES narrative tailored for the Brazilian waste pickers who are organised in cooperatives and associations. This tool enabled the proposition of a ban of waste-to-energy incinerators in municipalities that are in the position to promote waste pickers. The justification for such a ban is another contribution. An investigation of the inadequacy of waste-to-energy incinerators compared with the organised waste pickers in the Global South conducted through the lenses of the ecology of law, as conducted in Chapter 3, has never been conducted. Significantly, Brazil does not have federal legislation recognising waste pickers as environmental agents who provide essential and public services, as does the proposed model.

[1399] KOSOY; CORBERA, Payments for ecosystem services as commodity fetishism, p. 1235.

Another contribution is the connections made between the ecolaw-informed key criteria—ecodesign, making communities sovereign and making ownership generative, and not extractive—and waste schemes creating models that value inclusivity, sovereignty and the economic, social and cultural context of Brazil. These three elements were highlighted in this study to be the criteria among several other features of the original theory owing to their affinity to waste management regulation. The ultimate objective of the ecology of law is to create a more socially just, environmentally sustainable society, conceiving over three elements to accomplish it. Other items, such as ecoliteracy and the law as an instrument of violence and power, connect with inclusive and sustainable waste management. However, this research focuses on the benefits of waste picking at the socio-environmental (ecodesign), communal (sovereign communities) and organisation (generative property) levels, which are later used as comprehensive standards.

This selection does not mean that other elements are disregarded. Rather, this research has instead focused on the attributes most suited for the waste management context. For instance, ecoliteracy is covered by sovereign communities, and in the ecolaw-informed PES, waste pickers become environmental stewards. In terms of the violence of the legal system, it was explained in Chapters 3 and 5 that waste pickers face a range of oppressions, which include, but are not limited to, the law. This matter is continuously present in the thesis under the Global North and South conflicts. It is also discussed in Chapters 3 and 5 in the examination about inadequate work conditions, poor ecodesign and marginalisation since they are the primary struggles to make property generative in the ecolaw-informed PES.

PES is a powerful instrument to form a regulated approach to waste management. It is consistent with sound environmental and social principles and suited to the Global South's reality. Its alignment with the three ecology of law criteria is highly conducive to this achievement. The results of Chapter 3 demonstrated the superiority of the organised waste pickers to waste-to-energy incineration. First, they enhance ecodesign because they are labour-intensive, small-scale initiatives with better environmental outcomes. Second, they assist in making communities sovereign because they challenge environmental injustices. Last, they have generative property due to the nature of cooperatives and similar enterprises, which are uniquely positioned to empower their members since these organisations are owned and governed by the members and pursue a socio-environmental and communal purpose in coevolution with society's broader economic system. PES also advances through the ecolaw-informed criteria, making it a great match with waste pickers.

6.1 BENEFITS OF THE MODEL PROPOSED IN THIS THESIS

The ecolaw-informed PES for waste pickers suggested in this thesis is anticipated to have environmental and social benefits. These projected positive outcomes are in line with the current discussions about waste and the urbanisation of the Global South, examined in Chapter 1. They relate to the leading international debates, such as the ILO's decent work indicators, the UN's New Urban Agenda—particularly the promotion of vibrant, sustainable and inclusive urban economies in item 45—and the SDGs, especially Goal 11 on sustainable cities and communities. In short, the ecolaw-informed PES works for decent urbanisation and employment, livelihood opportunities and improved quality of life.

The environmental benefits were delineated in Chapter 3. In short, the ecolaw-informed PES for waste pickers is expected to increase sustainable waste management practices, such as the selective collection of waste and recycling. The intensification of these activities implies less waste discarded in open dumps and landfills, which leads to less harmful gases and leachate. The ecolaw-informed PES for waste pickers is likely to decrease greenhouse gases emissions, raw material consumption and energy expenditures and to assist in the mitigation of climate change.

The anticipated social benefits are a projection of an increase in the improvement in livelihoods and work conditions, some already provided by cooperatives and similar enterprises. The central enhancement is the transition from the informal to the formal economy and the ratio of employment increase to waste pickers' population. The proposed model is expected to generate labour productivity growth in cooperatives and similar enterprises, with gender-balanced opportunities, and decent hours.

In terms of social outcomes, it is vital to insert the ecolaw-informed PES as a policy working for social protection. It is a scheme targeting waste pickers that compensates them for their services through in-kind and non-monetary ways, such as skill training and other labour market interventions. The contract securing minimum wage payment considers providing adequate earnings and ensuring productive work, as well as decreasing waste pickers' poverty rate. Non-monetary payments, such as social security contributions, health and safety equipment provision and training, forecast stability and security. The ecolaw-informed PES is projected to foster decent work conditions in waste pickers' workplaces and to assist in reducing unsafe work, such as in dumps. Last, it is anticipated to promote social dialogues between waste pickers, local governments and industries.

The central reason for conducting this research was the limited literature and practice addressing the shortfalls of environmental law concerning waste pickers. This gap leaves them marginalised and unprotected although they remain the main force pushing for sustainable waste management in the Global South. Notably, Brazil has significant problems, despite being at the forefront of this discussion through progressive legislation that aims to integrate organised waste pickers into the official waste management systems. In this context, this thesis fills this gap by formulating PES as a strategy for organised waste pickers. This approach is relevant because it can give them more stability and safety, paramount to enhancing waste pickers' lives and promoting recycling. By developing the ecolaw-informed PES, this thesis attempts to balance these socio-environmental problems, through a bottom-up, grassroots and local strategy.

6.2 RESEARCH LIMITATIONS & FUTURE DIRECTIONS

Much has been achieved through the socio-legal methods used in this thesis; however, this process has also identified the limitations of such a method as well as fruitful avenues for future research. The main limitation is the lack of empirical work. Hence, this thesis fails to capture the nuances of the perspectives and internal conflicts, and consistencies and inconsistencies. This research is primarily an analysis of policy and practice and is reform-oriented.

An empirical study to cross-reference the thesis's findings with the views of key stakeholders, particularly the waste pickers themselves would be undoubtedly be of great future benefit. However, this was not feasible in this project due to financial constraints. As such, this thesis identified the perspectives of the stakeholders through a feasible alternative: policy positions. This thesis took advantage of data gathered about waste pickers from third-party sources, such as reports and bulletins, that reported on empirical studies used in this thesis, which were published by non-governmental institutes, organisations and scholars. It is essential to acknowledge the significance of the publications of Women in Informal Employment Globalising and Organising—WIEGO—and the IPEA reports to this study. It is envisaged that after the completion of this work, a draft for a bill will be presented to waste pickers for their feedback, for a new legislation. It is hoped that this consultation process will inject some of the nuanced perspectives that were missed through the lack of empirical work.

Throughout this thesis, but especially in Chapters 3 and 5, this research deliberately focuses on waste pickers organised in articulated and collective work initiatives. The case study

shows that the organised waste pickers help reduce socio-environmental problems connected to waste management in Brazil, such as pollution by decreasing it, which increases human health, making them urban environmental services providers. Moreover, their organisations promote generative ownership, and their actions foster sovereignty in communities. However, since this thesis focused on organised waste pickers, its extrapolation to other contexts may be problematic. This limitation is addressed in the research design by focusing on local needs and local solutions and maintaining participatory work capacity. Nevertheless, suppose the assumption of this thesis—that organising strengthens the health and wealth outcomes of waste pickers—is taken as self-evident. In that case, a greater understanding of waste picker decision-making around collective enterprises will be of value to improve understanding about how the ecolaw-informed PES model can have greater reach and uptake. Future research would be well placed to investigate the organised waste pickers' ideas about the ecolaw-informed PES. This would help to illuminate whether waste pickers conceive their role and needs in similar terms to researchers, as well as the usefulness of the terms of the proposed PES model to those who would be the beneficiaries of the reforms.

The selection of organised work follows the provisions of the Brazilian National Waste Policy and the advocacy of the Brazilian National Waste Pickers' Movement. Future research is advised to examine the reasons behind the choice to form a collective, particularly focusing on the intersectionality between gender, race and social class, and the ways in which the proposed ecolaw-informed PES for waste pickers would influence this option. Such research could help ensure that PES remains responsive to waste picker practices.

Looking forwards, the emphasis on cooperatives is important because they have been demonstrated to be fruitful to their members, as explained in Chapter 5. Organised waste pickers have better work conditions, and the expansion of this set of positive, collective work is expected to attract autonomous workers into cooperatives. Cooperatives promote empowerment, social visibility and fairer negotiation with suppliers, intermediaries and governments. Their formalisation strengthens waste pickers' social protection, capacity building and technical skills. Their ultimate goal is to put a spotlight on waste pickers as essential and public service providers. Future research could usefully examine the connections between the Social and Solidarity Economy, which is the foundation of the cooperative movement, and the ecolegal settings. Consequently, later it would be possible to examine the lessons that could be drawn for the ecolaw-informed PES.

Research is needed to investigate further the links between waste pickers, the circular economy and the ecolaw-informed PES. The circular economy is in exponential growth as a

strategic vision for sustainable development, and studies relating it to waste pickers are still at an early stage.[1400] Future research can address these links, focusing on PES and the ecolegal settings.

Another topic for future research is the relation between the ecolaw-informed framework, PES, waste pickers and Third World Approaches to International Law (TWAIL) theory. This thesis started to investigate the association of waste regulation schemes and colonialism. In addition, a more in-depth analysis of waste regulation, the informal recycling sector and PES should be conducted through the lenses of TWAIL.

Chapters 3 and 5 explained the reasons that this investigation focuses on urban solid waste, and not on other materials, which is a limitation. Urban solid waste means waste from homes and venues, according to the Brazilian legislation. A known fact is that electronic waste is progressively produced, consumed and discarded worldwide. It is recommended that future studies analyse waste pickers' role in recycling electronic waste and the ways in which regulations can assure their health and safety when handling these hazardous products.

The research presented here would also benefit from further examining the ecolaw-informed PES as a tool for human rights. Ideas that can be investigated are whether (i) waste pickers can gain independence from intermediaries that often have them in debt bondages, (ii) the recognition of waste pickers as providers of a public service weakens police harassment and (iii) their social discrimination can be minimised.

This thesis applied the ecolaw-informed criteria, which is based on the ecological approaches to environmental law framework. Since this was the theory chosen to guide this research, it limited the possibility of discussing and applying other relevant theoretical frameworks, such as decolonisation. In this sense, future research can apply the decolonisation theoretical framework to analyse sustainable waste management in the Global South.

A final limitation of this study is that it has focused in detail on a single policy in one policy arena, with the intent of foregrounding the complex connections between PES and the Brazilian organised waste pickers in light of the ecology of law. However, this does raise the question of the transplantable nature (or otherwise) of the findings. The extent to which this thesis's findings can be generalised is limited, given that PES for waste pickers must be attentive to context. Nevertheless, the proposed model is a broad skeleton, and the lessons

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[1400] GUTBERLET *et al*, Waste Picker Organizations and Their Contribution to the Circular Economy; VELIS, Waste Pickers in Global South: Informal Recycling Sector in a Circular Economy Era.; WAUTELET, Thibaut, **Exploring the role of independent retailers in the circular economy: a case study approach**, Master-Thesis, eufom European University for Economics & Management, Luxemburg, 2018.

learned and the techniques adopted here could be used to develop ecolaw-informed PES schemes in other jurisdictions. It is essential to look beyond the legal system's suboptimal designs for waste pickers and the disparity of power between these workers and high-end industry technicians, which is discriminatory and often covered by the legal framework.

As explained at the beginning of this chapter, waste is a global problem, and mechanisms to sustainably manage it are of interest to both the Global South and the Global North. A significant amount of the recyclables of the Global North are handled by waste pickers located in the Global South since international waste dumping is still a reality;[1401] thus, the ecolaw-informed PES is relevant for both geopolitical areas. In addition, the Global North could benefit from developing a similar instrument adapted to its context.

Legal transplantation is a widely applied model, and it has globalised environmental law.[1402] Legal transplantation means adopting the laws and legal institutions of one country to another, aiming to enhance legal systems. Even when partial, this transplanting is difficult because it does not take place in a cultural vacuum.[1403] That is, cultural, socio-economic, political and legal institutions influence how laws are interpreted and applied.

Therefore, future research entails the use of the lessons learned and techniques adopted in this thesis to develop ecolaw-informed PES models in other jurisdictions. Waste pickers are present throughout the Global South; however, countries where waste pickers have already started to organise in cooperatives are more suitable. The suggested jurisdictions are Argentina, Mexico, the Philippines, India and Indonesia.

6.3 RECOMMENDATIONS

The findings of this thesis have practical implications. This research, particularly after the COVID-19 outbreak, shines an unforgiving light on the legal system's negligence and waste regulations towards waste pickers. Even more importantly, in terms of trends in the longer term, it demonstrates that waste-to-energy incinerators are incompatible with the context of the Global South, including Brazil, and the ecology of law.

[1401] For more information about international waste dumping, see POPE, **Transferência Transfronteiriça de Resíduos sob a Perspectiva da Justiça Ecológica : Rumo à Gestão Internacional de Resíduos**.
[1402] MCDONALD, Jan, From Transplantation to Anticipation: Challenges for Environmental Law in a No-Analogue Future, *in*: FARRAR, John H.; LO, Vai Io; GOH, Bee Chen (orgs.), **Scholarship, Practice and Education in Comparative Law: A Festschrift in Honour of Mary Hiscock**, Singapore: Springer Singapore, 2019, p. 155.
[1403] HUSA, Jaakko, Developing Legal System, Legal Transplants, and Path Dependence: Reflections on the Rule of Law, **The Chinese Journal of Comparative Law**, v. 6, n. 2, p. 129–150, 2018, p. 130–131.

Regarding the legal settings, Brazilian waste pickers have fought tooth and nail for every recognition they have gained. Unsurprisingly, the country is the leader in progressive, inclusive waste management regulation and cooperatives. However, it is ironic, not to mention cruel, that the waste pickers who have been working towards sustainability before it became a trending topic are still some of the most vulnerable people in Brazil after years of struggle.

In these times of COVID-19, their vulnerability has become even more dramatic. Cooperatives and other similar enterprises have been quick to organise aid for waste pickers. Nevertheless, the main initiatives must come from the government. It should be a high priority for authorities to create public policies to recognise these environmental stewards as providers of essential and public services, provide them social security and remunerate them adequately. As explained in Chapter 5, it is important to remember that the choice between protecting themselves from COVID-19 and continuing to work is hardly a choice because waste pickers have low incomes and cannot afford to take time off work to self-isolate without risking starvation.

Waste pickers increase recycling rates, produce environmental services and benefit communities. It is imperative that in the future, they should be recognised as the environmental agents that they are and receive government support. Their future is part and parcel of the future of sustainable waste management systems and the future of environmental law. A safe and sustainable future requires us to place social and environmental matters at the frontline of our priorities. The ecolaw-informed PES will help achieve that future.

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