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Sustainable development: public policies for solid waste in Brazil

Desenvolvimento sustentável: políticas públicas de resíduos sólidos no Brasil

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Abstract

This paper aims at analyzing the importance of sustainable development since its origin during the first Conference of Human Environment, in 1972, in Stockholm, Sweden. Our research highlights the key role of the *Our Future Common Report* in establishing the pillars of sustainable development and its evolution until now. First, the paper sets out the three classic pillars of sustainable development and the paramount principles that support such pillars. In particular, our study presents the solid waste policy in Brazil, introduced by law no. 12.305/2010 in order to address a problem that particularly impacts the achievement of sustainable development targets. The solid waste is a major issue in cities all over the world and this is no different in Brazil. The 2010 law sets principles, objectives and the legal framework for sustainable development in accordance with the sustainable development pillars identified in this work. This legislation also addresses topics such as the solid waste policy, that needs to be implemented by the country, states and municipalities; the Reverse Logistics; the selective collection of waste; its reuse or recycling practices. The research methodology used in this article is exploratory and is based on the analysis of article references and bibliographic studies.

Keywords: Sustainable development. Pillars of sustainability. National policy of solid waste. Selective collection. Reverse Logistics.

Resumo

Este artigo tem como objetivo analisar a importância do desenvolvimento sustentável a partir de sua origem na primeira Conferência do Meio Ambiente Humano, de 1972, em Estocolmo/Suécia. Além disso, destaca o papel principal do Relatório "Nosso Futuro Comum", a fim de estabelecer os pilares e sua evolução até os dias atuais. Além disso, o artigo classifica os três pilares clássicos do desenvolvimento sustentável e os princípios fundamentais que os apoiam os. Além disso, esse estudo aborda a política de resíduos sólidos no Brasil, introduzida pela lei nº. 12.305, de 2010, a fim de estabelecer um vínculo com a necessidade de solução de um problema que afeta a conquista do desenvolvimento sustentável. O lixo sólido é um grande problema nas cidades de todo o mundo e, no Brasil, isso não é diferente. A lei estabelece princípios, objetivos e seus principais conceitos jurídicos de acordo com o desenvolvimento sustentável discutido neste trabalho. Também são descritos tópicos como a política de resíduos sólidos, que precisa ser implementada pelo país, estados-membros e municípios; a logística reversa; a coleta seletiva de resíduos; suas práticas de reutilização ou reciclagem. A metodologia de pesquisa empregada neste artigo é exploratória e baseia-se na análise de referências de artigos e estudos bibliográficos.

Palavras-chave: Desenvolvimento sustentável. Pilares da sustentabilidade. Política nacional de resíduos sólidos. Coleta seletiva. Lógica reversa.

1 Introduction

Nowadays there is an overwhelming use of the word sustainability. Everyone, companies, governments, nations, wants to be sustainable. The theme has been present in academic discussions and public policies due to the current environmental issues, such as the shortage of natural resources or climate changes and such issues are worsening as each day passes.

The first environmental problems were felt in the European countries but have since crossed borders and, now, reach the entire world and the necessity to adopt public policies both locally and at an international level is obvious.

In this context, one major issue is the management of solid waste. Large cities are exporting this problem to other parts of their country or the world.

In Brazil the problem is no different. There is a public policy about solid waste, created in 2010, law no. 12.305. However, only part of the guidelines was implemented. Since 2010, according to the law, all illegal procedures of discharging waste should have been replaced by sanitary landfills. Unfortunately, despite the law, public administration did not worry about such issues.

This paper shows and analyzes the importance of sustainable development since its origin in 1972, with the key role of the *Our Future Common Report* in establishing the three classic pillars of sustainability: economic development, social progress and environmental protection.

Moreover in the context of sustainability, our study focuses on the solid waste policy in Brazil and its implementation problems.

2 The Sustainable Development

2.1 Origin and classic pillars

The concept of balancing development with environmental concerns dates back to the 1970s after the first UN Conference related to Human Environment in Stockholm. This discussion arose with the first great environmental problems reported by studies such as *Silent Spring* by Raquel Carson and *The Limits to the Growth* conducted by *The Club of Rome*, raising awareness as to the urgency to discuss environmental issues (SCHRIJVER, 2008, p. 245).

The environmental degradation caused by the human being transcended the countries borders, the political limits, affecting regions and populations all over the world.

In fact, until then, human beings had always had a utilitarian vision about environment and there had never been a concern with the consequences of its

development, like the shortage of the natural resources, environmental damage or how one should manage solid waste generated by the consumerist society (MASCARENHAS, 2008. p. 17).

The environmental neglect caused a crisis opposing natural resources and human needs, where the first one is limited and the second is unlimited. Economic development had, until then, not taken into account the social and environmental cost. Historically, there it was never a priority that economic interest would encompass environmental problems. It was thought that the negative externalities, i.e. the environmental cost of the degradation that occur in the productive process would be neutralized by the nations' progress (MASCARENHAS, 2008. p. 17) or by the companies that cause the damage or use the natural resources and not by humanity at large.

The Stockholm Conference gathered more than 113 representatives of different countries and it is considered to be the landmark in environmental world history, where the UN Environmental Program (UNEP) was created together with the Stockholm Declaration Human Environment Rights providing a new direction to environmental issues. It emphasized the necessity to reformulate the development concept entirely.

This issue was identified by the "Our future common Report", presented in 1987 at the UN General Meeting that created and defined the term Sustainable Development, as follows:

> Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities (UNITED NATIONS (UN). Our future common report. p. 16.).

The provision of essential needs encompasses minimal conditions supply of drinkable water, food, good quality air, water sanitation and, consequently, respect for human rights. The Universal Declaration of Human Rights (1948) focuses on the right to life (art. III), on a standard of living that enables every human being to have access to better health conditions and well-being, including food, clothing and housing (art. XXV).

The Our Future Common Report focused on the limitations imposed to humanity in order to allow the environment to absorb the effects of human activities. This point is vital when the issue is the consumerist society and what we are doing with the solid waste generated for this purpose.

Likewise, the sustainable development concept is present in the Rio Declaration on Environment and Development originated in the UN Conference in Rio de Janeiro, in 1992, which is another landmark in world environmental history where important documents were written relating the concept of sustainable development, such as the Rio Declaration, Agenda 21, the Convention on Climate Change and the Convention on Biological Diversity, among others.

In the 1990s emphasis was on the following human rights: right to development, to social progress, to economic development, to food, to social justice, to popular participation in governmental decisions, focusing on poverty reduction (SCHRIJVER, 2008, p. 371). Nowadays, the link between human rights and the environment has become stronger and stronger, confirming the dependence of the human being on physical and biological systems.

Consequently, the Rio Declaration sets key principles to confirm the new purpose of development with sustainability. The first principle describes every human being`s right to a healthy and productive life in harmony with nature. Moreover, the principle 3 defines sustainable development: "The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations".

It is important to highlight that sustainable development encompasses solidarity, e. g. everybody needs to care about their neighbors as well as about the people that will be here after us. We cannot use all the natural resources because the future generations need them too.

This issue is linked with the systemic vision that is somehow complex since it needs to integrate all the aspects and all forms of life Indeed, we are interdependent in the life context. This is the meta system (MORIN, 2002, p. 175) where the systems are fully integrated and the properties of which cannot be reduced to small unities (CAPRA, 2003, p. 260). In that sense, all living things are part of a system, and each system is part of a large system comprising the global system. As a result, life and environment are umbilically linked and form one single body, which affects the environment and consequently affects all life on the planet (MASCARENHAS, 2008, p. 18).

Likewise the sustainable development principles are based on three pillars: economic development, social progress and environmental protection or, alternatively, are based on the *triple bottom line* of *people, planet* and *profit (*THIELE, 2013. p. 5).

Applying sustainable development needs to strike a balance among its pillars, because the economic development must come along with social progress and the protection of the natural resources. The three pillars of sustainable development must progress together and remain integrated because sustainability cannot be achieved if one of its pillars is neglected.

To SACHS (2004, p. 15), beyond the social, economical and environmental dimensions, there are also other pillars for sustainable development, e.g. territorial

dimension, that involves the spatial distribution of resources, populations and activities; the political dimension in which the democratic governance is a fundamental key factor to make things happen. Sachs adds that full employment and self-employment must be promoted, the development of alternative life styles which can save resources as well as the establishment of an international regulation for the globalization process (SACHS, 2007, p. 300).

Nowadays another component is rising: cultural creativity. "We underline the fact that our practices, relationships, and institutions have to initiate and respond to change if they are to endure for long. Sustainability demands imagination and innovation" (THIELE, 2013, p. 5). In fact, cultural creativity appears to open other possibilities to implement development with reduced use of natural resources, such as the recycling and reuse of solid waste in the productive process.

It is important to observe that sustainable development comprises the participation of all, Government and civil society, because the environmental questions have great repercussions on the course of our planet. In fact, to reinforce the conception of sustainable development it is crucial to address its multidimensional concept.

2.2 The multidimensional concept

Aiming at reinforcing sustainable development, classic pillar studies indicate a link with a multidimensional concept based on seven key principles (SCHRIJVER, 2008, p. 342-344).

The first principle is the countries' responsibility to ensure the sustainable use of natural resources, which originated from the Stockholm Environmental Human Declaration, principle 21 (United Nations Environmental Program. UNEP. Declaration of the United Nation Conference on Human Environment) which establishes that the states' sovereign right to explore its own natural resources and ensure that the activities should not damage other countries' environment (SCHRIJVER, 2008, p. 367).

The second principle addresses equity and poverty eradication, where the discussion about sustainable development must combine with the principle of equity, firstly in relation to the intergenerational aspect, equity between present and future generations, in which the present generation cannot deplete natural resources or harm the environment for future generations, and secondly the intra-generational equity that involves the right of the current generation to natural resources access, including the poorest population, and a more just income distribution within countries and an international level (SCHRIJVER, 2008, p. 343). In this context, the Principle 5 of Rio Declaration of Environment and Development establishes that "all States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development".

The third principle deals with the common but differentiated responsibilities of the States "in view of the different contributions to global environmental degradation" inserted in Rio Declaration of Environment and Development, Principle 7.

The forth principle of multidimensional concept highlights the Precautionary Principle, formulated in the Economic Commission of the European Union in 1990, and inserted in international right, in Rio Declaration, Principle 15, that sets:

> In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. (Principle 15).

Furthermore, the fifth principle refers to the participation and information concerning the environment "including information on hazardous material and activities in their communities and the opportunity to participate in decision-making processes" (Principle 10, Rio Declaration). According to this document, the states shall make the information widely available and encourage public environmental awareness and participation.

The sixth principle is the Good Governance, which acquired a central position in the debate on development, combining democracy, through popular participation and accountability of governments, according to the Rio Declaration, Principle 4, that establishes that the environmental protection constitutes an integral part of the development process in the context of sustainable development.

The last principle that composes the multidimensional concept of sustainable development is the principle of integration and interrelationship, which makes a link between the pursuit of poverty eradication and development, environmental protection and respect for human rights. Stockholm Declaration states in its Principle 13, the need for the States to adopt an integrated approach involving development and the protection of human environment for the benefit of the population.

Currently the human being has many challenges to promote sustainable development, climate change, the increase of pollution levels, excess consumption and the solid waste generated give evidence that we are not respecting the balance of the classic pillars. Our economic growth is occurring without concern for the other pillars, mainly the environmental protection.

In this context, and aiming to achieve sustainable development, it is important to discuss the Brazilian law that sets the public policies relating to solid waste.

3 Public policies relating to solid waste in Brazil

Each Brazilian citizen produces in average 1.2 kilo of solid waste per day and this amount is growing because in the last decade 40 million people achieved a higher social class (ASSOCIAÇÃO BRASILEIRA DE EMPRESAS DE LIMPEZA PÚBLICA E RESÍDUOS ESPECIAIS – ABRELPE, 2012. p. 28). There has been an economic evolution, mainly in consumption and an increase in the generation of solid waste without a corresponding preoccupation with its destination. This is a major problem in trying to achieve sustainable development.

Despite the problems, in 2010, Brazil adopted law no. 12.305, which established the National Policy for Solid Waste. This law was of paramount importance because it fixed the definitions, objectives, principles, guidelines, instruments and highlighted the responsibility of solid waste generators. For MILARÉ (2011, p. 900), the law has an environmental holistic vision (sanitary, social, economical, technical, cultural and political). The national policy is truly transdisciplinary such as the environment and needs to be applied under the sustainability principle.

The legal foundation of the law is in the Brazilian Constitution, article 225, that guarantees for all the right for an ecologically balanced environment that could promote a healthy quality of life and establishes that government and the collectivity must defend them for the present and future generation. Hence, law no. 12.305 aims to reinforce this guarantee.

In the definition section of the law, it is interesting to highlight the difference made by the law between final environmentally adequate *destination* and final environmentally adequate *disposal*. The first one means the possibilities to reuse, recycle, compost, energy utilization or other possibilities to avoid the harm or risks to public health and safety or to minimize the adverse environmental impact. The second, the final environmentally adequate *disposal,* includes only the waste to be disposed of in sanitary landfills (article 3th, VII, VIII).

In the same sense, the law makes the difference between *rejects* and *solid residues*. *Rejects* is waste that cannot be treated or recovered. *Solid residue* is everything discharged due to human activities for which an environmentally adequate destination can be provided (art. 3th, XV, XVI). The European Community (EUR-Lex. Directive 12/2006) only defined the term "waste" that means any substance or object which the holder discards or intends or required to discard (art. 1st, Directive 2006/12/EC).

Another important definition is the definition of *Reverse Logistics* (art. 3th, XII) which is an economic and social development instrument to perform the collection and restitution of solid waste for the business sector in order to reuse it in the productive cycle or to proceed with the environmentally adequate destination. To ROGERS and TIBBEN-LEMBKE (p. 2), "more precisely, reverse logistics is the process of moving

goods from their typical final destination for the purpose of capturing value, or proper disposal.".

The 2010 law also defines the *shared responsibility for the product cycle* that involves all participants in the productive cycle including manufacturers, consumers and all sectors in charge of this cycle and its final destination (art. 3th, XVII). This is also a principle that had its foundation in the Polluter Pays principle from Rio Declaration and known as *Extended Producer Responsibility* that intended "to emphasize that the responsibility is shared — the producer is not the only responsible party but also the packaging manufacturer, the consumer and the retailer" (KILBERT, p. 510). To MACHADO (2012, p. 645), the shared responsibility is intended to decrease the solid waste volume and reduce the health and environmental impacts that it causes.

The other fundamental principles applicable will be discussed below.

3.1 The main principles of the 2010 solid waste law

The 2010 law's main principles are inserted in article 6th, such as: the precaution and prevention principle, the polluter payer, the protector receiver, the systemic vision, the eco-efficiency, the cooperation between different spheres of government, business sector and segments of society, the shared responsibility and sustainable development.

According to GARBACCIO, PRIEUR (2019, p. 374) and all. "the precaution principle can be justified, where it is imperative to limit, supervise or prevent certain potentially dangerous actions without waiting for the danger to be scientifically established with certainty".

In fact, sustainable development encompasses all the other principles as we analyzed previously. When one talks about solid waste, the needs of our generation and the future generation must be taken into account, putting in practice the other principles that are expressed in the law and that are in the context of multidimensional concept.

With respect to the application of the precaution principle, in the case of solid waste management, can be understood as "the principle does not stop with prohibition, it introduces a dynamic that allows one to get out of it: that of the steps leading to authorizations to encourage the development of knowledge" (GARBACCIO; PRIEUR, 2019, p. 375).

It is important to stress the systemic vision principle that can be analyzed in solid waste management, which takes into account the environmental, social, cultural, economical, technological and public health variables, in the context of sustainable development. Indeed, the Rio Declaration sets in principle 4th that the "environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it" (UNITED NATIONS. Rio Declaration on environment and Development).

Moreover, the 2010 law defined the integrated management of solid waste, in article 3rd, XII, as a set of actions aimed at finding solutions for solid waste taking into account the political, economical, environmental, cultural and social dimensions, with social control and under the premise of sustainable development.

In addition to the *systemic vision* analyzed before, it is possible to link the other principles and to better understand the shared responsibility for the product cycle defined above. Specifically in the solid waste context, but more widely in all environmental issues, all form of life are linked and interdependent, and we must think about responsibility and solidarity with the present and future generations. Furthermore, another principle linked with the systemic vision is the eco-efficiency defined by the Word Business Council for Sustainable Development (WBCSD - EcoEfficiency. Learning module, 2005, p. 5), as:

> Eco-efficiency is achieved by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life-cycle to a level at least in line with the Earth's estimated carrying capacity (WBCSD, 2005, p. 3).

The 2010 law defines the principle of polluter payers and conversely, the protector receiver principle. The polluter payer appears in the Principle 16 for Rio Declaration, which states that the polluter should bear the cost of pollution. It is a guiding principle of OECD, since 1972. The second concept, the protector receiver, means that the protector should be compensated through benefits for environmental preservation or for generating positive externalities (ARAÚJO; SÉGUIN, 2012, p. 405).

It is the first time that this new principle, protector receiver, was present in the Brazilian law and created economic instruments, inserted in article 42, such as public incentives for selective collection and for waste pickers cooperatives as well as for reverse logistics implementation and development of products with less impact.

Therefore, in order to implement all of these principles in the management of solid waste it is necessary to ensure the cooperation among different spheres of government, the business sector and segments of society. Indeed, a joint action between government and society is an important instrument for the solution to environmental problems, which reinforce the necessity of providing public with information and raising awareness about these problems and ensuring popular participation to resolve them. It should be highlighted that Principle 20 of the Stockholm Declaration stresses the necessity of cooperation among countries to solve the environmental problems.

Indeed all these cited principles reinforce the importance of sustainable development to guarantee the continuity of life on Earth.

3.2 The objectives, guidelines and instruments

According to the GARBACCIO, PRIEUR and all (2019, p. 370):

> "The environment plays a "precursor" role in the modernization of forms of governance but this desire for innovation is accompanied by the desire to strengthen modes traditional state intervention - such as "command and control". Indeed, it's about mainly for those responsible for the environment, to set up a sectoral policy well defined, with conventional control systems (regulations, budgetary resources, etc.) in order to obtain convincing results in the short term".

And it is in this sense that the Brazilian law for the national policy of solid waste proposes, in summary, the direction for a sustainable society, wherewith all this policy might concern about the quality of life using sustainable development to change the form of consumption and waste discharge, through enforcement of sustainable standards of production and consumption of goods and services.

The 2010 Brazilian law aims to stimulate the integrated management of solid waste, making a link between the shared responsibility and the systemic vision, with a special emphasis on the inclusion of waste solid cooperatives in the cycle of production and of benefits derived from recyclable materials and to stimulate the recyclable material industry.

In 1995, W. SUNDERLIN in an article on global change, was already evidence of the researchers' reflections gravitating around the three "paradigmatic" categories: on the one hand, those who have an essentially managerial vision of "governance"; on the other, those who insist on cultural developments or differentiations; and finally, those who have a vision "agonistic", in terms of "power relations", of the problem, and consider that the solutions necessarily go through improbable structural changes (world government, European leadership ...)" (SUNDERLIN, W., 1995 cited *Id. ibid*., p. 370).

It is not necessary, at this time, to address this conflict over governance in detail. It's needed, however, to understand the importance of complementarily between the State and civil society, what could be defined as "governability. As an example of this complementarily, not perfect, but important to recognize is that in Brazil there are approximately 400,000 waste pickers who live from this activity mainly organized in cooperatives (*Instituto de Pesquisa Aplicada*. IPEA. 2013, p. 44). The recycling and reusing of materials have an economic value and promote jobs and income for thousands of people. In addition, the law foresees economic instruments to promote those cooperatives in article 42, through government financial incentives for cooperatives and associations in order to implement physical infrastructure and

the purchase of equipment. To MILARE (2011, p. 885), these economic instruments contribute to a more effective management of solid waste.

According to the Brazilian Institute of Applied Research (*Instituto de Pesquisa Aplicada* – IPEA), the Brazilian people throws away R$ 8 billion (approximately $3.5 billion) per year of solid waste that is not recycled (2013, p. 13) which could be used to generate income. This possibility could be harnessed.

It is good to remember that the waste pickers' work is important not only in the economic or social vision, but they provide a relevant environmental service in limiting the use of natural resources in the productive process. The recycling or reusing of solid waste in the productive process produce also a lot of environmental services because non consumption of natural resources or raw material that are replaced by inputs generated by solid waste (IPEA. Pesquisa sobre pagamento por serviços ambientais urbanos para gestão de resíduos sólidos, 2010). To MACHADO (2012, p. 641), the law recognized the waste solid has a social value and it is an economic good for waste pickers and promotes citizenship.

To implement the Brazilian policy, article 9 of the 2010 defines some instruments such as the plans of solid waste management at the federal, state, municipal levels and also at the level of companies. The minimum content of these plans is in articles 15 and following, such as selective waste collection, environmental education, encouraging the creation of cooperatives and associations, economic incentives, among others.

The most important part of the guidelines inserted in article 10, is that such article establishes the order of priority in solid waste management policy: no generation, reduction, reusing, recycling, treatment of solid waste and the environmentally adequate disposal. This is a fundamental guideline since it is necessary to invest on environmental education to change the consumerist way of life, the consumption form that has no concern with solid waste generation and the use of natural resources and consequently neglects sustainable development.

In this context, the legal guidelines correctly set the need to make the population aware of the generation of solid waste resulting from the consumption society, and hopefully, to reduce its generation. When such a reduction is not possible, the solid waste generated must be reused, recycled or treated. Lastly, only the material for which there is no possibility of being reused or recycled, the solid waste must be disposed in an environmentally adequate site.

It is important to highlight that article 54 of the 2010 law provided for the obligation to close down all of open dumps that still exist in the country as from August 3rd, 2014. The reality is that this legal provision was not implemented in time.

Failing this deadline, municipalities are subject to civil, criminal and administrative sanctions for complying with this legal obligation[1]. The federal

1 See Law no. 12.305/2010, art. 51; Law no. 6.938/ 1980, art. 14, par. 1st.; Law no. 9.605/1998, art. 54, par. 1st,V; Decree no. 6514/2008, art. 62,V.

government stipulated also, that the states and municipalities that do not have solid waste management plans and the municipalities that do not close down the open dumps will lose possibilities to obtain federal financing.

4 Conclusion

Sustainable development involves the main principle established in the international environmental documents that, in summary, reinforce the multidimensional concept that establishes the way to hold the three classic pillar: economic and social progress with environmental protection Paramount in achieving this goal are creativity and innovation in order to create new possibilities that promote the development with the minimum negative externalities in the environment.

The Brazilian law no. 12.305, that establishes the National Public Policy for Solid Waste, has its foundation in the three classic pillars of sustainability. Its objectives, principles, instruments and guidelines demonstrate that the key is to make the government, companies and the society aware that the solid waste problem involves the common responsibility and requires actions of all these actors to avoid the damage caused by indiscriminate use of natural resources or an illegal discharging of the solid waste.

The main concern of the law is the priority order of waste management.

First, the no generation or reduction of solid waste production involves environmental education and awareness on consumption.

Secondly, in case of solid waste generation, such solid waste must be recycled, reused or treated.

Lastly, in order of priority, when it is not possible to reuse the solid waste, it must be disposed in an environmentally adequate site. This is a major concern in Brazil because there is still a large amount of this material being disposed in open dumps.

Therefore, it is necessary to invest in economic incentives such as tax reduction at the municipal, state and federal levels for people and companies that could recycle or reused the solid waste or that assist the cooperatives of waste pickers. Another incentive is to implement the residues stock market, wherein the residues produced by one industry can be an input to another and there can trade with one another, or yet, incentives to stimulate cooperation actions to reduce solid waste impact on the environment.

In respect of the Brazilian policy of solid waste, everybody needs to do their part in this process to achieve the sustainable development: government, companies and the civil society have an important duty to implement them.

Finally, the legal measures confirm that the systemic vision is crucial when we analyze the environmental problems.

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