DOI: https://doi.org/10.15446/ga.v25n2.105292

Perspectives of environmental management: A critical analysis

Perspectivas de la gestión ambiental: un análisis crítico

Nadenka Beatriz Melo-Brito[a], Rodrigo Rey-Galindo[a, b]

RESUMEN

La *Gestión Ambiental* se ocupa de aquellos procesos administrativos, políticos, sociales y económicos que pretenden resolver problemas ambientales. Alrededor de ese concepto se han constituido diferentes paradigmas que analizan cómo los Estados la abordan. La toma de decisiones se concentra en la dinámica técnico-científica, que tiende a favorecer el modelo económico y de mercado actual, en el cual algunas decisiones se adoptan a través de la visión económica y los intereses políticos del modelo neoliberal. En la actualidad, los problemas ambientales no presentan soluciones concretas y reales. Este artículo discute los aspectos de la gestión ambiental, su evolución, sus prácticas y los resultados asociados en diferentes contextos geográficos. La investigación es de índole cualitativa, basada en una revisión bibliográfica que parte de la hermenéutica y el paradigma interpretativo. Como resultado, propone un modelo de gestión que implica atributos de intertransdisciplinariedad y complejidad, que trabaje sobre las causas del problema e intervenga en la economía con medidas ambientales más restrictivas, como la propuesta de gestión ambiental diferencial.

PALABRAS CLAVE: gestión ambiental, medioambiente, gestión ambiental diferencial, paradigma ambiental

ABSTRACT

Environmental management concerns those administrative, political, social, and economic processes that attempt to solve environmental problems. Different paradigms have been established around this concept to analyze how states approach it. Decision-making focuses on technical-scientific dynamics, tending to favor the current economic and market model, whereby some decisions are taken through the economic vision and political interests of the neo-liberal agenda. Nowadays, environmental problems do not seem to have specific and concrete solutions. This article reviews the environmental management issues, their evolution, practices, and outcomes in different geographical settings. The research is qualitative based on a bibliographic review derived from hermeneutics and the interpretive paradigm. It proposes a management model that involves inter-transdisciplinary and complex attributes, works on the causes of the problem, and brings in the economy with more constraining environmental measures, such as the proposal of differential environmental management.

KEYWORDS: environmental management, environment, differential environmental management, environmental paradigm

Introduction

Environmental problems have worsened over time. The environmental deterioration caused by natural resources, their conservation and management, overexploitation, agriculture and land use, ecology and biodiversity, pollution, climate change, overpopulation and urbanization of territories, as well as the social problems resulting from development and its influence on the environment, confirm this (Riechmann, 2008; Naredo, 2015; Rodríguez-Becerra, 2019).

In response to this situation, environmental management has emerged as a strategy to address these problems; it can be encouraged during decision-making, from natural resource management planning and policy formulation to the regulations

a Universidad Distrital Francisco José de Caldas, Environmental Studies Research Group -GEA-UD-Research Incubator Innbio. Bogotá, Colombia. Orcid Melo-Brito, N.: 0000-0002-4255-8470; Orcid Rey-Galindo, R.: 0000-0003-2650-9369

b Corresponding author: rodrigo.reyg@gmail.com

Receipt: October 14, 2022. Acceptance: February 22, 2023.

(cc) BY-NC-SA

established by government agencies. Likewise, appropriate management would benefit the productive and commercial sectors. (Dale, 2003).

Similarly, the state's attention to environmental problems has been directed mainly to ecosystem models to ensure that natural resources are not depleted, extinct or degraded (Gutiérrez, 2005), i.e., that they are available in terms of utility and scarcity for society (Gómez-Orea y Gómez-Villarino, 2013).

The state approach to these problems has driven the practice of a technocentric model (Bryant and Wilson, 1998), which presents substantial differences in the contexts of developed versus developing countries (Latchinian, 2016; Naredo, 2018). However, the commitment is to consolidate the neoliberal mercantilist model and Eurocentric globalized thinking (March, 2013; Castillo et al., 2017; Eschenhagen, 2021) without offering answers regarding improving current environmental quality in natural and urban spaces.

It can be remarked that, in practice, the environmental management undertaken since the 1970s has failed in its fundamental purpose of completely solving ambient problems (Federovisky, 2007; Lippert, 2006; Rodríguez-Becerra, 2019). In this sense, and in accordance with the historical, cultural and analytical gaze, this research considers the documents that make it possible to propose a critical and differentiated environmental management.

This research article explores the concept of *environmental management* through etymology, considering the development of the field worldwide and over time; it also addresses the seven environmental paradigms formulated by Colby (1991) and March (2013), ranging from the relationships between society, nature, and economy to current ambient management. Finally, differential environmental management is put forward as a category of analysis to understand the new dynamics.

Methodology

Qualitative research underpins the present review article (Rodríguez-Gómez et al., 1999; Vasilachis de Gialdino, 2006; Hernández-Sampieri & Mendoza, 2018) applied to the environmental area to understand the phenomena of this field (Pinilla & Aguado, 2012). It also draws on the *interpretive paradigm* of general hermeneutics, which recognizes the reality of the subjects to make new theoretical and methodological constructions (Vasilachis de Gialdino, 2006; Ricœur, 2003 & 2004; Grondin, 2014; Melo, 2019), as it comprises interpretation, understanding, and knowledge (Dilthey, 2000). The work is geared towards reflection with a bibliographical review of phenomena in specific contexts in the framework of *multivocal meanings* by broadening explanations to improve understanding (Ricœur, 2003 & 2004). In this sense, it focuses on the hermeneutic episteme (Martínez-Miguélez, 2011 & 2012), grounded in experiences, academic and scientific literature, and the facts of environmental management.

Likewise, the holistic model (Sánchez-Torres & Aguilera, 2014) is integrated with a complex (Morin, 1994; Carrizosa, 2000; Leff, 2002 & 2007) and systemic (von Bertalanffy, 1976) view of the variables and structures of the subject. In this sense, the present research delves into the analysis of environmental management in the Anglo-Saxon and Latin American contexts regarding how the management process is conducted and its results.

A corpus of 168 documents was compiled, including printed documents (books) and electronic documents (theses, articles, and reports) collected in databases. The search included Spanish, English, and French databases such as Dialnet and journals such as *Environmental Management*. The keywords were *paradigma (paradigm), environmental paradigm (paradigma ambiental), differential environmental management (gestión ambiental diferencial), gestión ambiental, and environmental management*. Once the collection was formed, the documents were organized and analyzed to contrast and draw inferences, proposing a *differential environment management* model.

Environmental management

This section explores the concept of *environmental management* using as synonyms the terms *gestión* (in Spanish) and *management* (in English) (Aktouf, 2001 & 2017) since both expressions encompass the management of resources and relationships, or the

rational and intentional guidance of a system based on the implementation of actions necessary to attain desired, formulated or predetermined ends, goals and objectives consistent with the sociocultural and economic context (Roth, 1969; Vega, 2001 & 2017; Gutiérrez, 2005; Sanabria, 2007; Lertzman, 2009).

Management comes from the Latin *gestus* derived from the word *gerere* (Aktouf, 1998). It is directly related to the expression *gestio-onis*, which means to carry out (Huergo, 2003). The English expression *management* stems from the French *ménager*, used in the 14th century and becoming *ménagement* in the 16th century (Aktouf, 1998).

The verb *to manage* implies the creative exercise of managing (Huergo, 2003). Moreover, management is something created by human beings (Pink, 2010), useful in multiple social, political, domestic, and organizational environments (Boddy, 2017, cited in Kaehler & Grundei, 2019), and individually in the framework of the ideas and actions undertaken, and collectively in line with policies (Vega, 2017).

Therefore, this document uses the expression *environmental management* in English. Such expression dates back to 1877 publication by Ernst Haeckel, associated with the connection of human beings with nature, specifically with pollution control and environmental degradation processes (cited in Flórez & Mosquera, 2013). Its origins come from the Eurocentric vision (Castillo et al., 2017) or environmental management of the West (Lippert, 2006), a model widely extended in the scientific revolution.

Environmental management corresponds to social science (Bryant & Wilson, 1998); it is entirely human (Vega, 2017) or anthropogenic (Latchinian, 2016), inherent to social activity (Lippert, 2005), and involves human behaviors (Pol, 2002). Riechmann affirms this is a situation of "human self-management" (2008, p. 6). Likewise, from the perspective of complexity, it is assumed as a social construction (Carrizosa, 2000).

There are different approaches to environmental management due to the breadth of its scope (Barrow, 2002 & 2006; Rodríguez-Becerra & Espinoza, 2002; Ibrahim, 2019) and, therefore, it offers many options, meanings, concepts, aspects, areas, spheres, and territorial scales where it can be applied, thus implying a high load of multivocal meanings that give the term a polysemic character (Ricœur, 2003).

On the states' side, environmental management began in France with the Imperial Decree of 1810 on unhealthy establishments about the so-called 'nuisances' due to odors; this regulation is considered the first legislation on industrial pollution in the world (Jarrige & le Roux, 2017). For his part, Jouvenel (1971, cited in Naredo, 2015) indicates that this decree was a reply to the complaints that industrialists permanently presented to the French State to request authorization for their installations. Naredo (2015) acknowledges that this legal regime of giving permission favored the companies, as it generated the circumstance of a "normal contamination endorsed by the state", evidencing the presence of environmental damage.

In the Netherlands in 1811 and in England in 1821, several laws reproduced the French regulation (Jarrige & le Roux, 2017); likewise, Sweden issued 1874 the Health Protection Act related to the location of industries (Swedish Environmental Protection Agency [EPA], 2017). In most countries, judges, based on the so-called Nuisance Act (Coase, 1960), handled environmental problems between neighbors and companies.

In the United States, environmental management started in 1870 in the forestry area (Petulla, 1983), associated with the Declaration of Yosemite as the first natural national park (Camacho & Cardoso, 2010). The first law related to the environment goes back to 1899: it tried to protect the navigability of polluted rivers, and it is recognized that, by the beginning of the 20th century, the regulations provided limited controls on pollution (Shifrin, 2005). In the European context, Sweden proclaimed 1903 the first forest law, and 1909 was the first nation to declare nine national nature parks under protection (EPA, 2017).

Coase (1960) stressed the possibility that the government, through "laws or perhaps more probably through an administrative body" (p. 100), intervene in the problems caused by polluting sources to solve the limitation of the economy in addressing the issue of environmental degradation (Naredo, 2015).

In this same sense, Carson's (2005) approaches caused an increased interest in the environmental

issue in the 1960s, especially in the use of pesticides (Pérez, 2005). However, it is broadly accepted that before this decade, the importance of the environment was relatively modest (Lippert, 2006; Vidal & Regaldo, 2022). Barrow (2002) indicates that it was widely known and factual that government agencies and industries hide and ignore environmental damage.

Lippert (2006) states that the origin of modern environmentalism, as well as that of private and public environmental management, emerged after 1970 when developed countries focused on academic and professional research processes (Edelman et al., 2017), where technology and legal norms merge to control pollutant loads (Shifrin, 2005); however, the techniques used to address environmental issues (corrective-reactive) were concretized in developing countries, without the necessary adaptation and flexibility for each context (Youssefi-Khalajabadi, 1994).

In the 1970s, developed countries directly addressed legal standards for environmental issues and the creation of corresponding authorities. Thus, Japan was the first in 1967 (Barrett & Therivel, 1991; Barrett, 1994); in 1969, Sweden (EPA, 2017) and the United States (Llewellyn & Peiser, 1973) issued their regulations and promoted others (Sorensen, 1998), in line with the general concern about environmental issues and quality of life in their societies (Theodore & Theodore, 2021).

At the same time, in 1968, the United Nations convened the Conference on the Human Environment, held in 1972 (Rojas, 2004); in it, the states acquired a leading role in the environmental exercise. From that moment on, the intention of multiple international organizations directly involved in the direction and action to address environmental issues is configured (D'Amico & Agoglia, 2019). It is recognized as a milestone for environmental management because the topic lacked sufficient importance within the states; its final declaration favored the enactment of legal norms on the environment and directly influenced political constitutions (Amaya, 2002). In contrast, Rojas (2004) indicates that in the act of creation of the European Union (EU), there is no mention of environmental issues.

By that time, state management was favored by establishing public institutions that controlled pollution, formulating environmental quality standards (Conesa, 2010), and implementing command and control mechanisms (Rodríguez-Becerra & Espinoza, 2002). Likewise, in the EU, the Intergovernmental Action Program on Environmental Issues has been in place since 1973 and has been applied since 1976 (Camacho & Cardoso, 2010), in which the states try to ensure that society and the production sectors comply with the parameters established within the permitted pollution. As Debord planned in 1971, this state exercise will create "new specializations, ministerial services, jobs, and bureaucratic promotions" (2006, p. 86).

The principle known as *the polluter pays* also emerged, which was promoted by the Organization for Economic Cooperation and Development (OECD) in 1972 (Valenzuela, 1991; Zapata, 1997) and was established internationally in the Rio Declaration on Environment and Development (United Nations, 1992). The aim is to promote the application of *prevention* in the economic and legal philosophy of environmental management; that is, instead of paying for pollution, this and the subsequent payment should be avoided (Valenzuela, 1991; Rojas, 2004; Rodríguez, 2022). However, prevention does not prevail since polluters have sufficient economic resources: paying for pollution is preferred to implementing measures to prevent it (Eschenhagen, 2010).

In the public and literary spheres, the historical evolution of environmental management can be appreciated in Figures 1 and 2, showing different events that have driven this exercise in modern society.

It is noteworthy that environmental problems have characterized humankind throughout its history. There is proof of inadequate conditions associated with forest clearing, overgrazing, and soil degradation by agriculture and mining in the Egyptian, Greek, Mesopotamian, and Roman civilizations (White Jr., 1967; du Pisani, 2006); likewise, documentary records of Western society's history (Lippert, 2006; Camacho & Cardoso, 2010; Vázquez et al., 2014). For example, wood was fundamental to

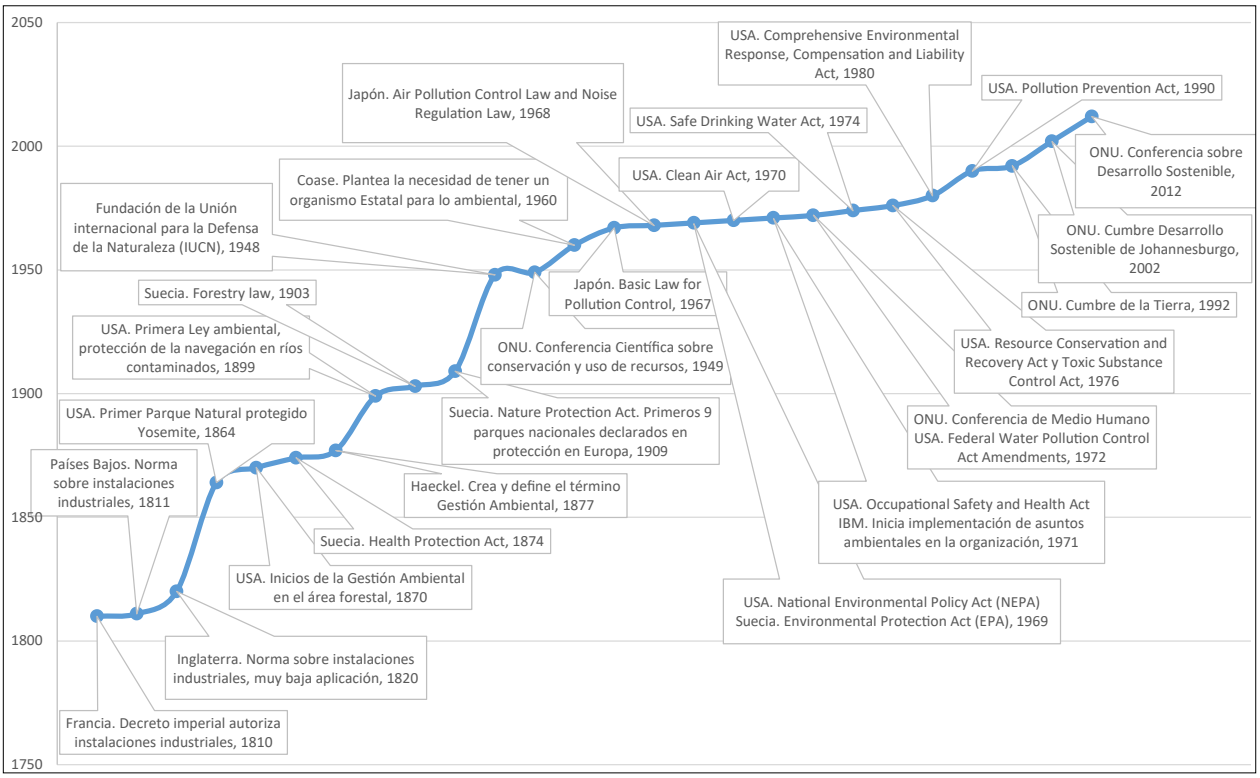

Figure 1. Historical analysis of environmental management.
Note. Sources: adapted from Petulla (1983), Barrett and Therivel (1991), Sorensen (1998), Shifrin (2005), Camacho and Cardoso (2010), Vázquez et al. (2014), Jarrige and le Roux (2017), EPA (2017).

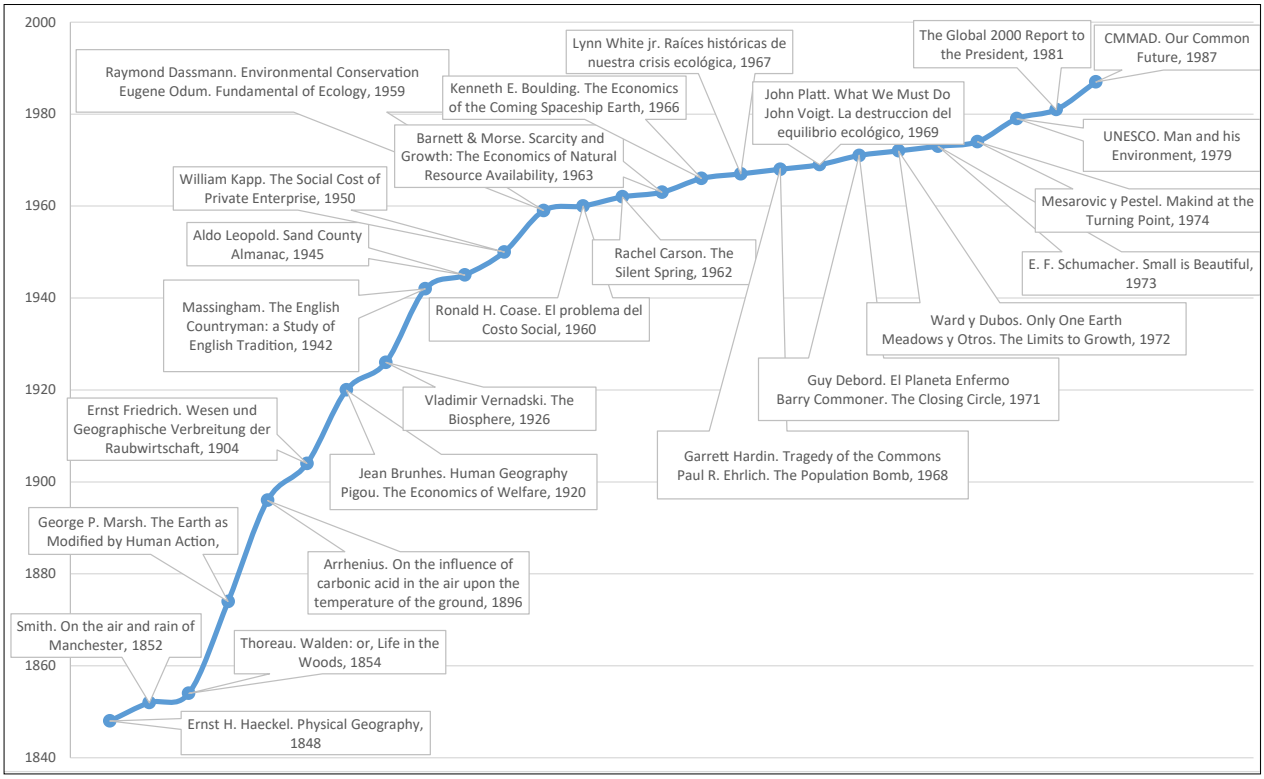

Figure 2. Analysis of environmental management publications.
Note. Sources: adapted from Boada (2004), Pérez (2005), Camacho and Cardoso (2010), Vázquez et al. (2014), and Naredo (2010).

society in the Middle Ages (du Pisani, 2006; Marquardt, 2006), but its relevance decreased when the use of coal came about, initially in China (960 and 1279) and later in England (13th century) (Steffen et al., 2007) and then with the use of hydrocarbons as part of the industrial revolutions (Jarrige & le Roux, 2017). As a result, these problems remain over time, although some have been improved (ozone layer and acid rain) (Federovisky, 2007; Rodríguez-Becerra, 2019), while others still prevail.

On the other hand, the scientific approach to environmental issues arose in the 18th century, prompted by classical thinkers in the context of the first industrial revolution (Lippert, 2006; Vázquez et al., 2014). This widely influenced environmental practice, where Western environmental science was considered the leading and only one in a globalized world in several fields (Youkana et al., 2021).

As a widespread problem, pollution dates back to the industrial revolutions (Jarrige & le Roux, 2017) —started in England— and spread to the Netherlands, United States, Canada, Russia, and Japan (Steffen et al., 2011). Particularly in industrialized societies, there is increased economic growth, resulting in environmental effects that compel the implementation of environmental management (Youssefi-Khalajabadi, 1994). The activity of man becomes a geological pressure force on nature, assisted by the pollutant loads since the first industrial revolution, determining that some authors call the present time the 'Anthropocene' (Crutzen & Stoermer, 2000), and leading the planetary system to an imminent risk of exceeding its limits (Steffen et al., 2015) by depicting a possible breakdown of the current society (Diamond, 2007).

Indeed, there is no single or universal definition of environmental management (Barrow, 2006; Nel & Kotzé, 2009), even though it is understood as a social process that, from a set of actions, aims to change a current situation for a desired one by understanding human interactions with environmental ones and identifying social, economic, physical and technological limits, from a rational inter- transdisciplinary objectivity to improve the ambient situation (Estevan 1994 cited in Vidal & Regaldo, 2022; Rodríguez-Becerra & Espinoza, 2002; Barrow, 2006; Rey-Galindo, 2020).

Jørgensen et al. state that the amassed experience in environmental management, with more than 40 years of application, proves the relevance of "not considering solutions to single problems, but considering all problems associated with an ecosystem... and evaluating all possible solutions proposed by the relevant disciplines" (2016, p. 1).

Edelman et al. (2017), reviewers of publications on environmental management written in Latin America during the last 50 years, identify several environmental themes (Table 1). To this analysis, it is necessary to add a paradigm shift in current management.

Table 1. Synthesis of environmental issues

Period	Name	Most prominent issues
1970-1979	Environmental compartmentalization	Rural development and the environment, ecological damage in rivers, deforestation.
1980-1989	Environmental implications of development	Population and the environment; inclusive the effects of all urban-based pollution on people.
1990-1992	Economic development and sustainability	Close connection of poverty with environmental degradation in cities and description of the steps towards sustainable development.
1993-1998	Sustainable development	Institutional and regulatory framework; determining the role of the private sector in urban environmental management and promotion of environmental management in the industry.
1999-2017	From policy to action	Implementation of relevant programs and procedures for sustainable local development without concrete results.
2017-present	Paradigm shift in environmental management	Questioning of the environmental approach and the required changes. Necessary discontinuation of the dominant hegemonic market discourse. Effective application of theoretical postulates on economic agents.

Note. Source: adapted from Edelman et al. (2017).

Petulla (1983 & 1987) is one of the first authors to tackle environmental management in industries and the role of the professionals in charge. By the seventies and eighties, some large companies advanced in the field (Porter & van der Linde, 1996; Epstein, 2000), and different models for the environmental behavior of organizations were conceived (Kolk & Mauser, 2002). In fact, in 1971, IBM was among the first to include environmental issues (Camacho & Cardoso, 2010). The business community has widely and extensively used the ISO 14 000 standard model; however, its application does not ensure proper environmental management (Parker, 2016). In addition, some companies misuse it for their production process due to the high deployment costs (Rey-Galindo, 2020).

Environmental paradigms

While *paradigm*, from the point of view of Kuhn (1971) and Lakatos (1983), identifies the epistemology of sciences, it equally recognizes experimental procedures as primordial and acceptable (Sokal & Bricmont, 1999); in the same sense, Ansoff (1987) remarks that a paradigm handles several hypotheses that allow building scientific theories, which may be initially contradictory, but complementary within the scientific "umbrella". This article focuses on the environmental paradigm as a manager of ideas that make it possible to overcome the constraints of disciplines and their specializations (Yelwa, 1997; Flechas & Lukomski, 2008).

In environmental management, seven paradigms have been defined regarding the interactions between the economy, society, nature, and the environment. Initially, five were established (Colby, 1991), complemented by two others formulated in the 21st century (March, 2013). The first, known as the *frontier economy*, prevailed until the 1970s and contemplated nature as an unlimited source of resources for raw materials and input supplier in productive processes and, at the same time, as an infinite recipient of polluting burdens. It is an excluding economy of the environment. This paradigm utilized the tall chimneys (Colby, 1991), which allow the dilution and dispersion of pollutants, together with clean-up and environmental education campaigns (Vega, 2001).

The second paradigm, *deep ecology*, focuses on the ecosystemic and natural above the economic and social. It demands a cultural transformation of society (Díaz-Rodríguez et al., 2019); in addition, it poses almost a return to preindustrial living conditions through undesirable measures, deemed unfeasible (Colby, 1991; Aktouf, 2001).

Another paradigm, *environmental protection*, supposes an economic externality (Colby, 1991). It is the prevailing one today based on the hegemonic economic model (Naredo, 2010, 2015 & 2018; Rodríguez-Becerra, 2019) and a linear cycle of energy, raw materials, and inputs (Boada, 2004; Ellen MacArthur Foundation, 2013). It is a flexible and moderated version of the previous paradigm (Penna & Cristeche, 2008). Its way of approaching environmental topics is called "end-of-pipe solutions", constituting a situation that undermines environmental quality since it shifts pollutant loads from one medium to another (van Hoof et al., 2008) and does not address the cause (Lindhqvist, 2000).

The next paradigm, *resource management*, proposes the possibility of integrating the classical market economy with natural capital with a view to the economization of ecology (Penna & Cristeche, 2008). State control is directed to the management and use of renewable natural resources with conservation and protection policies (Díaz-Rodríguez et al., 2019); protected areas are established along the lines of conservationism (Rodríguez-Becerra & Espinoza, 2002; Guhl Nanneti, 2015), and examples of this are the first declarations of the national parks Yosemite (in 1864) and Yellowstone (in 1872) in the United States.

The *ecodevelopment* paradigm involves the shift from linear economics to a bio-physical economic model, a thermodynamic economy based on energy flows within the framework of entropic debt (Rifkin, 2011). It tries to mimic ecosystemic processes by incorporating adaptability, resilience, and uncertainty in planning, economics, and social systems (Colby, 1991). Consequently, it currently presents different models, known as the 'social market economy' (Aktouf, 2001), 'economy with an eco-integrative approach' (Naredo, 2015 & 2018), and 'biodiversity economy' (Dasgupta, 2021). This paradigm is supported by the principles of precaution

and prevention (Zapata, 1997; Rojas, 2004), plus that of prudence (Díaz-Rodríguez, 2014).

March (2013) states that by the 21st century, two paradigms associated with the neoliberal model and environmental management emerge. One is called *ecological modernization* and indicates that environmental interventions must empathize with the economic model, approaching them from "the creation of new markets, new demands by citizens and innovation in production and industrial organization" (March, 2013, p. 146). The second is *market environmentalism*, which seeks to internalize environmental costs, acquire property rights as allocation mechanisms and establish public-private partnerships (March, 2013).

In summary, environmental concern has been around for a long time; in the beginning, it was addressed independently for each of the disciplines, and the aspects were considered isolated between them; later, paradigms associated with conservation and influenced by the economic development model emerged. Finally, it is crucial to note that the paradigm of *market environmentalism* (March, 2013) and that of *environmental protection* (Colby, 1991) mentioned above are considered current positions of what is happening in ambient management since they show a panorama of relationships following the complexity of the environment and contemporary times.

Current environmental management

Applied to the different paradigms formulated by Colby (1991) and March (2013), this one is adjusted to technical advances and scientific evolution and has focused on using technological solutions to environmental problems (Purser et al., 1995), which has allowed describing the approach as 'technoscience' (Hottois, 1984 cited in Estades, 2000), 'state technocentrism' (Bryant & Wilson, 1998), 'technocratic' (Cotgrove, 1982 cited in Miller, 1985; Pol, 2002; March, 2013), 'technocentrism' (O'Riordan, 1977 cited in Miller, 1985; Youssefi-Khalajabadi, 1994; Lippert, 2004 & 2006), 'technological determinism' (Miller, 1985), 'technolatry' (Riechmann, 2005 & 2008), 'technocratization' (Morin & Hulot, 2008), 'techno-politics' (Vila, 2014) or 'technoscientific' (Díaz-Rodríguez et al., 2019).

The authors refer to a model of thought where technical information plays a central role in decision-making and environmental planning by states (Miller, 1985). However, Hardin (1968) and Colby (1991) point out that the technology generated by society is supposed to solve environmental problems, but this situation is unclear. In Latin America and the Caribbean, environmental management lacks substantial support in the scientific model (Latchinian, 2016; Federovisky, 2018).

In this sense, Miller (1985) highlighted how the professional practice of environmental management has become specialized to the point of preventing a broader look at the problems; indeed, its conceptualization is expected to be disassociated exclusively from the technical and also to include social variables added to the economic ones. Precisely, that univocal disciplinary look leads to limited and biased environmental management (Holling, 1978; Jørgensen et al., 2016), making it necessary for the model to be approached in an inter-transdisciplinary manner.

There is consensus on the need for a convergence toward transdisciplinary research (Spano et al., 2020). For his part, Martínez-Miguélez (2012) recognizes that interdisciplinarity is insufficient to address environmental issues due to its limitation in each disciplinary situation. From environmental research, given the problems that must be addressed in a holistic and complex way, inter-transdisciplinarity is indicated as the most appropriate model (Ramírez-González, 2016).

It shows that a scientific model is required that overcomes the application of sciences in isolation (Morin & Hulot, 2008), where environmental management is based on transdisciplinarity (Pol et al., 2010) with different territorial scopes and the responsibility of the multiple actors involved —academic, scientific, political, eco-economic and citizens (Ramírez-González, 2016; Spano et al., 2020).

On the other hand, it has been identified that, through environmental management, considerable money and efforts have been invested in the symptoms of the problem but not in solutions to the causes (Barrow, 2006). Nor has the complexity of the whys and bottleheads been understood (Eschenhagen, 2021).

Thus, the postulates of the different international meetings (1992, 2002, & 2012) have not translated into environmental and social reality (Naredo, 2015; D'Amico & Agoglia, 2019). Indeed, Federovisky (2018) admits that the United Nations model for addressing environmental problems has not yielded the expected results; on the contrary, it has been perceived as a means of validating the deepening of the overall ambient crisis. The kind of management of environmental issues promulgated by the international order has been called 'hegemonic environmentalism' (D'Amico & Agoglia, 2019).

However, since the 1970s, environmental management has focused on state exercise by favoring command and control without incorporating all the environmental variables of the territory (Bryant & Wilson, 1998). However, these problems remain despite efforts, and different approaches remain without effective implementation (Rojas, 2004; Morin & Hulot, 2008; Camacho & Cardoso, 2010; Naredo, 2015; Rodriguez-Becerra, 2019; Dasgupta, 2021). Furthermore, it is stipulated that the environmental policies of the states have failed, given their orientation toward economic growth (Meadows et al., 2006; Valadéz & Landa, 2003; Eschenhagen, 2010; Naredo, 2015). Several publications in different geographical contexts attest to this, related to problems resulting from poor environmental management, such as ecosystem degradation, deforestation and loss of biodiversity, soil erosion and degradation, inadequate disposal of solid and hazardous waste, and air and water pollution (Bowonder, 1986; Tinas, 1987; Departamento Nacional de Planeación [DNP], 1995; Sánchez-Triana et al., 2007; Henry & Douhovnikoff, 2008; Federovisky, 2007 & 2012; Martinez-Alier et al., 2014; Chifari, 2016; Molina-Prieto et al., 2019; Rodriguez-Becerra, 2019; Agüero et al., 2020).

Likewise, in some Latin American and Caribbean countries, environmental management presents drawbacks related to inadequate planning originating in (a) little knowledge of environmental authorities; (b) limited economic, financial, technical, and human resources; (c) absence of concrete actions and measures to reduce environmental damage or prevent it, and (d) low effective community participation, among others (DNP, 1995; Sánchez-Triana et al., 2007; Guhl Nanneti, 2015; Edelman et al.,2017; Vega, 2017; Rodríguez-Becerra, 2020; Rodríguez, 2021; Lozano & Barbarán, 2021).

Conversely, to mitigate the effects of the covid-19, it was necessary to establish an economic, commercial, and social blockade to prevent the spread of the disease; such a situation evidenced an improvement in the environmental quality (Abu-Rayash & Dincer, 2020; Arora et al., 2020; Aydın et al., 2020; Bao & Zhang, 2020; Briz-Redón et al., 2021; Chen et al., 2020; Kalbusch et al., 2020; Norouzi et al., 2020; Paital, 2020; Sicard et al., 2020; Somani et al., 2020; Yunus et al., 2020; Ju et al., 2021; Liu et al., 2022). Therefore, the belief of an unnecessary restriction of the productive system to improve the environmental condition (Colby, 1991) is erroneous, given the scientific evidence that demonstrates the imperative to apply undesirable measures to the market (Aktouf, 2001) and generate tighter restrictions on the productive system and economic bodies (Naredo, 2010; Federovisky, 2018; Rodríguez-Becerra, 2019). In other words, intervening in the production, commercial, and financial capacity improves the environmental quality.

Therefore, in different governments, and the private sphere, environmental issues yield in importance, and economic situations are prioritized (Colby, 1991; Federovisky, 2007, 2012 & 2018; Steffen et al., 2007; Latchinian, 2016; Naredo, 2010 & 2015; Aktouf, 2001 & 2017; Vidal & Regaldo, 2022).

Now, the paradigms of *environmental protection* (Colby, 1991) and *market environmentalism* (March, 2013) are directly connected to the trend of ambiance management called *moderate environmentalism* (Sánchez-Torres & Aguilera, 2014) or *hegemonic environmentalism* (D'Armico & Agoglia, 2019). Structures that attempt, in one way or another, to make the economic development model compatible with the environment and nature.

These currents emerged in contexts of developed, industrialized countries with high economic capacity and sufficient income in their societies, which allowed them to meet their basic, axiological, and superfluous needs (Max-Neef et al., 1986) and "to worry about the long-term ecological consequences only after industrialization had given

them a high level of economic opulence" (Ward & Dubos, 1972, p. 23). Thus, the environmental approaches of developed countries focus on different interests concerning those of developing countries, with unfavorable results in this attempt at compatibility (Colby, 1991; Youssefi-Khalajabadi, 1994; Lomborg, 2003; Pol et al., 2010; Sánchez-Torres & Aguilera, 2014; Latchinian, 2016; Federovisky, 2018), especially, because of unmet social needs including poverty, malnutrition, low income, lack of opportunities in education and, in general, social inequalities and inadequate distribution of wealth (Stiglitz, 2012; Piketty, 2014; Youkana et al., 2021). Enzensberger (1996, cited by Lippert, 2006) states that environmental problems have followed poor societies, which are themselves victims of adverse effects (García, 2008; Federovisky, 2012). Moreover, rich countries behave as predators and poor ones as prey (Naredo, 2018).

Besides, it is worth recognizing that the neoliberal model (Aktouf, 2017; Eschenhagen, 2021) proposes a relationship with the environment through "privatization, co-marketization, corporatization, deregulation/regulation and commodification" (March, 2013, p. 142). Hence, it belongs to the political discourse contradicting decisions that disfavor nature (Federovisky, 2018); therefore, it is shown that, in essence, this does not matter to anyone or at least to the economic and political power to improve the environmental reality (Federovisky, 2007).

The fact that environmental decision-making is circumscribed to the political and that the political is permeated by the economic has repercussions on inadequate management by the state (Lezama, 2004; Eschenhagen, 2010; Edelman et al., 2017; Federovisky, 2018). So, the fundamental questioning, as outlined by several authors, is perhaps related to the economic model.

Differential environmental management

This typology intends to incorporate innovative tools and concepts, as Latchinian (2016) indicates, into new environmental management. In particular, by integrating more human issues coming from the social (Bryant & Wilson, 1998) and economic (Naredo, 2010 & 2015) sciences that have remained unnoticed, precisely because the management model focused on the technical and ended up being insufficient (Rivera, 2007). The manner of conducting environmental management requires differentiation, including the physical and territorial, in addition to the social, business, institutional, and economic valuation (Naredo, 2010).

Differential environmental management is an emerging and complex paradigm (Estades, 2000; Morin & Hulot, 2008) with a structure determined by critical environmentalism (D'Armico & Agoglia, 2019). It requires overcoming disciplinary barriers, specialization, and simplism and incorporating alternatives that allow a deep look at interferences, interdependencies, and interrelationships (Morin & Hulot, 2008; Eschenhagen, 2021) in the way of managing the environment to evolve in a harmonious relationship with beneficial exits to the current environmental dynamics. The objective is to avoid catastrophism becoming the norm in academic thinking (Naredo, 2010).

Therefore, it is conceived as a proposal that formulates alternatives to Western hegemonic thinking, such as those directed towards new forms of environmental education with traditional and local knowledge in early childhood (Melo, 2019) or in the university model (Eschenhagen, 2021; Youkana et al., 2021).

According to Rey-Galindo (2020), differential environmental management focuses on the following key factors: (a) the root/adjacent cause of environmental degradation; (b) intrinsic motivation; (c) incentives; (d) rewards and emotions; (e) stakeholders' interests at all levels, and (f) polycentrism for the environment.

In addition, this management model must also focus on the micro-territorial, with a conceptual transition from 'environmental problem' to 'environmental element'. It should also include, among others, the different tools and techniques of typical environmental management (Ibrahim, 2019; Rey-Galindo, 2020), which can be combined with extended producer responsibility (Lindhqvist, 2000) and the deposit/reimbursement system (Walls, 2011), among others. For example, currently, for waste management, the application of the seven 'r's (redesign, reduce, reuse, repair, renew, recover, and recycle) (Mercader-Moyano et al., 2022) for waste

management is being promoted (Mercader-Moyano et al., 2022). However, it would be more useful to establish a single 'r' as 'productive reincorporation' in the same processes that generate waste from consumption to reduce the burden of waste management by society or the state.

For developing the essential factors of the differential environmental management model, further research is needed to identify the mechanisms and strategies to advance toward a proposal for a real improvement in environmental quality.

Conclusions

Environmental management is based on the techno-scientific model in an attempt to solve environmental problems; the economic, social, and political sectors place great hope in this vision. However, after more than 50 years of environmental management, no progress has been made in practical and concrete solutions to the same hitches.

Similarly, the conclusion is that the genesis of today's environmental problems is related to the economy (Yelwa, 1997; Barrow, 2002; Leff, 2002; Lippert, 2004 & 2006; Boada, 2004; Morin & Hulot, 2008; Federovisky, 2007 & 2012; Kempf, 2010; March, 2013; Rodríguez-Becerra, 2019; Naredo, 2010 & 2015; Aktouf 2001 & 2017; D'Amico & Agoglia, 2019; Peniche, 2022). It has been established that the state has given way to the exercise of environmental management, leaving the productive sector responsible for such management; therefore, a model of private environmental management has materialized (Guhl Nanneti, 2015).

The evidence reflects that environmental management in the natural and productive business context has been widely implemented. However, the difficulties associated with consumption and its waste, both packaging and product shelf life, persist in most urban conglomerates. Therefore, "environmental management is undertaken based on unquestioned cultural and epistemological assumptions" (Lippert, 2006, p. 18).

Thus, current environmental management suffers from incongruities, contradictions, ambiguities, or inconsistencies between what is theoretically and politically formulated versus its execution or practical application in the real world (Cubillos, 2009; Federovisky, 2018). Moreover, the analysis of environmental problems and environmental management itself, as well as their possible interpretations and reflections, overflow the technical-scientific and philosophical scope and involve the necessary socioeconomic and political consideration (de Nicolás et al., 1994; Estades, 2000; Arrow et al., 2013; Naredo, 2010, 2015 & 2018).

Precisely, through the conceptual and philosophical approach, and the interpretation of environmental management, this article formulates the foundations for differential management as an emerging paradigm that proposes a new vision of the problems derived from the economic model by incorporating the management processes key factors additional to the environmental technique, which address more human and economic elements.

Authorship contributions: Nadenka Beatriz-Melo: methodological design, drafting, and approval of the manuscript. Rodrigo Rey-Galindo: literature review, methodological design, analysis, and text drafting.

Conflicts of interest: there is no conflict of interest.

References

Abu-Rayash, A., & Dincer, I. (2020). Analysis of the electricity demand trends amidst the covid-19 coronavirus pandemic. *Energy Research & Social Science*, *68*, 101682. https://doi.org/10.1016/j.erss.2020.101682

Agüero, H. L., Medina, I. G., & Romero, S. L. (2020). Una investigación sobre la gestión ambiental en ciudad de la Sierra Peruana. *Revista Varela*, *20*(57), 381-396. http://revistavarela.uclv.edu.cu/index.php/rv/article/view/9

Aktouf, O. (1998). La administración: Entre tradición y renovación. Artes Gráficas Univalle. https://idoc.pub/documents/20-aktouf-omar-la-administracion-entre-tradicion-y-renovacionpdf-546godvko9n8

Aktouf, O. (2001). *La estrategia del avestruz racional: Post-globalización, economía y organizaciones*. Universidad del Valle Facultad de Ciencias de la Administración.

Aktouf, O. (2017). *Basta de derroche: Acabar con la economía—management a la americana*. Universidad Nacional de Colombia Facultad de Ciencias Económicas.

Amaya, O. D. (2002). *La constitución ecológica de Colombia: Análisis comparativo con el sistema constitucional latinoamericano*. Universidad Externado de Colombia.

Ansoff, H. I. (1987). The emerging paradigm of strategic behavior. *Strategic Management Journal*, *8*(6), 501-515. https://doi.org/10.1002/smj.4250080602

Arora, S., Bhaukhandi, K. D., & Mishra, P. K. (2020). Coronavirus lockdown helped the environment to bounce back. *Science of The Total Environment*, *742*, 140573. https://doi.org/10.1016/j.scitotenv.2020.140573

Arrow, K. J., Ehrlich, P., & Levin, S. (2013). *Some perspectives on linked ecosystems and socio-economic systems*. SSRN. https://doi.org/10.2139/ssrn.2287329

Aydın, S., Nakiyingi, B. A., Esmen, C., Güneysu, S., & Ejjada, M. (2021). Environmental impact of coronavirus (covid-19) from Turkish perceptive. *Environment, Development and Sustainability*, *23*(5), 7573-7580. https://doi.org/10.1007/s10668-020-00933-5

Bao, R., & Zhang, A. (2020). Does lockdown reduce air pollution? Evidence from 44 cities in northern China. *Science of The Total Environment*, 731, 139052. https://doi.org/10.1016/j.scitotenv.2020.139052

Barrett, B. (1994). Integrated environmental management—Experience in Japan. *Journal of Environmental Management*, *40*(1), 17-32. https://doi.org/10.1006/jema.1994.1002

Barrett, B., & Therivel, R. (1991). *Environmental policy and impact assessment in Japan* (1st ed.). Routledge. https://doi.org/10.4324/9780429199165

Barrow, C. J. (2002). *Environmental management: Principles and practice*. Routledge. https://uomustansiriyah.edu.iq/media/lectures/5/5_2020_03_04!03_12_11_PM.pdf

Barrow, C. J. (2006). *Environmental management for sustainable development* (2nd ed.). Routledge.

Boada, A. (2004). *Las empresas y el medio ambiente: Un enfoque de sostenibilidad*. Universidad Externado de Colombia.

Bowonder, B. (1986). Environmental management problems in India. *Environmental Management*, *10*(5), 599-609. https://doi.org/10.1007/BF01866764

Briz-Redón, Á., Belenguer, C., & Serrano, Á. (2021). Changes in air pollution during covid-19 lockdown in Spain: A multi-city study. *Journal of Environmental Sciences*, *101*, 16-26. https://doi.org/10.1016/j.jes.2020.07.029

Bryant, R. L., & Wilson, G. A. (1998). Rethinking environmental management. *Progress in Human Geography*, *22*(3), 321-343. https://doi.org/10.1191/030913298672031592

Camacho, C., & Cardoso, P. P. (2010). Revisión del problema ambiental y su gestión. *Poliantea*, *6*(10). https://doi.org/10.15765/plnt.v6i10.224

Carrizosa, J. (2000). *¿Qué es ambientalismo? La visión ambiental compleja.* Programa de las Naciones Unidas para el Medio Ambiente (Pnuma), Universidad Nacional de Colombia - Instituto de Estudios Ambientales (IDEA) y Centro de Estudios de la Realidad Colombiana (Cerec). http://www.pnuma.org/educamb/documentos/PDF/PAL1.pdf

Carson, R. L. (2005). *Primavera silenciosa*. Crítica-Biblioteca de Bolsillo. https://www.academia.edu/28078616/Carson_Rachel_Primavera_Silenciosa

Castillo, A. Y., Suárez, J. H., & Mosquera, J. (2017). Naturaleza y sociedad: Relaciones y tendencias desde un enfoque eurocéntrico. *Luna Azul*, *44*, 348-371. https://doi.org/10.17151/luaz.2017.44.21

Chen, C., Zarazua de Rubens, G., Xu, X., & Li, J. (2020). Coronavirus comes home? Energy use, home energy management, and the social-psychological factors of covid-19. *Energy Research & Social Science*, *68*, 101688. https://doi.org/10.1016/j.erss.2020.101688

Chifari, R. (2016). *Integrated assessment of municipal solid waste metabolism: The case of the metropolitan area of Naples, Italy* [Doctoral dissertation, Universitat Autònoma de Barcelona]. https://core.ac.uk/download/pdf/132089045.pdf

Coase, R. H. (1960). The problem of social cost. *The Journal of Law and Economics*, *3,* 1-44. https://www.journals.uchicago.edu/doi/10.1086/466560

Colby, M. E. (1991). Environmental management in development: The evolution of paradigms. *Ecological Economics*, *3*(3), 193-213. https://doi.org/10.1016/0921-8009 91 90032-A

Conesa, V. (2010). *Guía metodológica para la evaluación de impacto ambiental* (4th ed.). Mundi-Prensa. http://www.paginaspersonales.unam.mx/app/webroot/files/1613/Asignaturas/1818/Archivo1.5036.pdf

Crutzen, P. J., & Stoermer, E. F. (2000). The "Anthropocene". *Global Change News Letter*, *41*, 17-18. http://www.igbp.net/download/18.316f18321323470177580001401/1376383088452/NL41.pdf

Cubillos, L. F. (2009). La gestión cultural ambiental frente al desafío de las problemáticas ambientales reales. In C. E. Gómez & U. Hernández (Eds.), *Diálogos entre saberes, ciencias e ideologías en torno a lo ambiental* (pp. 19-28). Universidad Tecnológica de Pereira Facultad de Ciencias Ambientales. http://media.utp.edu.co/centro-gestion-ambiental/archivos/dialogo-entre-saberes/dialogosdelsaber2.pdf

D´Amico, M. P., & Agoglia, O. (2019). La cuestión ambiental en disputa: El ambientalismo hegemónico y la corriente ambiental crítica. Lecturas desde y para América Latina. *Revista Colombiana de Sociología*, *42*(1), 97-116. https://doi.org/10.15446/rcs.v42n1.73247

Dale, V. H. (2003). Opportunities for using ecological models for resource management. In V. H. Dale (Ed.), *Ecological modeling for resource management* (pp. 3-19). Springer. https://doi.org/10.1007/0-387-21563-8_1

Dasgupta, P. (2021). *Final report - The economics of biodiversity: The Dasgupta review*. HM Treasury. https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

de Nicolás, J. P., Ferrer, F. J., & Cabrera, P. G. (1994). Gestión ambiental y cambio del paradigma científico. In B. Hernández, J. Martínez & E. Suárez (Eds.), *Psicología ambiental y responsabilidad ecológica* (pp. 112-127). Universidad de Las Palmas de Gran Canaria. https://pnicolas.webs.ull.es/articulos/gestamb.pdf

Debord, G. (2006). *El planeta enfermo*. Anagrama.

Departamento Nacional de Planeación y Unidad de Política Ambiental. (1995). Crisis ambiental en Colombia. *Planeación & Desarrollo*, *XXVI*(3), 125-150. https://colaboracion.dnp.gov.co/CDT/RevistaPD/1995/pd_vXXVI_n3_1995_art.4.pdf

Diamond, J. (2007). *Colapso: Por qué unas sociedades perduran y otras desaparecen*. Debolsillo. http://www.fis.puc.cl/~jalfaro/astrobiologia/apoyo/Colapso_Diamond.pdf

Díaz-Rodríguez, C. (2014). El principio de precaución: Un discurso bioético para la producción de energía eléctrica en la sociedad del riesgo. *Revista Colombiana de Bioética*, *9*(1), 126-150. https://programasbioetica.unbosque.edu.co/publicaciones/Revista/rev91/arti2_Carlosdiaz.pdf

Díaz-Rodríguez, C., Yate-Arévalo, A., & Sánchez-Buendía, E. E. (2019). The field of knowledge of the environmental management paradigm. *International Journal of Management Concepts and Philosophy*, *12*(3), 23. https://ideas.repec.org/a/ids/ijmcph/v12y2019i3p255-277.html

Dilthey, W. (2000). *Dos escritos sobre hermenéutica: El surgimiento de la hermenéutica y los Esbozos para una crítica de la razón histórica*. Istmo.

du Pisani, J. A. (2006). Sustainable development – historical roots of the concept. *Environmental Sciences*, *3*(2), 83-96. https://doi.org/10.1080/15693430600688831

Edelman, D. J., Schuster, M., & Said, J. (2017). Urban environmental management in Latin America, 1970-2017. *Current Urban Studies*, *5*(3), 305-331. https://doi.org/10.4236/cus.2017.53017

Ellen MacArthur Foundation. (2013). *Towards the circular economy: Economic and business rationale for an accelerated transition*. Ellen MacArthur Foundation. https://emf.thirdlight.com/link/x8ay372a3r11-k6775n/@/preview/1?o

Epstein, M. J. (2000). *El desempeño ambiental en la empresa: Prácticas para costear y administrar una estrategia de protección ambiental*. Ecoe.

Eschenhagen, M. L. (2010). Los límites de la retórica verde o ¿por qué después de más de 30 años de esfuerzos no se observan mejoras ambientales sustanciales? *Gestión y Ambiente*, *13*(1), 111-118. https://revistas.unal.edu.co/index.php/gestion/article/view/25388/25876

Eschenhagen, M. L. (2021). Adversidades y posibilidades de alternativas al desarrollo: Epistemologías otras y educación ambiental superior. *Gestión y Ambiente*, *24*(supl1), 83-106. https://doi.org/10.15446/ga.v24nsupl1.91240

Estades, N. P. (2000). Alternativas filosóficas, éticas y políticas frente a la crisis ambiental. *Mediações – Revista de Ciências Sociais*, *5*(2), 153-174. https://doi.org/10.5433/2176-6665.2000v5n2p153

Federovisky, S. (2007). *El medio ambiente no le importa a nadie. Bestialidades ecológicas en la Argentina: Del Riachuelo a las papeleras*. Planeta.

Federovisky, S. (2012). *Los mitos del medio ambiente: Mentiras, lugares comunes y falsas verdades*. Capital Intelectual.

Federovisky, S. (2018). *El nuevo hombre verde: Cómo el neoliberalismo nos hace responsables del desastre ecológico que provoca el sistema*. Capital Intelectual.

Flechas, E., & Lukomski, A. (2008). El paradigma emergente y su impacto en la investigación epistemológica de las ciencias sociales. *Hallazgos*, *5*(10), 133-145. https://doi.org/10.15332/s1794-3841.2008.0010.09

Flórez, C. G., & Mosquera, J. (2013). La relación ser humano-naturaleza frente a los derechos fundamentales en el territorio. *Alimentos Hoy*, 22(28), 79-96. https://alimentoshoy.acta.org.co/index.php/hoy/article/view/159/153

García, E. (2008). ¿Por qué andamos siempre de la greña con la naturaleza si nos pasamos la vida entera jurándole amor eterno? In J. Riechmann (Coord.), *¿En qué estamos fallando?: Cambio social para ecologizar el mundo* (pp. 25-50). Icaria. https://dialnet.unirioja.es/servlet/libro?codigo=344739

Gómez-Orea, D., & Gómez-Villarino, M. T. (2013). *Evaluación de impacto ambiental* (3rd ed.). Mundi-Prensa.

Grondin, J. (2014). *¿Qué es la hermenéutica?* Herder.

Guhl Nanneti, E. (2015). Evolución del Ministerio de Ambiente de Colombia en sus primeros veinte años: 1994-2014. In E. Guhl Nanneti & P. Leyva (Eds.*), La gestión ambiental en Colombia, 1994-2014: ¿Un esfuerzo insostenible?* (pp. 25-108). Friedrich Ebert Stiftung en Colombia Fescol y Foro Nacional Ambiental. https://library.fes.de/pdf-files/bueros/kolumbien/11555.pdf

Gutiérrez, A. L. (2005). Gestión ambiental: ¿Estrategia para el desarrollo sostenible? *Revista Trabajo Social*, (1), 85-109. https://revistas.udea.edu.co/index.php/revistraso/article/view/24257

Hardin, G. (1968). The tragedy of commons. *Science*, *162*(3859) 1243-1248. https://pages.mtu.edu/~asmayer/rural_sustain/governance/Hardin%201968.pdf

Henry, L. A., & Douhovnikoff, V. (2008). Environmental issues in Russia. *Annual Review of Environment and Resources*, *33*(1), 437-460. https://doi.org/10.1146/annurev.environ.33.051007.082437

Hernández-Sampieri, R., & Mendoza, C. P. (2018). *Metodología de la investigación: Las rutas cuantitativa, cualitativa y mixta*. Mc Graw-Hill. http://www.biblioteca.cij.gob.mx/Archivos/Materiales_de_consulta/Drogas_de_Abuso/Articulos/SampieriLasRutas.pdf

Holling, C. S. (Ed.). (1978). *Adaptive environmental assessment and management*. John Wiley & Sons. https://pure.iiasa.ac.at/id/eprint/823/1/XB-78-103.pdf

Huergo, J. (2003). *Los procesos de gestión*. Universidad Pedagógica. http://servicios.abc.gov.ar/lainstitucion/univpedagogica/especializaciones/seminario/materialesparadescargar/seminario4/huergo3.pdf

Ibrahim, A. M. (2019). An overview of the concept and practice of environmental management. *Dutse Journal of Pure and Applied Sciences* (*Dujopas*), *5*(1b), 48-61. https://fud.edu.ng/journals/dujopas/2019_JUNE_Vol_5_No_1b/48%20-%2061%2038%20edited-1.pdf

Jarrige, F., & le Roux, T. (2017). *La contamination du monde. Une histoire des pollutions à l'âge industriel*. Éditions du Seuil.

Jørgensen, S. E., Marques, J. C., & Nielsen, S. N. (2016). *Integrated environmental management: A transdisciplinary approach*. CRC Press.

Ju, M. J., Oh, J., & Choi, Y.-H. (2021). Changes in air pollution levels after covid-19 outbreak in Korea. *Science of The Total Environment*, *750*, 141521. https://doi.org/10.1016/j.scitotenv.2020.141521

Kaehler, B., & Grundei, J. (2019). *HR Governance*. Springer.

Kalbusch, A., Henning, E., Brikalski, M. P., De Luca, F. V., & Konrath, A., C. (2020). Impact of coronavirus (covid-19) spread-prevention actions on urban water consumption. *Resources, Conservation and Recycling*, *163*, 105098. https://doi.org/10.1016/j.resconrec.2020.105098

Kempf, H. (2010). *Para salvar el planeta*. Capital Intelectual.

Kolk, A., & Mauser, A. (2002). The evolution of environmental management: From stage models to performance evaluation. *Business Strategy and the Environment*, *11*(1), 14-31. https://doi.org/10.1002/bse.316

Kuhn, T. S. (1971). *La estructura de las revoluciones científicas*. Fondo de Cultura Económica. https://www.fondodeculturaeconomica.com/Ficha/9786071608253/F

Lakatos, I. (1983). *La metodología de los programas de investigación científica*. Alianza Editorial. https://epistemologiaufro.files.wordpress.com/2010/10/lakatos.pdf

Latchinian, A. (2016*). El ambientalista crítico: Gestión ambiental, ecologismo y desarrollo en América Latina*. Ediciones Puntocero.

Leff, E. (2002). *Saber ambiental. Sustentabilidad, racionalidad, complejidad, poder* (2nd ed.). Siglo XXI.

Leff, E. (2007). La complejidad ambiental. *Polis Revista Latinoamericana*, (16), 7 p. https://dialnet.unirioja.es/servlet/articulo?codigo=2359294

Lertzman, K. (2009). The paradigm of management, management systems, and resource stewardship. *Journal of Ethnobiology*, *29*(2), 339-358. https://doi.org/10.2993/0278-0771-29.2.339

Lezama, J. L. (2004). *La construcción social y política del medio ambiente*. El Colegio de México.

Lindhqvist, T. (2000). *Extended producer responsibility in cleaner production: Policy principle to promote environmental improvements of product systems* [Doctoral dissertation; IIIEE, Lund University]. https://portal.research.lu.se/en/publications/extended-producer-responsibility-in-cleaner-production-policy-pri

Lippert, I. (2004). *An introduction to the criticism on sustainable development*. Brandenburg University of Technology Cottbus-Senftenberg. https://doi.org/10.13140/RG.2.1.1421.6805

Lippert, I. (2005). *Map-Making for ERM studies* [Bachelor Thesis, Brandenburg University of Technology]. https://opus4.kobv.de/opus4-btu/frontdoor/index/index/year/2008/docId/415

Lippert, I., Jackson,H., Trujillo, A., & Spencer, M. (2006). *How can red-green politics learn from pre-1960s environmental management history? Western reflection on the human role in the environmental crisis*. Lancaster University. https://www.academia.edu/1064089/How_Can_Red_green_Politics_Learn_from_Pre_1960s_Environmental_Management_History_Western_Reflection_on_the_Human_Role_in_the_Environmental_Crisis

Liu, Z., Deng, Z., Zhu, B., Ciais, P., Davis, S. J., Tan, J., Andrew, R. M., Boucher, O., Arous, S. B., Canadell, J. G., Dou, X., Friedlingstein, P., Gentine, P., Guo, R., Hong, C., Jackson, R. B., Kammen, D. M., Ke, P., le Quéré, C., … Schellnhuber, H. J. (2022). Global patterns of daily CO_2 emissions reductions in the first year of covid-19. *Nature Geoscience*, *15*(8), 615-620. https://doi.org/10.1038/s41561-022-00965-8

Llewellyn, L. G., & Peiser, C. (1973). *NEPA and the environmental movement: A brief history*. National Bureau of Standards. https://doi.org/10.6028/NBS.IR.73-218

Lomborg, B. (2003). *El ecologista escéptico*. Espasa

Lozano, P., & Barbarán, H. (2021). La gestión ambiental en los gobiernos locales en América Latina. *Ciencia Latina Revista Multidisciplinar*, *5*(1), 212-228. https://doi.org/10.37811/cl_rcm.v5i1.221

March, H. (2013). Neoliberalismo y medio ambiente: Una aproximación desde la geografía crítica. *Documents d'Anàlisi Geogràfica*, *59*(1), 137-153. https://doi.org/10.5565/rev/dag.17

Marquardt, B. (2006). Historia de la sostenibilidad. Un concepto medioambiental en la historia de Europa central (1000-2006). *Historia Crítica*, *1*(32), 172-197. https://doi.org/10.7440/histcrit32.2006.07

Martínez-Alier, J., Temper, L., & Demaria, F. (2014). Social metabolism and environmental conflicts in India. *Indi@logs - Spanish Journal of India Studies*, *1*(1), 51-83. https://ddd.uab.cat/pub/indialogs/indialogs_a2014v1/indialogs_a2014v1p51.pdf

Martínez-Miguélez, M. (2011). Paradigmas emergentes y ciencias de la complejidad. *Opción*, *27*(65), 45-80. https://www.redalyc.org/pdf/310/31021901003.pdf

Martínez-Miguélez, M. (2012). *Nuevos fundamentos en la investigación científica*. Trillas.

Max-Neef, M., Elizalde, A., & Hopenhayn, M. (1986). *Desarrollo a escala humana: Una opción para el futuro*. Centro de Alternativas de Desarrollo (Cepaur). http://habitat.aq.upm.es/deh/adeh.pdf

Meadows, D., Randers, J., & Meadows, D. (2006). *Los límites del crecimiento: 30 años después*. Galaxia Gutenberg.

Melo, N. B. (2019). Enseñanza a partir de saberes tradicionales de las comunidades de la etnia wayuu. *Educación y Educadores*, *22*(2), 237-255. https://doi.org/10.5294/edu.2019.22.2.4

Mercader-Moyano, P., López-López, J., & Camporeale, P. E. (2022). An environmental construction and demolition waste management model to trigger post-pandemic economic recovery towards a circular economy: The Mexican and Spanish cases. In S. S. Muthu (Ed.), *Environmental footprints of recycled products* (pp. 83-135). Springer. https://doi.org/10.1007/978-981-16-8426-5_4

Miller, A. (1985). Technological thinking: Its impact on environmental management. *Environmental Management*, *9*(3), 179-190. https://doi.org/10.1007/BF01867074

Molina-Prieto, L. F., Suárez-Serrano, M., & Villa-Camacho, M. E. (2019). Bucle multidisciplinar para la sustentabilidad urbana. *Revista de Arquitectura*, *21*(2), 76-88. https://doi.org/10.14718/RevArq.2019.21.2.2048

Morin, E. (1994). *Introducción al pensamiento complejo*. Gedisa. https://norberto2016.files.wordpress.com/2016/10/morinedgar_introduccion-al-pensamiento-complejo_parte1.pdf

Morin, E., & Hulot, N. (2008). *El año I de la era ecológica: La Tierra que depende del hombre que depende de la Tierra*. Ediciones Paidós Ibérica. https://filosofialiceo2019.files.wordpress.com/2020/04/el-ac3b1o-i-de-la-era-ecolc3b3gica.pdf

Naciones Unidas. (1992). *Declaración de Río sobre el Medio Ambiente y el Desarrollo*. https://www.un.org/spanish/esa/sustdev/documents/declaracionrio.htm

Naredo, J. M. (2010). *Raíces económicas del deterioro ecológico y social: Más allá de los dogmas* (2nd ed.). Siglo XXI.

Naredo, J. M. (2015). *La economía en evolución: Historia y perspectivas de las categorías básicas del pensamiento económico* (4th ed.). Siglo XXI.

Naredo, J. M. (2018). La ideología económica en la historia y el medio ambiente. Claves para un cambio de paradigma. In J. Riechmann, A. Matarán & Ó. Carpintero (Eds.), *Para evitar la barbarie: Trayectorias de transición ecosocial y de colapso* (pp. 17-56). Universidad de Granada.

Nel, J. G., & Kotzé, L. J. (2009). Environmental management: An introduction. In H. Strydom & N. King (Eds.), *Environmental management in South Africa* (pp. 1-33) (2nd ed.). Juta. https://www.academia.edu/23076024/Environmental_management_An_introduction_by_Nel_JG_and_Kotze_LJ_in_Strydom_H_and_King_N_eds_Environmental_management_in_South_Africa_2ed_1_33

Norouzi, N., Zarazua de Rubens, G., Choupanpiesheh, S., & Enevoldsen, P. (2020). When pandemics impact economies and climate change: Exploring the impacts of covid-19 on oil and electricity demand in China. *Energy Research & Social Science*, *68*, 101654. https://doi.org/10.1016/j.erss.2020.101654

Paital, B. (2020). Nurture to nature via covid-19, a self-regenerating environmental strategy of environment in global context. *Science of the Total Environment*, *729*, 139088. https://doi.org/10.1016/j.scitotenv.2020.139088

Parker, T. (2016). *The meaning of environmental management: An interpretive study of managing emergent or evolutionary environmental and energy strategy* [Doctoral dissertation; IIIEE, Lund University]. https://portal.research.lu.se/en/publications/the-meaning-of-environmental-management-an-interpretive-study-of-

Peniche, S. (2022). Hermenéutica de la sustentabilidad. Contribución crítica a la teoría económica desde la perspectiva de la economía ecológica. *Economía UNAM*, *19*(55), 131-142. https://doi.org/10.22201/fe.24488143e.2022.55.698

Penna, J. A., & Cristeche, E. (2008). *La valoración de servicios ambientales: Diferentes paradigmas*. INTA.

Pérez, C. (2005). La identidad científica del desarrollo sostenible: Determinando un nivel de resolución para las ciencias ambientales. *Contextos*, (45-48), 51-129. file:///Users/imac/Desktop/Dialnet-LaIdentidadCientificaDelDesarrolloSostenible-4218076.pdf

Petulla, J. M. (1983). Environmental management: Defining the profession. *Environment: Science and Policy for Sustainable Development*, *25*(8), 2-5. https://doi.org/10.1080/00139157.1983.9928780

Petulla, J. M. (1987). Environmental management in industry. *Journal of Professional Issues in Engineering*, *113*(2), 167-183. https://doi.org/10.1061/(ASCE)1052-3928(1987)113:2(167)

Piketty, T. (2014). *El capital en el siglo XXI*. Fondo de Cultura Económica.

Pinilla, C. I., & Aguado, J. (2012). *La investigación en gestión ambiental*. Fundación Universitaria del Área Andina. https://digitk.areandina.edu.co/handle/areandina/513

Pink, D. H. (2010). *La sorprendente verdad sobre qué nos motiva*. Gestión.

Pol, E. (2002). Environmental management: A perspective from environmental psychology. In R. B. Bechtel & A. Churchman (Eds.), *Handbook of environmental psychology* (pp. 55-84). Jhon Wiley & Sons.

Pol, E., Moreno, E., & Castrechini, A. (2010). Gestión ambiental como gestión de comportamientos. In J. I. Aragonés & M. A. Cuervo (Eds.), *Psicología ambiental* / (3rd ed.). Ediciones Pirámide.

Porter, M. E., & van der Linde, C. (1996). Verdes y competitivos: Acabar con la disyuntiva. In M. E. Porter (Ed.), *Ser competitivo: Nuevas aportaciones y conclusiones* (pp. 351-375). Deusto.

Purser, R. E., Park, C., & Montuori, A. (1995). Limits to anthropocentrism: Toward and ecocentric organization paradigm? *Academy of Management Review*, *20*(4), 1053-1089.

Ramírez-González, A. (2016). Inter- y transdisciplinariedad en investigaciones ambientales. Una sinopsis. *Gestión y Ambiente*, *19*(2), 318-331. https://doi.org/10.15446/ga.v19n2.57291

Rey-Galindo, R. (2020). Gerencia ambiental y herramientas de pensamiento holístico ambiental. *Salud y Administración*, *7*(21), 39-57. https://revista.unsis.edu.mx/index.php/saludyadmon/article/view/195

Ricœur, P. (2003). *El conflicto de las interpretaciones: Ensayos de hermenéutica*. Fondo de Cultura Económica.

Ricœur, P. (2004). *Tiempo y narración. Tomo I - Configuración del tiempo en el relato histórico* (5th ed.). Siglo XXI.

Riechmann, J. (2005). *Un mundo vulnerable: Ensayos sobre ecología, ética y tecnociencia* (2nd ed.). Los Libros de la Catarata.

Riechmann, J. (2008). Hemos de aprender a vivir de otra manera. In J. Riechmann (Coord.), *¿En qué estamos fallando?: Cambio social para ecologizar el mundo* (pp. 5-24). Icaria.

Rifkin, J. (2011). *La Tercera Revolución Industrial. Cómo el poder lateral está transformando la energía, la economía y el mundo*. Paidós.

Rivera, J. A. (2007). Algunas reflexiones sobre el análisis territorial y la administración del medio ambiente en Colombia. *Revista Luna Azul*, (25), 86-102. https://www.redalyc.org/articulo.oa?id=321727227007

Rodríguez-Becerra, M. (2019). *Nuestro planeta, nuestro futuro*. Penguin Random House.

Rodríguez-Becerra, M. (2020). *Los límites impuestos por la naturaleza y el desarrollo*. Friedrich Ebert Stiftung. http://library.fes.de/pdf-files/bueros/mexiko/17038.pdf

Rodríguez-Becerra, M., & Espinoza, G. (2002). *Gestión ambiental en América Latina y el Caribe. Evolución, tendencias y principales prácticas*. Banco Interamericano de Desarrollo. http://documentacion.ideam.gov.co/openbiblio/bvirtual/019857/GestionambientalenA.L.yelC/GestionAmb..pdf

Rodríguez-Gómez, G., Gil, J., & García, E. (1999). *Metodología de la investigación cualitativa* (2nd ed.). Ediciones Aljibe. https://www.researchgate.net/publication/44376485_Metodologia_de_la_investigacion_cualitativa_Gregorio_Rodriguez_Gomez_Javier_Gil_Flores_Eduardo_Garcia_Jimenez

Rodríguez, G. A. (2021). *Yo participo, tú participas, otros deciden: La participación ambiental en Colombia*. Friedrich Ebert Stiftung Fescol y Foro Nacional Ambiental. https://library.fes.de/pdf-files/bueros/kolumbien/17450.pdf

Rodríguez, G. A. (2022). *Fundamentos del derecho ambiental colombiano*. Friedrich Ebert Stiftung Fescol y Foro Nacional Ambiental. https://foronacionalambiental.org.co/wp-content/uploads/2022/05/FUNDAMENTOSDERECHOAMBIENTALCOLOMBIANO.pdf

Rojas, C. M. (2004). *Evolución de las características y de los principios del derecho internacional ambiental y su aplicación en Colombia*. Universidad Externado de Colombia.

Roth, R. E. (1969). Fundamental concepts for environmental management education (K-16). *Environmental Education*, *1*(2), 65-74. https://doi.org/10.1080/00139254.1969.10801495

Sanabria, M. (2007). De los conceptos de administración, gobierno, gerencia, gestión y *management*: Algunos elementos de corte epistemológico y aportes para una mayor comprensión. *Universidad y Empresa*, *9*(13), 155-194. https://revistas.urosario.edu.co/index.php/empresa/article/view/1040

Sánchez-Torres, D. M., & Aguilera, M. (2014). Corrientes del ambientalismo y alternativas de gestión desde la sustentabilidad y la ética ambiental. *Semestre Económico*, *17*(35), 149-160. https://doi.org/10.22395/seec.v17n35a6

Sánchez-Triana, E., Ahmed, K., & Awe, Y. (Eds.). (2007). *Prioridades ambientales para la reducción de la pobreza en Colombia: Un análisis ambiental del país para Colombia*. The World Bank. https://doi.org/10.1596/978-9-5883-0710-7

Shifrin, N. S. (2005). Pollution management in the twentieth century. *Journal of Environmental Engineering*, *131*(5), 676-691. https://doi.org/10.1061/(ASCE)0733-9372(2005)131:5(676)

Sicard, P., de Marco, A., Agathokleous, E., Feng, Z., Xu, X., Paoletti, E., Diégues, J. J. D., & Calatayud, V. (2020). Amplified ozone pollution in cities during the covid-19 lockdown. *Science of the Total Environment*, *735*, 139542.

Sokal, A., & Bricmont, J. (1999). *Imposturas intelectuales*. Paidós. https://proletarios.org/books/Sokal_y_Bricmont-Imposturas_Intelectuales.pdf

Somani, M., Srivastava, A. N., Gummadivalli, S. K., & Sharma, A. (2020). Indirect implications of covid-19 towards sustainable environment: An investigation

in Indian context. *Bioresource Technology Reports*, *11*, 100491. https://doi.org/10.1016/j.biteb.2020.100491

Sorensen, D. L. (1998). Regulations. In R. R. Dupont, T. E. Baxter, & L. Theodore (Eds.), *Environmental management: Problems and solutions* (chapter 1). Taylor & Francis-CRC Press.

Spano, G., Giannico, V., Elia, M., Bosco, A., Lafortezza, R., & Sanesi, G. (2020). Human health-environment interaction science: An emerging research paradigm. *Science of the Total Environment*, *704*, 135358. https://doi.org/10.1016/j.scitotenv.2019.135358

Steffen, W., Crutzen, P. J., & McNeill, J. R. (2007). The Anthropocene: Are humans now overwhelming the great forces of nature? *Ambio: A Journal of the Human Environment*, *36*(8), 614-621. https://doi.org/10.1579/0044-7447(2007)36[614:TAAHNO]2.0.CO;2

Steffen, W., Grinevald, J., Crutzen, P., & McNeill, J. (2011). The Anthropocene: Conceptual and historical perspectives. *Philosophical Transactions of the Royal Society A. Mathematical, Physical and Engineering Sciences*, *369*(1938), 842-867. https://doi.org/10.1098/rsta.2010.0327

Steffen, W., Richardson, K., Rockstrom, J., Cornell, S. E., Fetzer, I., Bennett, E. M., Biggs, R., Carpenter, S. R., de Vries, W., de Wit, C. A., Folke, C., Gerten, D., Heinke, J., Mace, G. M., Persson, L. M., Ramanathan, V., Reyers, B., & Sorlin, S., (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, *347*(6223), 1259855. https://doi.org/10.1126/science.1259855

Stiglitz, J. E. (2012). *El precio de la desigualdad: El 1 % de la población tiene lo que el 99 % necesita* (Ebook). Taurus.

Swedish Environmental Protection Agency. (2017). *Swedish Environmental Law: An introduction to the Swedish legal system for environmental protection* (N°. 6790; p. 36). https://www.naturvardsverket.se/om-oss/publikationer/6700/swedish-environmental-law/

Theodore, M. K., & Theodore, L. (2021). *Introduction to environmental management* (2nd ed.). Taylor & Francis-CRC Press.

Tinas, J. (1987). La gestión ambiental del "ecosistema urbano". *Ábaco, Ecología y Medio Ambiente*, (3), 12-18.

Valadéz, A., & Landa, P. (2003). Política y gestión ambiental. Características y lineamientos generales. *Psicología y Ciencia Social*, *5*(2), 54-61. https://www.redalyc.org/pdf/314/31405205.pdf

Valenzuela, R. (1991). El que contamina, paga. *Revista de la Cepal*, (45), 77-88. https://repositorio.cepal.org/bitstream/handle/11362/11833/045077088_es.pdf?sequence=1&isAllowed=y

van Hoof, B., Monroy, N., & Saer, A. (2008). *Producción más limpia: Paradigma de gestión ambiental*. Universidad de Los Andes-Alfaomega.

Vasilachis de Gialdino, I. (Coord.) (2006). *Estrategias* de investigación cualitativa. Gedisa.

Vázquez, G. A., Lucho, C., Coronel, C., & Beltrán, I. (2014). Esbozo histórico de las ciencias ambientales: I. De Hipócrates a primavera silenciosa. *PÄDI Boletín Científico de Ciencias Básicas e Ingenierías del ICBI*, *2*(3). https://doi.org/10.29057/icbi.v2i3.528

Vega, L. (2001). *Gestión ambiental sistémica: Un nuevo enfoque funcional y organizacional para el fortalecimiento de la gestión ambiental pública, empresarial y ciudadana en el ámbito estatal*. [Doctoral dissertation, University of la Laguna].

Vega, L. (2017*). La dimensión ambiental del desarrollo*. Ecoe.

Vidal, E., & Regaldo, L. (Eds.). (2022). *Gestión ambiental: Introducción a sus instrumentos y fundamentos*. Ediciones UNL. https://bibliotecavirtual.unl.edu.ar:8443/bitstream/handle/11185/6604/Gestion_Ambiental_Vidal_Regaldo_WEB.pdf?sequence=1

Vila, E. (2014). *El oxímoron de la ´planificación científica`. Falacias, críticas y propuestas para salir de esa trampa*. Vadell Hermanos Editores.

von Bertalanffy, L. (1976). *Teoría general de los sistemas: Fundamentos, desarrollo, aplicaciones*. Fondo de Cultura Económica. https://cienciasyparadigmas.files.wordpress.com/2012/06/teoria-general-de-los-sistemas-_-fundamentos-desarrollo-aplicacionesludwig-von-bertalanffy.pdf

Walls, M. (2011). *Deposit-Refund systems in practice and theory*. Resources for the Future. https://media.rff.org/documents/RFF-DP-11-47.pdf

Ward, B., & Dubos, R. (1972). *Una sola Tierra: El cuidado y conservación de un pequeño planeta*. Fondo de Cultura Económica.

White Jr., L. (1967). The historical roots of our ecologic crisis. *Science*, *155*(3767), 1203-1207.

Yelwa, D. L. (1997). *An unhealthy neighbourhood at an inauspicious hour: Environmental Management during the "ecocrisis"* [Master's thesis, York University]. https://www.academia.edu/28244193/An_unhealthy_neighbourhood_at_an_inauspicious_hour_microform_environmental_management_during_the_Ecocrisis_

Youkana, E., Rojas-Robles, R., Avilés-Irahola, D., Mora-Motta, A., & Santander-Durán, J. (2021). Pensamiento ambiental, críticas al desarrollo y propuestas en construcción para la cooperación Sur-Sur-Norte. *Gestión y Ambiente*, 24(supl1), 11-38. https://doi.org/10.15446/ga.v24nsupl1.92944

Youssefi-Khalajabadi, D. (1994). *The implications of public participation in environmental management and development* [Doctoral dissertation, University of Salford]. https://core.ac.uk/download/pdf/1664548.pdf

Yunus, A. P., Masago, Y., & Hijioka, Y. (2020). Covid-19 and surface water quality: Improved lake water quality during the lockdown. *Science of The Total Environment*, *731*, 139012. https://doi.org/10.1016/j.scitotenv.2020.139012

Zapata, J. V. (1997). *Desarrollo sostenible. Marco para la ley internacional sobre el medio ambiente: Legislación y lineamientos internacionales*. Ediciones Librería del Profesional.