

Original article



Theoretical approach to economic-financial instruments and mechanisms for the environmental management of bays



Aproximación teórica de instrumentos y mecanismos económico-financieros para la gestión ambiental de bahías

Abordagem teórica dos instrumentos e mecanismos econômico-financeiros para a gestão ambiental de baías

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Received: 24/02/2022

Accepted: 7/04/2022

ABSTRACT

In view of the deterioration of the environment, mainly in coastal areas, caused mainly by the excessive actions of economic agents, a critical and descriptive vision is needed on the part of researchers. Within this framework, the environmental issue is present in the National Economic and Social Development Plan until 2030, which calls for economic mechanisms that have a positive impact on the environment. In line with this claim, the priority of creating an economic-financial mechanism for the environmental management of bays is recognized. Consequently, the objective of this paper was to socialize the theoretical references associated with the economic instruments of environmental policy, as well as the economic-financial mechanisms for the environmental management of bays. Theoretical and empirical methods were used for the documentary review and systematization of knowledge. Among the main results, the key role of environmental management

was noted, highlighting the importance of establishing the theoretical references associated with economic-financial instruments and mechanisms, their components and structure and contributing to the integration of the economic dimension in environmental management and policy; as well as the use in Cuba of the economic instruments of environmental policy and the influence it has had at present at the national and international level, which allowed providing more effective solutions to the problems of the environment and its preservation.

Keywords: economic-financial mechanism; economic instrument; environmental policy; environmental management of bays.

RESUMEN

Ante el deterioro del medio ambiente, principalmente en zonas costeras, originado fundamentalmente por la acción desmedida de agentes económicos, se precisa de una visión crítica y descriptiva por parte de los investigadores. En este marco, el tema ambiental está presente dentro del Plan Nacional de Desarrollo Económico y Social hasta el 2030, en el que se apuesta por mecanismos económicos que impacten positivamente en el medio ambiente. Alineado a este reclamo, se reconoce la prioridad de crear un mecanismo económico-financiero para la gestión ambiental de bahías. En consecuencia, el objetivo del presente trabajo consistió en socializar los referentes teóricos asociados a los instrumentos económicos de la política ambiental, así como de los mecanismos económico-financieros para la gestión ambiental de bahías. Se utilizaron métodos teóricos y empíricos para la revisión documental y la sistematización de conocimientos. Entre los principales resultados se constató el papel clave de la gestión ambiental, destacando para su consecución la importancia de establecer los referentes teóricos asociados a instrumentos y mecanismos económico-financieros, sus componentes y estructura y contribuir a la integración de la dimensión económica en la gestión y política ambiental; así también el uso en Cuba de los instrumentos económicos de política ambiental y la influencia que ha tenido en la actualidad a nivel nacional e internacional, lo que permitió brindar soluciones más efectivas a los problemas del ambiente y su preservación.

Palabras clave: mecanismo económico-financiero; instrumento económico; política ambiental; gestión ambiental de bahías.

RESUMO

Em vista da deterioração do meio ambiente, principalmente nas áreas costeiras, causada principalmente pela ação excessiva dos agentes econômicos, é necessária uma visão crítica e descritiva por parte dos pesquisadores. Dentro desta estrutura, a questão ambiental está presente no Plano Nacional de Desenvolvimento Econômico e Social até 2030, que exige mecanismos econômicos que tenham um impacto positivo sobre o meio ambiente. De acordo com esta afirmação, é reconhecida a prioridade da criação de um mecanismo econômico-financeiro para a gestão ambiental das baías. Consequentemente, o objetivo deste trabalho foi socializar as referências teóricas associadas aos instrumentos econômicos da política ambiental, bem como os mecanismos econômico-financeiros para a gestão ambiental das baías. Métodos teóricos e empíricos foram utilizados para revisar documentos e sistematizar conhecimentos. Entre os principais resultados, foi confirmado o papel fundamental da gestão ambiental, destacando a importância de estabelecer as referências teóricas associadas aos instrumentos e mecanismos econômico-financeiros, seus componentes e estrutura, e contribuir para a integração da dimensão econômica na gestão e política ambiental; bem como o uso em Cuba de instrumentos econômicos de política ambiental e a influência que eles tiveram em nível nacional e internacional, o que permitiu soluções mais eficazes para os problemas ambientais e sua preservação.

Palavras-chave: mecanismo econômico-financeiro; instrumento econômico; política ambiental; gestão ambiental de baías.

INTRODUCTION

At present, the environmental issue is identified with the most important concerns of mankind. In this context, in Cuba, a developing country with urgent economic and social needs to solve, the balance with the environment is subject to strong sectoral pressures; that is why in recent years special attention has been paid to the design and implementation of environmental strategies and

the promotion of development practices more responsible with the environment and society, in all its integrality (Rodríguez García & Peña Fuentes, 2019).

Economic science also faces the search for solutions to environmental problems based on multidisciplinary, with the purpose of protecting and conserving the services offered by ecosystems. To address the root causes of the environmental problem, it is necessary to adopt measures in the decision-making process that integrate the costs and benefits of altering the environment. This can be achieved by different means, such as the establishment of regulations, the conviction and participation of all stakeholders (entities, government, Ministry of Science Technology and Environment, and population in general), or through the economic instruments of environmental policy that can contribute to minimize or repair the effects caused by man (Báez Quiñones, 2018).

In Cuba, the Ministry of Science Technology and Environment (Citma in Spanish) governs the National Biodiversity Strategy from 2016 to 2020, which establishes within its directive principles the development and application of environmental economics with the objective of applying economic instruments and social incentives for decision making (Citma, 2016).

Economic instruments have a bearing on the costs and benefits attributable to alternative courses of action faced by agents, which affect the profitability of alternative processes or technologies, or the relative price of a product and, consequently, the decisions of producers and consumers (Cepal, 2015).

Through economic instruments such as tariffs, prices, levies, taxes, subsidies and funds, private economic agents internalize the social costs of their actions when making decisions as consumers, producers of goods and service providers. In recent years, a growing interest in employing fiscal instruments for environmental protection that fundamentally force polluters to pay is noticeable around the world (García López, 2018).

Hence, the option of employing economic instruments that contribute to minimizing environmental impacts, confronting climate change and especially protecting and conserving ecosystems, plays an important role, since it provides the possibility of creating financial economic mechanisms to support environmental management models in vulnerable environments. In this sense, bays represent a challenge in their comprehensive management, due to the growing increase of pollution in them (García López, 2018).

The most general legal support for the use of economic instruments in Cuba is provided by Law 81 of the Environment of 1997, which legally supports the policy outlined in the National Environmental Strategy of the same year and develops the general legal framework for its application. This law includes in the articles of Chapter IX Economic Regulation the aforementioned legal basis for the policy outlined. The purpose of Law 113/2012 on the Tax System is to establish the taxes, principles, norms and general procedures on which the Tax System of the Republic of Cuba is based.

The implementation of economic instruments that contribute to the management of coastal areas has gained great importance over the years, since their pollution is due to a greater extent to those institutions that interact directly with them. Despite the fact that Cuba is located in an area of intense maritime traffic, which entails a high environmental risk, it is considered that there are no serious general marine pollution problems (Bordt & Saner, 2019).

Bays are usually of great economic and strategic importance for any country, as they are very favorable locations for the construction of ports; they also have great social and cultural value, hence the need to care for and protect them.

For this reason, the present research is based on the theoretical approach of financial economic mechanisms that benefit the development of environmental management of bays, since, despite the existence of theoretical-methodological antecedents, there is no general consensus among the authors that defines these mechanisms and instruments for the management of ecosystem services, the use in Cuba of economic instruments of environmental policy and the influence it has had at present at the national and international level.

This study was carried out with the objective of socializing theoretical references associated with economic-financial instruments and mechanisms, their components and structure; simultaneously, it lays the foundations for integrating the economic dimension into environmental management and policy, which will provide more effective solutions to environmental problems and their preservation, by facilitating the corresponding information to assume tasks in a participatory manner, while contributing to the financing of sustainable environmental management of bays.

MATERIALS AND METHODS

In order to obtain the results of this research, different methods of the theoretical and empirical level were used, based on a dialectical-materialistic approach, which allowed the analysis of the bibliography cited on the subject and the synthesis of the aspects consulted, to determine the main contradictions and links between the components of the object of study, channeling the research to the search for new regularities.

Induction and deduction are two fundamental theoretical methods for the research, since they achieve the justification of the importance of the implementation of economic instruments in management.

Among the methods of the theoretical level, the historical-logical method was applied in the research, which made possible the analysis of the theoretical references associated with the economic-financial mechanisms for the environmental management of bays, allowing to reveal their essence, definitions, categories, classification for the management of ecosystem services, their advantages and disadvantages, as well as the use in Cuba of the economic instruments of environmental policy and the influence it has had at the present time at national and international level and the background of environmental management, its evolution and definition.

As for the empirical methods used in the research, the bibliographic review stands out, where documents, reports, books that explicitly cover the topics addressed by the research were examined, through which the evolution and definition of environmental management, the economic instruments for such management, their influence at present, as well as the environmental taxes in Cuba and the legal aspects on the tax payment; in addition, the need for the use of economic instruments in environmental management could be verified.

RESULTS AND DISCUSSION

Analysis of economic instruments for environmental management policy

Since the sixties of the last century, the need to raise awareness about the use of natural resources to ensure sustainable development, understood as that which allows man to develop his potential

and his biophysical and cultural heritage and, ensuring its permanence in time and space, began to be disseminated in the world (Gámez Adame *et al.*, 2017).

The protection of the environment constitutes a challenge for humanity, which entails a firm commitment of society, governments and organizations to carry out actions for its protection, which substantiates the need for environmental management within all organizations (Gámez Adame *et al.*, 2017).

According to Law 81 of the Environment, environmental management is defined as the conduct, direction, control and administration of the use of natural resources in the various existing ecosystems, through the conservation, improvement, rehabilitation and monitoring of the environment and the control of human activity in this sphere.

Environmental management is a process aimed at solving, mitigating and/or preventing environmental problems in order to achieve sustainable development; it is to reconcile human activities and the environment through instruments that stimulate and make this task feasible, which presupposes the modification of human behavior in relation to nature, due to the current situation of its degradation (Huerta & García, 2009).

This is preceded, therefore, by a decision-making process, based on the various planning scenarios in which a set of activities, mechanisms and actions are carried out to save raw materials and materials, and minimize waste and pollution, while seeking to achieve an adequate balance for economic development, improvement of the quality of life of the population, rational use of resources and environmental conservation (Toledano Cordero, 2017).

Environmental management, in a general sense, is defined as the integrated administration of the environment with criteria of rationality, to achieve the well-being and harmonious development of human beings, in such a way that the quality of life is improved and the availability of resources is maintained, without depleting or deteriorating renewable resources or dilapidating non-renewable ones, for the benefit of present and future generations (Rodríguez García & Peña Fuentes, 2019).

It also deals with the actions and instruments used to ensure the control and rational administration of natural resources, materialized in the development of regulations, standards, institutional provisions, legal regulations, among others, which objective is the improvement and conservation of

the environment, in correspondence with internal and external, cultural, social and political factors (Gámez Adame *et al.*, 2017).

The systematization of the above concepts allows to identify as common elements: the notion of action, the state character and the specific purpose in terms of environmental protection; to a lesser extent, reference is made to citizen participation and the multidisciplinary nature of the actions to be carried out.

Environmental management aims to balance human action and environmental protection. It seeks the modulation of human action in relation to environmental components to avoid or mitigate the negative effects of the development of the species (Toledano Cordero, 2017).

The fundamental objective of environmental management is related to contributing to sustainability in development, protection of resources and environmental quality, as well as avoiding environmental degradation, improving the quality of life (Rodríguez García & Peña Fuentes, 2019).

Natural systems make fundamental contributions to the existence and quality of life, which have no possible substitutes such as: the provision of water, food, the existence of biogeochemical cycles, gas exchange, climate regulation; without these ecosystemic services no form of life is possible and, therefore, neither is the functioning of any productive system, which is why it is necessary to introduce the use of economic instruments to achieve good environmental management, as well as the categories that define them.

According to the Organization for Economic Cooperation and Development (García López, 2018), the following categories of economic instruments have been mainly identified.

Charges or taxes: are charges to be paid on the amount and/or quality of pollutant discharges to the environment, through which a given emission reduction can be achieved in a cost-effective manner; the rationale is that a cost-minimizing source will reduce its emissions in response to the tax, to the extent that the marginal cost of reducing them equals the tax.

Subsidies: they become an alternative to solve pollution problems, forcing the producer to consider the cost of its activities.

Deposit and reimbursement systems: a surcharge is established on the prices of products with polluting potential, which is destined to a deposit fund. When pollution is avoided, the deposit is refunded.

Market creation: refers to the creation of markets where producers can buy or sell emission allowances or the residues from their processes. A distinction is made between: tradable emission permits; intervention in the market, granting subsidies; and legal liability schemes.

Financial incentives for enforcement: this is considered more of a legal instrument, as it involves the implementation of fines for non-compliance. Two enforcement mechanisms are proposed: non-compliance fees and performance bonuses, as reimbursable payments based on the expectation of compliance.

Traditionally, environmental regulation has concentrated on command and control type instruments. These are characterized by being instruments that leave little flexibility to the emitting source. In general, they establish emission standards for all emitting sources, either uniformly or in a differentiated manner, and the source must comply with the standard. In contrast, economic instruments or market instruments aim to modify the behavior of emitting agents by altering the incentives (relative prices) they face, without the need to establish a specific emission level for each polluting source.

The Organization for Economic Co-operation and Development (OCDE in Spanish) in 2017 defined some basic conditions for a public policy instrument to qualify as an economic instrument: they are "instruments that affect the estimates of costs and benefits of initiatives open to economic agents. Their effect is to influence the decision-making and behavior of these agents in such a way that the alternatives that are chosen lead to a more environmentally desirable situation than would occur in the absence of the instrument. Economic instruments, in contrast to direct regulation, give freedom to economic agents to respond to a certain stimulus in a way that they themselves think is most beneficial" (OCDE, 2017).

The great advantage of economic instruments is that they make it very clear who controls pollution, who conserves and who pays (either for polluting or for conserving). Their disadvantages have also been pointed out, among which are their effects on national and foreign competitiveness, distributive effects, the implementation of proposals, and the political cost of economic instruments.

Economic instruments are a tool that mainly seeks to incentivize, compensate, benefit, support or induce a change in the agents involved by charging or assigning an economic value represented in the form of a fee, price or cost.

They use prices as market signals to incentivize or disincentivize environmental behavior, e.g., environmental taxes.

Likewise, there are economic instruments of a mandatory nature, for example, taxes, and others of a voluntary nature, such as some environmental funds that arise from the private sector (García López, 2018).

Among the instruments with greater use are environmental taxes, which attempt to increase the costs of environmentally harmful activities, including pollution, and, therefore, incentivize actors to reduce these activities (Barragán Muñoz & de Andrés García, 2020). So the implementation of this economic instrument is done in order to influence a specific behavior, making a product more expensive, but at the same time, with the intention of obtaining income (Mouso Batista *et al.*, 2019).

In both industrialized and developing countries, economic instruments have been applied primarily in response to specific situations, usually driven by a mix of ecological and economic considerations. Attempts to approach policy along economic lines were motivated, from the outset, by the implementation problems inherent in regulatory and control approaches, as well as by the static nature and high costs of a decontamination-oriented environmental policy.

In summary, it can be said that the fundamental characteristic of economic instruments is that they allow the consumer to choose between degrading the environment, paying a price for it, or not doing so, and receiving the corresponding economic reward. There are a number of economic instruments and a variety of classifications of them. Therefore, in the context of the research, the classification given by García López (2018) is assumed, which refers to them as:

- Tax instruments: tax levies and fiscal aids
- Financial instruments: funds, trusts, bonds, goodwill deposits, insurance covering environmental damages, soft loans and other types of public aid (non-fiscal).
- Market-based instruments: deposit-refund systems and certification of negotiable issues

The economic instruments essentially seek to prevent and control pollution so that it does not occur and environmental externalities are not generated (García López, 2018).

Economic-financial mechanisms for the management of ecosystem services

The concept of financial mechanisms is broad and includes financial tools of diverse nature. In general, financial mechanisms can be defined as the ways in which a provider makes financial resources available to organizations that need them, which can have very different implications in terms of capital recovery, expected returns, property rights, among others (Kilonzi & Ota, 2019).

Capital can be raised through two categories of financing sources: internal sources and external sources. The former consist of capital derived from equity in the enterprise; from its social base (loans or donations from its members); from surpluses or assets; or from internal private financial instruments (e.g., mini-bonds). The latter can take many more forms, such as concessions. And external sources can come from angel investors (individuals or entities with experience in the sector that are interested in promoting entrepreneurship), venture capitalists (specialized in seed capital, i.e., in the financing and promotion of projects or companies that are starting to operate, or that have already had a small development and are in the first round of financing) or crowdsourcing platforms (refers to a massive collaboration provided by individuals who are not part of an entity) (Fracica Naranjo, 2009).

Several countries have developed different financial mechanisms for ecosystem conservation.

The most commonly used financial mechanisms are payments for environmental services and conservation incentives. In any case, such mechanisms should be designed from the beginning with the intention of evaluating their effectiveness, to know more clearly how it is working, when and to what extent these investments are really helping conservation (Puerta Fernández *et al.*, 2018).

However, financial mechanisms do not act on their own, but are developed through economic instruments, which serve as a bridge to channel funds from financing sources, hoping that the application of these instruments in environmental management can induce a change in the behavior of economic agents, internalizing the external costs derived from the overexploitation of natural resources and environmental deterioration.

In Cuba, environmental incentive mechanisms are also well developed, especially in the forestry and agricultural sectors, including the National Fund for the Environment, the National Fund for Forestry Development and the National Program for Soil Conservation and Improvement.

The bibliography consulted shows how different authors define or use the term economic instruments or financial mechanism indistinctly, but in the development of the research the difference between both concepts is evident. However, after an analysis of the authors cited in previous paragraphs, in the context of the research, the financial mechanism is assumed to be the set of interconnected elements that ensure a flow of money, of public origin, for the conservation and sustainable management of ecosystems, in such a way that their multifunctionality is appreciated and recognized.

These innovative mechanisms promote the participation and investments of a range of stakeholders, the use of sustainable practices and nature conservation, and often complement international development aid and local funding sources (Pascual & Corbera, 2011).

Mechanisms of this type have been used for the implementation of public policies around the world. For example, there is the Clean Development Mechanism, which comprises greenhouse gas emission mitigation projects that can be financed by developed countries within developing countries, created to help achieve the goals of the United Nations Framework Convention on Climate Change. There is also the Montreal Protocol, which has succeeded in reducing impacts on the ozone layer at a very reasonable cost. Other mechanisms used in Latin America and the Caribbean are National Climate Change Funds and National Carbon Markets (INECC, 2018).

The countries of the region, in some way, have had experiences with the use of economic and financial mechanisms for environmental management, at different scales and with different modalities. Most of them solve a local issue, in general, and have been part of development projects. Successful experiences are considered to be those that achieve two things at the same time: a financial objective (generating funds for environmental management) and an economic objective (a change in consumer behavior) (Báez Quiñones, 2018).

It is necessary to devote time to understanding the design of an instrument or mechanism and the consequences of their respective impacts at the initial stage of mechanism creation or instrument adoption. On the other hand, it is useful to have the same staff during the design and implementation

stage of the mechanisms and instruments to ensure that the policies actually lead to the achievement of the original objectives.

Cuba's use of economic instruments of environmental policy

In Cuba, the application of economic instruments has not been a linear, stable and successful process in all cases, because most of the instruments applied lack a timely evaluation of their effectiveness; others have been developed, in part, in relation to the initial goals and some have never been applied (Vázquez Díaz, 2011). One of the factors that conditioned the use and application of different instruments of economic regulation in Cuba was associated with the conditions of the Cuban economy, to which had to be added the international scenario. The other aspect that largely conditioned this process was the lack of experience in the economic evaluation of environmental impacts and the scarce experience in the application in the country of economic valuation techniques in this field.

Cuba has a well-defined environmental policy, which is ratified in the National Plan for Economic and Social Development until 2030, created in 2021, which states: Cuba is home to natural resources that provide significant potential for the well-being of society and sustainable economic and social development (No. 158). However, centuries of indiscriminate exploitation generated significant negative impacts on the Cuban environment and the state of natural resources, which strategic axis is: Natural Resources and Environment and Specific Objective No. 3 consisting of: protect and sustainably use the goods and services of ecosystems and the natural and cultural heritage of the country (MEP, 2021).

In 2012, the United Nations Development Program, in response to the agreements of the Convention on Biological Diversity, initiated the promotion of a global collaborative alliance to promote the conservation and management of biodiversity; through a new approach and an innovative methodology, it encourages inter-institutionality and implements actions that derive from national priorities, whose objective is to enable the identification of the financial gap of Biodiversity, mobilizing resources from various sources and financial mechanisms to develop a comprehensive strategy, thus emerging the Biodiversity Finance Initiative, being its acronym BIOFIN.

Cuba is accepted and becomes a member of BIOFIN on February 10, 2017, being No. 30 worldwide and No. 10 in Latin America and the Caribbean. This is a technical assistance project that serves to

prepare for the fulfillment of national goals related to biodiversity and sustainable development (BIOFIN, 2017).

The application of economic instruments in the search for solutions to environmental problems has gained momentum and relevance since the 1990's. This is especially true after the signing of the Kyoto Protocol as an alternative to reduce pollution levels and promote more efficient use of resources by inducing changes in the population's behavior (Cepal, 2015).

Based on the sources cited, it was found that Latin American countries face the growing challenge of designing economic instruments (Table 1) that can be effective and efficient in achieving the environmental goals set.

Table 1 - Main economic instruments used in environmental policy

Economic Instruments of Environmental Policy	Features	Year established	Applicable entity
System of Natural Areas Protected by the State for the Conservation of Biodiversity (SINANPE in Spanish)	Its objective is to contribute to the sustainable development of the country, through the conservation of a representative sample of biological diversity, articulating and strengthening the group of protected natural areas of Peru, through the effective management of protected natural areas, guaranteeing the contribution of their environmental, social and economic benefits to society.	Established by Supreme Decree 010/90-AG of March 24, 1990 and is comprised of Peru's network of protected natural areas.	National Service of Natural Areas Protected by the State (SERNANP in Spanish), Government of Peru.

<p>Environmental Impact Assessment (EIA) (prevention and control instruments)</p>	<p>It is a procedure by which the significant effects that a certain plan, program or project may have on the environment are studied prior to its approval or authorization by the competent body.</p>	<p>Between the 1990s and the first decade of the present century. Period marked by the rise of environmental issues worldwide.</p>	<p>Governments of Argentina, Spain, Ecuador, Mexico, Peru, Uruguay and Chile in their Environmental Impact Assessment System (SEIA in Spanish).</p>
<p>Environmental Adequacy Program (PAMA in Spanish)</p>	<p>It is a document that contains the commitments of specific actions to be carried out by a company in order to address environmental impacts identified as a result of its activities.</p>	<p>2006</p>	<p>National Service of Natural Areas Protected by the State (SERNANP), Government of Peru.</p>
<p>Territorial Environmental Assessment (EVAT in Spanish)</p>	<p>It is the technical and administrative procedure by which all aspects related to the protection of the environment in relation to the territories are taken into consideration in the decision-making process.</p>	<p>-</p>	<p>National Service of Natural Areas Protected by the State (SERNANP), Government of Peru. Environmental Impact Assessment System (SEIA).</p>
<p>Fines for non-compliance with environmental regulations</p>	<p>There are many federal entities whose function is to take corrective measures for damage caused to the environment and have the right to impose economic sanctions on individuals and companies</p>	<p>As of 1995</p>	<p>Mexico, Public Prosecutor's Office for the Protection of the Environment of the State of Mexico (PROPAEM in Spanish).</p>

	that fail to comply with environmental regulations.		Spain, art. 149.1. 23rd and art. 148.1. 9th European Conformity. Colombia's National Environmental Licensing Authority (ANLA in Spanish) is responsible for setting fines for environmental damage. National Service of Natural Areas Protected by the State (SERNANP), Government of Peru.
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Source: prepared by the authors based on the bibliography consulted.

However, the effective application of these instruments in developing countries has so far been relatively scarce. Practice shows that when instruments or taxes are applied at random, without due justification and without real possibilities of control, they lose credibility and over time can create distortions that do not help the purpose of their implementation.

Environmental taxes in Cuba

Among the economic instruments that Cuba has implemented, environmental taxes stand out as prevention alternatives to pollution actions or tending to it as one of the essential problems detected of environmental affectation (Rodríguez García & Peña Fuentes, 2019).

Environmental taxes have been susceptible of important analysis, since they are a relatively new trend to solve environmental problems. They are based on principles that emanate from two disciplines that together provide theory and practice: Environmental and Tax Law.

Environmental taxes facilitate revenues for environmental purposes, i.e., the proceeds from these taxes can be used to finance investments in environmental infrastructure (Carralero Alisvech, 2015).

True environmental taxes must generate incentives that result in the achievement of the directly pursued purpose (environmental protection).

The general design of the system of economic instruments for environmental protection in the Cuban context is essentially based on the international principle proclaimed in the Rio Declaration, such as the polluter pays. They reflect in their essence the planned character of the Cuban economy and the non-hyperbolization of market mechanisms in general and in environmental economic management.

From the legal point of view, the implementation of economic instruments offers the possibility of broadening the range of responses to environmental protection, and not exclusively for the sanctioning aspect of the law, but also towards the stimulation of good practices in an important part of the spheres of production and services.

Legal aspects of tax payments in Cuba

The legal and more general support for the use of economic instruments in the country is provided by Environmental Law No. 81 of 1997. The instruments with the most experience in the country are: the environmental investment plan; the funds that finance activities in this area (National Environmental Fund, Forestry Development Fund, Science and Technological Innovation Fund); taxes; royalties and fees for mining operations; tariff bonuses for the importation of environmentally friendly technologies; the use of soft credits for the environment, among others.

In recent years, the standard for the accounting recording of environmental expenses has been incorporated, with a view to assessing the impact of climate change and the results of the Task Life, it is Specific Accounting Standard No. 11 "Environmental Accounting" (NEC No. 11), which aims to establish the accounting treatment of operations related to the effective protection of the environment, provided that they can be identified separately from the rest of the activities carried out by the entity, in order to support the supplementary information. This standard is applicable to all entities located in the national territory in the recognition, valuation and reporting of operations carried out with the objective of protecting the environment, provided that the assets, liabilities, income and expenses can be identified in a differentiated manner (Raymond *et al.*, 2014).

With the approval of the Tax Law (Law 113 of 2012), the bases for environmental taxes were adopted, which includes the extension of the current Havana Bay tax to other bays, the tax for discharges in watersheds that tax bays and the beach tax. During the last few years, work has been done on the gradual implementation of these taxes, requiring an analysis of the mechanism adopted and the benefits of their implementation.

The Havana Bay is studied as a precedent, since it is a beginner in the application of this tax which, as of this year 2021, will begin to be applied in the Matanzas Bay and the Cienfuegos Bay. The tax is understood as the use and exploitation of the bay, the use of the coastline and the basification; it will be applied to persons or entities, Cuban or foreign, that use or exploit the bays for economic, tourist, recreational or other purposes. Another tax that is currently in place is the tax for the approved discharge of waste in watersheds, which is used in a differentiated manner depending on the type of discharge and type of waste and also according to the classification of the watershed.

Currently, following the implementation of the Monetary Regulation process, which provides for monetary and exchange rate unification, the Council of State of the Republic of Cuba has adopted modifications in its environmental and tax provisions, as shown in the following table:

Table 2 - Changes in Cuba's tax laws

Existing Law	Substitute law (new)	Who makes it	Modified articles
Law 113 of the Tax System (July 2012)	Decree Law No. 21 (January 1st, 2021)	Council of State of the Republic of Cuba	Annexes 2, 4, 5 and 6 of this law. Annex 5, which relates to the tax base and tax rates for the tax on the use and operation of the bays, referred to in Article 261

Source: Own elaboration based on the Official Gazette of the Republic of Cuba

Environmental management of bays and its implementation by the Cuban state

Coastal zones are the habitat of a significant number of marine species, the most vulnerable in their life cycle, which for years have been negatively impacted by industrial, agricultural, transportation,

fishing and tourism uses. Since the second half of the twentieth century, the inhabitants of the planet became aware of the affectations caused to coastal ecosystems, largely because these problems had a negative, rapid and direct impact on the well-being of the human species (Decree Law 212/2000).

Due to sea level rise, projected for the 21st century and beyond, coastal systems and low-lying areas will increasingly experience adverse impacts, such as permanent occupation by the sea, flooding and coastal erosion (Iturralde Vinent 2017; Citma 2017; Reyes Pupo, 2018 cited in Mouso Batista *et al.*, 2019).

The growing concern about this situation motivated the search for alternatives to make development compatible with the maintenance of the processes that support coastal ecosystems, hence the emergence of Integrated Coastal Zone Management, one of the most important approaches to consider in order to implement actions aimed at the sustainable development of coastal areas.

There have been carried out studies that sustain programs of Integrated Management of Coastal Zones, as a tool of the Environmental Management, among them: Environmental Diagnosis for Tourism Development in the Bahía de Vita-Bahía de Samá sector of Holguín province (2003), which addresses the methodological basis of Landscape Ecology, the integrated geoecological diagnosis; and the establishment of guidelines for an integrated management proposal for the coastal zone comprised between Bahía de Vita and Punta Cayuelo (2004), both described in Mouso Batista *et al.* (2019).

The coastal zone and its watersheds interact functionally through hydrological flows of freshwater, sediments and dissolved substances, forming a coastal fluvial-marine continuum. These systems are under strong environmental pressure associated with anthropogenic inducers, such as urbanization, industrialization and agricultural production. The clearing of domestic and industrial waste, soil erosion, water resource projects and habitat conversion lead to alterations in the balance of nutrients and organic matter in coastal waters, changes in the structure of biotic communities and changes in ecosystem dynamics.

There are many effects resulting from anthropogenic pressures, such as: loss of integrity of coastal systems and their resilience, increase of aquatic pathologies; in addition to the compromise of the potential for the generation of services provided by ecosystems, such as the loss of fishing and recreational potential. The high ecological and socioeconomic value of coastal zones and watersheds

is still threatened by climate change and the consequent rise in ocean levels and intensification of storms.

The coastal zone is an essential part of the exorheic basins and its sustainability depends, in part, on the management actions taken at the basin level. In this context, the continuous provision of environmental goods and services provided by the coastal zone and the health of coastal subsystems demand the adoption of integrative strategies in spatial, temporal, intersectoral, political, institutional and interdisciplinary terms.

Another point widely linked to integrated watershed and coastal zone management refers to nature conservation, a cross-cutting issue for the effective planning of conservation units and which depends, in part, on the connectivity of a network of conservation units that incorporates terrestrial and marine units, so as to ensure the natural balance of hydrological flows and biological species.

Interactions are evaluated in terms of connectivity between conservation units and sources and sinks of materials and species responsible for the efficiency of the conservation units.

In the case of Cuba, bay management is associated with the strategic program of integrated coastal management, since it provides the necessary information and knowledge so that the main actors of the bay, coastal communities and hydro-regulatory strips can participate in the decisions that affect them. The territory is assured of the minimum requirements in the organizational, functional, technical and methodological areas, but to achieve this there must be the composition and functioning of the management authority; the integrality of the zone that encompasses the bay, the port, its watersheds and its coastal interaction zone, based on the dimensions: government, community, science and management, which transversely encompass the following sectors: Business (to which we must now add the non-state sector of the economy), Institutional and Community.

As a result of the bibliographic review, it can be concluded that the use of economic instruments greatly favors environmental management since, by taking advantage of the economic interests of polluters, the costs of preventing environmental burdens are reduced and the sustainable use of natural resources is promoted.

In turn, the financing mechanism is a process that should not only result in the flow of financial resources for the needs of the area, but should also improve the construction of alliances with the actors directly and indirectly involved in its management.

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Conflict of interest:

Authors declare not to have any conflict of interest.

Authors' contribution:

Yenisleidys Monzón Aldama designed the study, analyzed the data, prepared the draft, was involved in the collection, analysis and interpretation of the data.

Sheila Pérez Díaz was involved in the collection, analysis and interpretation of the data.

Mercedes Marrero Marrero y Maritza Petersson Roldán carried out the critical revision of the article with important contributions to its intellectual content and approved the final version to be published.

All authors reviewed the writing of the manuscript and approve the version finally submitted.



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