

## Characterization of public policy management for the payment for forest ecosystem services

### Caracterización de la gestión de políticas públicas para el pago por servicios ecosistémicos forestales

### Caracterização da gestão de políticas públicas para o pagamento de serviços do ecossistema florestal



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#### ABSTRACT

Governments are currently facing the challenge of designing and managing public policies that harmoniously integrate economic, social and environmental issues to ensure sustainability in development. Given that there is a lack of use of the existing potential in the ecosystem services and the way they are managed from the public administration, the objective was set to characterize the state of the management of the payment for forest ecosystem services in the municipality of Pinar del Río. This was done based on an analysis of the primary and secondary sources of information. As theoretical methods, the historical and logical and the systemic were used, and as empirical methods, the measurement and the expert method. Associated with the theoretical and practical methods, the following procedures were used: analysis, synthesis and abstraction. The following techniques were used to collect, process and analyze information: survey, interview and document analysis; descriptive statistics were also used to arrive at conclusions through the use of Minitab 17 software. In the diagnosis carried out, it was found that municipal decision makers do not articulate actions that integrate national, sectorial and territorial interests in terms of the use of financial resources coming from the establishment of payment for forest ecosystem services, which favor the political-

economic-social recognition of these, in addition, it is necessary to manage public policies to conserve and protect the environment.

**Keywords:** public management; public policies; payment management; forest ecosystem services

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## RESUMEN

Los gobiernos, en la actualidad, se encuentran ante el reto de diseñar y gestionar políticas públicas que integren, de manera armónica, los temas económicos, sociales y ambientales para garantizar la sostenibilidad en el desarrollo. Dado que existe un desaprovechamiento de las potencialidades existentes en los servicios ecosistémicos y la forma en que se gestionan desde la administración pública, se trazó el objetivo encaminado a caracterizar el estado de la gestión del pago por servicios ecosistémicos forestales en el municipio Pinar del Río. La misma se realizó a partir de un análisis de las fuentes primarias y secundarias de información. Como métodos teóricos, se emplearon el histórico y lógico y el sistémico y como métodos empíricos, la medición y el método de expertos. Asociados a los métodos teóricos y prácticos, se utilizaron los siguientes procedimientos: análisis, síntesis y abstracción. Para la captación, procesamiento y análisis de la información, se utilizaron las siguientes técnicas: encuesta, entrevista y análisis documental; se empleó, además, la estadística descriptiva para arribar a conclusiones mediante la utilización del software Minitab 17. En el diagnóstico realizado, se constata que los decisores municipales no articulan acciones que integren los intereses nacionales, sectoriales y territoriales en función del aprovechamiento de los recursos financieros provenientes del establecimiento del pago por servicios ecosistémicos forestales, que favorezcan el reconocimiento político-económico-social de los mismos, además, es necesario la gestión de políticas públicas para conservar y proteger el medioambiente.

**Palabras clave:** gestión pública; políticas públicas; gestión del pago; servicios ecosistémicos forestales

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## RESUMO

Os governos enfrentam atualmente o desafio de elaborar e gerir políticas públicas que integrem harmoniosamente as questões econômicas, sociais e ambientais para garantir a sustentabilidade no desenvolvimento. Como há uma falta de aproveitamento do potencial existente nos serviços ecossistêmicos e da forma como eles são administrados pela administração pública, foi estabelecido o objetivo de caracterizar o estado da gestão do pagamento por serviços ecossistêmicos florestais no município de Pinar del Río. Isto foi feito com base em uma análise das fontes de informação primária e secundária. Métodos históricos e sistêmicos foram utilizados como métodos teóricos, e métodos de medição e métodos especializados foram utilizados como métodos empíricos. Associados aos métodos teórico e prático, foram utilizados os seguintes procedimentos: análise e síntese e abstração. As seguintes técnicas foram utilizadas para coletar, processar e analisar informações: pesquisa, entrevista e análise documental; estatística descritiva

também foi utilizada para tirar conclusões usando o software Minitab 17. No diagnóstico realizado, verificou-se que os tomadores de decisão municipais não articulam ações que integrem interesses nacionais, setoriais e territoriais em termos de utilização de recursos financeiros provenientes do estabelecimento de pagamentos por serviços dos ecossistemas florestais, o que favoreceria o reconhecimento político-econômico-social desses serviços. Além disso, é necessário administrar políticas públicas de conservação e proteção do meio ambiente.

**Palavras-chave:** gestão pública; políticas públicas; gestão de pagamentos; serviços do ecossistema florestal

## INTRODUCTION

Today, the world economy, after being affected by a series of crises: the global financial crisis of 2008-2009, the European sovereign debt crisis of 2010-2012, adjustments in world commodity prices of 2014-2016 and the persistent tensions that accompanied it, has reached a growth of 3.0 %, but the economic benefits continue to be unevenly distributed by country and region (ONU, 2017).

On the other hand, an environmental crisis is becoming evident with direct and diverse effects on human beings: on their health, on their economic activities, on their forms of enjoyment and recreation, on their very appreciation of nature and on their ways of studying and knowing it, which is affirmed by Rojas and Perez (2013, p. 31): "nature and its ecosystems determine human life (and vice versa) and demand the emergence of theories and approaches oriented towards that purpose". This infers the need to give more consideration to the long-term health of the ecosystem and its role in enabling human settlement and economic activity.

The above conditions provide a great opportunity to reorient policies that address some of the structural issues that continue to hinder progress towards the Sustainable Development Goals, such as: addressing climate change, addressing existing inequalities and removing institutional barriers to development (ONU, 2017).

In this sense, the ecosystem services appear as a proposal so that the natural functions of the ecosystems can be seen as "services" that these provide to the people, seeking to establish a change of paradigm in the management of these ecosystems, in the conservation of biodiversity and safeguard of the life of the human beings, proposal that has frequently derived in the establishment of payment schemes for forest ecosystem services (FES). It stands out for its high value, which puts into play the sustainable construction of development and its unequivocal impact on the quality of life of communities (Yáñez Sarmiento et al., 2019).

There is a clear lack of data models that allow the characterization and mapping of ecosystem functions and ecosystem services that can be implemented in commercial markets and little weight in decision making to support the generation of conservation and natural resource management policies. Furthermore, ecosystem services can be defined as the conditions and processes through which ecosystems and the species that

inhabit them sustain human life and are determined by their contribution to human well-being, being the end product of various ecosystem functions (climate, water, erosion), which can provide tangible goods such as wood or food, resulting from different ecosystem processes (Valdés Quintero et al., 2017, pp. 19-20).

Previous studies by Dominguez (2009) refer to the proposal of a payment rate for environmental ecosystem services. To achieve this, it is necessary, among other things, that local governments are the protagonists of the strategies to be followed to achieve their development, based, first of all, on their own potentialities, strengthening local power structures and taking advantage of their autonomy in decision-making. This implies a great challenge for the municipal governments, since they must establish, in correspondence with the sectorial and national policies, economically non-discrepant territorial policies, that allow them to activate and stimulate the development of their municipalities.

What Capote, Torres and del Castillo (2018) propose is decisive, where they establish that an adequate coordination of all levels, distinguishes two aspects, first: the role attributed to each municipality in the conception of the provincial and national development plan, based on the promotion of territorial policies associated to the payment of ecosystem services and second: the role corresponding to the strategic lines of municipal development, which are determined on the basis of their potentialities and capacities, being the ecosystems an alternative.

In view of the above, the objective of this article is to characterize the current state of public policy management for payment for forest ecosystem services in the municipality of Pinar del Río.

## **MATERIALS AND METHODS**

The research is based on the dialectical-materialistic method and uses theoretical and empirical methods.

As theoretical methods, the historical-logical method was used to analyze the evolution and essence of payments for forest ecosystem services, as well as the deepening in terms of the different criteria related to the forms for their realization. The analysis and synthesis are used for the critical appraisal of the contextual theoretical framework and the deepening in terms of the different criteria for its realization.

The bibliographic review was carried out to justify the theoretical background related to the problem and the verification of the environmental situation, caused by the decision-making process in the area under study.

To obtain the information within the empirical methods, the survey techniques were used. Their application took into account a guide elaborated by the authors, where they considered the main aspects to be verified. Ten officials and five specialists from the

Environmental Unit of the Cuban Ministry of Science, Technology and Environment (Citma) and five from Physical Planning (specialists from the department linked to environmental planning) were interviewed. The level of experience in their positions ranges from 10 to 15 years.

The Delphi method was used for the selection of experts, and 13 experts in the subject in question were considered as possible candidates for the study. Expert judgment was applied to validate the stages of the proposal and the activities to be carried out as well as the selection of the educational techniques.

The methodology used in the diagnosis was that developed by Vallejos (2008) which consists of four fundamental stages:

- Step 1. Determination of information needs
- Step 2. Defining the sources of information
- Step 3. Design of the formats for information gathering
- Step 4. Data collection, analysis and information processing

For the processing of the information obtained through the survey applied to experts, the Delphi methodology was used, which includes the following:

1. Select experts by means of an index of expertise or knowledge
2. Propose the set of questions to be implemented in the survey
3. Designing the survey
4. Apply and analyze its reliability
5. Analyze the results of the survey using different techniques to be employed

In determining the experts, the following was taken into account: they were asked to mark with a cross (X) the degree of knowledge or information they possessed on the subject in question, based on a scale of 1 to 10, where the number 10 will be the one with the highest level of knowledge; in this way, the coefficient of knowledge (Kc) of each one will be determined and subsequently the experts with the highest values of (Kc) will be selected.

The group of selected experts is then asked to carry out a self-evaluation, according to the following table, of their levels of argumentation or foundation on the subject of study.

**Table 1** - Assessment to determine the argumentation or rationale of each expert

Source of argumentation	High	Medium	Low
Theoretical analyses carried out by you	0.3	0.2	0.1
Your experience	0.5	0.4	0.2
Work by national authors	0.05	0.05	0.05
Works by foreign authors	0.05	0.05	0.05
Your own knowledge of the state of the problem abroad	0.05	0.05	0.05
Your intuition	0.05	0.05	0.05

Source: Delphy method

Having these data, the competence coefficient K can be calculated for each expert through the formula:  $K=0.5 * (Kc+Ka)$

The code of interpretation of these competence coefficients (K) is shown as follows:

- High competition ratio  $0.8 < K < 1.0$
- Average competition ratio  $0.5 < K < 0.8$
- Coefficient of competition under  $K < 0.5$

For this case, the group of experts with the highest competence coefficient was selected to make up the survey. To design the survey questions by the authors, nine items were proposed. The experts' criteria were applied to perfect the questionnaire based on this empirical method in question, where each expert assessed each question of the survey with the following criteria: Very Adequate, Quite Adequate, Adequate, Not Very Adequate and Not At All. The statistical processing was performed using the SSPS Version 22 tool and the Minitab 17 tool to determine the criteria and reliability of the survey questions (Table 1).

In the course of the research, different documents were reviewed such as:

- Legal regulatory framework
- Policies, standards and regulations for the development and implementation of payment for ecosystem services
- Law 81 - Environmental Law
- Law 85 - Forestry Law
- Business strategy of Pinar del Río Agroforestry Enterprise (2018)
- Strategy of the Municipal Administration Council (CAM 2017-2030)
- Land use plan of the province and the municipality of Pinar del Río
- Productive economic activity of the municipality and forestry
- Forest management plans of the municipality
- Minutes of the Municipal Assemblies of People's Power and the Council of Municipal Administration

- Management plan of the agroforestry enterprise in the municipality of Pinar del Rio (2018)
- Government reports on forestry (2015-2018)

Six experts were selected by the authors for their expertise as shown in tables 2, 3 and 4 below.

From the results obtained, the knowledge coefficient  $K_c$  can be determined (Table 2).

**Table 2** - Expert Knowledge Coefficient ( $K_c$ )

Number of experts	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13
Coefficient $K_c$	0.8	0.3	0.7	0.9	0.9	0.6	0.4	0.2	0.5	0.7	0.8	1.0	0.4

From the table above and the self-assessment made by the experts, the argumentation coefficient ( $K_a$ ) is calculated according to table 3.

**Table 3** - Determination of the experts' argumentation coefficient ( $K_a$ )

Number of experts	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13
Coefficient $K_a$	0.9	1.0	0.8	0.6	0.8	0.5	0.9	0.9	0.8	0.8	1.0	0.8	0.9

Having these data, the competence coefficient  $K$  can be calculated for each expert through the formula:  $K=0.5 * (K_c+K_a)$ . Then the coefficients of competence (Table 4) for each expert:

**Table 4** - Competence coefficients by expert

Number of experts	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13
Coefficient $K$	0.85	0.65	0.65	0.75	0.85	0.55	0.65	0.55	0.65	0.75	0.95	0.95	0.65

As can be seen, there are 6 experts with a higher coefficient  $K$ , however, in order to increase the number of consultations, one more is selected from those with a coefficient of 0.65, with a total of 7 selected.

As part of the methodology used to carry out the diagnosis, the survey was applied to the 7 experts defined to determine the questions of the diagnosis (Table 5).

**Table 5** - Expert evaluation according to survey conducted

Questions	C1	C2	C3	C4	C5	Total
Q1. Expert evaluation according to survey conducted						
Q2. Importance of charging for ecosystem services						
Q3. Need to design procedures to develop territorial policies for the management of this payment						
Q4. Need to create mechanisms that allow, from the local public management, to favor nature and its natural resources in the municipality						
Q5. Limitations or weaknesses affecting such payment						
Q6. Consideration of whether the implementation of such a payment, at the municipal level, contributes to sustainable development						
Q7. Consideration of whether the municipal government can manage such payment						
Q8. Consider that Finance and Price should collect such payment						
Q9. Do you consider that such money should be made available on the locality						

Source: Own elaboration from the assessment of each expert

Legend: C1 Very suitable, C2 Quite suitable, C3 Suitable, C4 Not suitable, C5 Not suitable

Subsequently, using Minitab 17 software, the results were statistically analyzed to define the cumulative relative frequency (Table 6), which made it possible to identify which questions are approved for application.

**Table 6** - Accumulated relative frequencies

.	<b>C1 (Very adequate)</b>	<b>C2 (Quite adequate)</b>	<b>C3 (Adequate)</b>	<b>C4 (Not very adequate)</b>
Q1	0.42857143	0.857143	1	1
Q2	0.57142857	0.857143	1	1
Q3	0.14285714	0.714286	1	1
Q4	0.71428571	0.857143	1	1
Q5	0.85714286	1	1	1
Q6	0.28571429	1	1	1
Q7	0.14285714	1	1	1
Q8	0	0	0.142857	0.285714
Q9	0	0	0	0.142857

Source: Own elaboration from SPSS version 2

The results were tabulated with the help of the electronic tabulator Excel.

## RESULTS AND DISCUSSION

The results of the literature review show that in relation to the regulatory framework (Law 81-Environmental Law and Law 85-Forestry Law) there is a series of regulations such as:

- The absence of a policy establishing payment for forest ecosystem services in the country
- The municipality's spatial planning does not take into account what is related to this payment
- Municipal development strategies do not take into account payments for forest ecosystem services, so it can be argued that the legal regulatory framework at the country and municipal level does not have regulations, standards and policies that establish the forms of these payments or the mechanisms to be followed by the enterprise to plan, organize and execute them, and the Municipal Administration Council lacks policies and tools for the control of these payments and the monitoring that they carry out because of the importance that they have for the municipalities from the environmental, economic and social aspects

The results of the expert survey show that most experts considered that forest ecosystem services should be charged for through a payment system and that the design of procedures to develop territorial public policies for this purpose is quite appropriate. A majority recognizes the need to create local public management mechanisms that favor the nature and use of their ecosystem resources. It is noted that the term payment

for forest ecosystem services does not currently exist; the term environmental services is used, without containing a payment for the use of the resources.

However, six of them recognize that there are limitations to its application, including:

- Lack of training on the subject for policy managers and officials
- Delays in the forestry sector to welcome the initiative
- Lack of understanding by beneficiaries of the need to invest resources to establish, maintain and conserve forests and their ecosystem services
- The non-existence of legal mechanisms to guarantee the application of the system designed by Dominguez (2009)

These limitations coincide with those put forward by Costanza et al. (2017), who stated that there is still a long way to go in the effective implementation of payment for ecosystem services, especially from political debates, especially in countries where the economic vision predominates and policies that do not favor this, among which, of course, Cuba is not included. Hence, these difficulties can be solved precisely with an efficient local public management.

In addition, Domínguez, Medina and Medina de la Rosa (2017) state that "at present, there is a conscious action to try to raise the quality of life of societies by modifying tropical forests and thereby achieve ecosystem services supply, mostly. In this case, the actions to convert these spaces into areas of cultivation, grazing, among others, stand out".

The authors agree with Torres (2018), where he "points out that one of the main limitations to promote these management processes is the lack of identification of development policies at the municipal level as part of local development strategies, with the corresponding programs and projects for their implementation. On this last element it can be indicated that one of the causes is given by the fact that, within the functions of the municipal governments, established by the Constitution of the Republic, it is not collected the one of managing own territorial policies that establish the limits of operation of the local actors and allow to coherently articulate the national, sectorial and territorial interests in function of the use of endogenous and exogenous resources".

It is important what is expressed by Valenzuela (2003) where he emphasizes the importance of the territory as a space of analysis that favors the knowledge of the reality, the human and natural resources, the potentialities and comparative advantages, the lacks and deficiencies and the obstacles to the achievement of the aspirations; that, according to Torres (2015), are necessary tools that make possible the localities to define their development strategies.

After applying the survey to the experts and once the questions to be applied were defined, a second survey was applied to 24 people, among which was the Citma official within the government who has 15 years of experience in the position. The rest of the respondents were workers of the Agroforestry Enterprise where the work experience of the respondents is between 10 and 15 years. As it was a small sample, it was applied to 100 % of the respondents; the key results were:

- Regarding the knowledge that the respondent has about the topic of the FES, it was found that 37.5 % answered in the affirmative; 25 % said they had no knowledge and finally 37.5 % maintained a position to some extent
- Regarding the importance of paying for the use of the FES, since this money would be put into the function of maintaining all the ecosystems and would be contributing to the conservation of the environment, 95.83 % of the total consider that it is important, while 4.16 % assume a valuation to some extent, it is also worth noting that there are no negative criteria
- 100 % of the respondents agree that there is no management for the issue of payment for forest ecosystem services
- It will be necessary to create a mechanism that allows, from public management, to pay for forest ecosystem services. We can observe that 4.16 % maintain a negative response, while 95.83 % refer to the need to create the means to carry out this payment
- The question of whether the municipal government could constitute the manager to develop such payment, 37.5 % of respondents had a negative vote, while 62.5 % said that the same would be the ideal to develop such management and no comments are presented in the option of some measure
- Some of the elements included in the justifications propose, in their great majority, that it should be the manager since it is the maximum representative of the municipality; another of the criteria expressed is that it is more feasible that the agroforestry enterprise takes action in the matter because the government has to comply with other functions; it is proposed that the National Office of Tax Administration be the one that manages the payment with the help of the Ministry of Finance and Prices

From the triangulation of the primary and secondary information sources, the authors were able to arrive at the following regularities regarding existing limitations in the Pinar del Río municipality for the management of public policies, for the payment for forest ecosystem services, such as:

- There is a lack of knowledge about mechanisms to implement the management of territorial policies associated with payment for forest ecosystem services
- The benefits provided by forest ecosystem services are not recognized by the actors who influence the management process of territorial policies associated with payment for forest ecosystem services
- Public problems associated with payments for forest ecosystem services are not adequately identified
- The potential of payment for forest ecosystem services in the municipality of Pinar del Río that could contribute to environmental management and economic and social development is not being used
- There is a lack of policies, norms, laws and mechanisms at national and municipal levels that facilitate the implementation of territorial policies to establish payment for forest ecosystem services

Good management of territorial policies for payment for forest ecosystem services is important and necessary, since it would contribute to the political-economic-social recognition of these services, which would make the municipality see the benefits that

such payment would bring in terms of maintaining forest ecosystems in their care and beautification.

For the diagnosis, primary information sources were consulted, as it was the case of the surveys, where it was noted that, in the term of payment for forest ecosystem services, there is a general lack of knowledge. The need for this payment is also recognized in order to assist the municipality in environmental management, economic and social development. On the other hand, it is clear that there is a lack of policies, legal recognition and mechanisms created for this type of payment at the national, provincial and municipal levels.

The sources of secondary information used during the diagnosis were the documentary review where a series of documents were analyzed, such as: regulatory legal framework (Law 81-Environmental Law and Law 85-Forestry Law), business strategy of the Agroforestry Enterprise Pinar del Río (2018), strategy of the Municipal Administration Council (CAM 2017-2030), territorial ordering plan of the province and the municipality Pinar del Río, minutes of the Municipal Assemblies of the People's Power and of the Municipal Administration Council, among others. In addition, it was possible to observe in relation to the existing regulatory framework that, first of all, there is no policy in the country that establishes payment for forest ecosystem services, which means that the term "ecosystem services" is not used in any of the legislation reviewed. In the territorial management plans of the municipality, there is no consideration for such payment; in the municipal development strategies, there is no mention of forest ecosystem services at any time, so it can be stated that in all the documentation reviewed there is nothing related to the issue in question.

Based on the triangulation of the primary and secondary information sources, the following are identified as the main regularities: the benefits provided by the payment for forest ecosystem services are not recognized by the actors that influence the management process of territorial policies associated to the payment for forest ecosystem services; there is a waste of potentialities offered by the payment for forest ecosystem services in the Pinar del Río municipality that could contribute to the environmental management and the economic and social development of the same. There is also a lack of knowledge about mechanisms to implement the management of territorial policies associated to the payment for forest ecosystem services, and there is a lack of policies, regulations, laws and mechanisms at national and municipal levels to facilitate the implementation of territorial policies to establish the payment for forest ecosystem services.

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#### **Conflict of interest:**

Authors declare not to have any conflict of interest.

#### **Authors' contribution:**

The authors have participated in the writing of the paper and the analysis of the documents.



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