

Paying for Atmospheric Services Provided by Mangroves in Mexico: A Legal Approach

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Abstract: In Mexico it is necessary to encourage mangrove conservation, not only through a legal strategy, but also through economic instruments used to promote the internalization of environmental externalities to protect the atmosphere.

This paper aims to study the legal basis to design a payment for the atmospheric services provided by mangroves in this country, emphasizing the state and municipal level faculties for this purpose.

Key words: Mangroves, economic instruments

1. Introduction

A strong emphasis has recently been placed on the need of paying for the ecological, and specially atmospheric, services provided by mangroves in Mexico.

As Tomlinson pointsout [1]:

One of the most remarkable adaptations of mangroves is that, to a greater or lesser extent, a significant part of their root system is off the ground, which allows them to capture and transport atmospheric gases to underground roots found in oxygen-poor soil.

Mexico is among the four countries that host the largest areas of this ecosystem; it accounts for 5% of the world's total, which places the country just below Indonesia, Brazil and Australia [2].

Some mangrove tree species are currently protected by local laws and are categorized as critically endangered [3]. However, the threat persists and over the past years 20% of the world's mangrove forests have been destroyed [4]. Moreover, coastal areas are especially attractive for both housing and tourism activities, so mangroves are constantly threatened.

The economic value of coastal areas is usually high and therefore, the decision-making process between conservation and development is not always efficient.

2. Mangrove Forests and the Ecological Services They Provide

A wetland is a transition area between aquatic and terrestrial ecosystems. Mangroves, which are forested areas that provide many goods and services, are within these areas.

Ecological services provided by wetlands, according to SEMARNAT [5] are:

- Flood control;
- Coastal-zone soil stabilization;
- Water rivers, lakes and coastal stream filtration and preservation;
- Transportation of people and materials;
- Water sports and recreational activities;
- Pollution dilution and protection of water quality;
- Birds and wildlife habitat;
- Soil fertilization;
- Increase in the property's market value, and

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- Cultural, ethical, emotional and aesthetic values.

Sanjurjo and Welsh [6] described the value of environmental goods and services provided by mangrove forests and highlighted that "Total Economic Value (TEV) is the concept used to embody the aggregation of values provided by a forest ecosystem, such as mangrove forest". According to these authors, the TEV encompasses two types of values:

- · Use values and
- Non-use values.

Within the non-use use values, authors distinguish between bequest and existence values.

- Use values comprise:
- Present use values
- Future use values

Also, present use values can be split into:

- Direct use values;
- Indirect use values.

Finally, within the indirect use values are:

- Environmental values;
- · Ecosystem values.

In regards to carbon adsorption services, UNEP [7] points out that:

Around 20 percent of greenhouse gas emissions are coming from the clearing and burning of forests. Therefore safeguarding and restoring these systems might significantly reduce greenhouse gas emissions that would, otherwise, enter the atmosphere. Wetlands along with tropical and boreal forests are the largest carbon reservoirs ecosystems and provide, in addition, trade goods and protection services.

It is important to note that [8]:

Mangroves release fewer carbon emissions compared to other forest ecosystems. This is mainly because of a low soil decomposition rate, which causes a much higher soil carbon storage level than that of freshwater systems.

Thus, mangrove conservation and even restoration can be a very effective public policy to combat climate change, specifically within strategies relevant to emission mitigation. Therefore, it is necessary not only to encourage mangrove conservation through legal strategy, but also through economic instruments used to promote the internalization of environmental externalities to protect the atmosphere.

According to some authors, despite this, "a fully developed carbon capture market has yet to be established, since many transactions are carried out as direct agreements between governments or non-governmental organizations and environmental service providers." [8]

In many cases mangroves are within protected natural areas (according to the 2010 mapping, 60.3% of Mexico's total mangrove area is located within federal and state Protected Natural Areas), which hinders the identification of those who favor from or enable service delivery.

It is difficult to find the link between titleholders, those who enable or those responsible for the mangrove ecosystems that provide environmental services, and those that will directly benefit from such services.

As noted by the Stern Review, "economists describe human-induced climate change as an 'externality' and the global climate as a 'public good' and, unlike other externalities, it is global in its causes and consequences".

We can consider that mangroves, like tropical and boreal forests, provide global environmental services. Therefore, they should be considered when counting greenhouse gas emissions. It is possible and ideal to design economic instruments at a federal level for paying for the environmental services mangroves provide

3. Legal Basis for Paying for Atmospheric Services in Mexico

Mexico's National Development Plan for 2013-2018 [9] includes a strategy to strengthen federal policies on climate change and environmental care "to move towards a competitive, sustainable, resilient, and low-carbon economy". In regards to economic instruments the National Strategy on Climate Change [10] points out that:

... There are still economic instruments in our country that lead to an inefficient use of natural resources and, also, accentuate economic differences among the population. To improve current practices it is necessary to review such frameworks and create new ways, instruments, regulations, policies and programs towards a more responsible management of natural resources that result in an improvement of the quality of life. Some examples include those related to ecosystem and species conservation and the sustainable use of forests and wildlife; establishing effective regulations for protected natural areas; giving economic value to ecological services; lowering the price of gasoline; and implementing new rate schemes on sectors that use the most energy and water. However, all of this is not enough to tackle the many climate change and sustainability challenges that the country faces as a whole.

On the other hand, in Mexico, the General Law on Climate Change [11] states that the federal government shall "design and promote to the faculted agencies and entities the establishment and implementation of climate-change-related economic instruments."

It is important to point out that states have several faculties and it s specially relevant for this issue the one related to:

"Creation, regulation, management, and implementation of actions to mitigate and adapt to climate change, according to the National Strategy and Program, within –among others- the following areas:

Preservation, restoration, management, and sustainable use of ecosystems and water resources within its jurisdiction".

Regarding municipalities, they can:

Formulate and implement policies and practices to address climate change in line with the National Development Plan, the National Strategy, the State Program for Climate Change and other applicable laws, within the following areas:

Natural resources and environmental protection within its jurisdiction;

They can also participate in the design and implementation of incentives that promote compliance of GLCC's objectives."

When it comes to national policy on climate change principles, the GLCC lists that "The use of economic instruments for mitigation, adaptation and reduction of the vulnerability against climate change enhance the protection, preservation and restoration of the environment; the sustainable utilization of the natural resources, also to generate economic benefits to whom is implementing" [12].

4. Conclusion

There are, definitely, the legal basis(within each of the three levels of government in Mexico) to design a payment for the mangrove's atmospheric services, which are located within the sea-land federal zone, in accordance with the Regulation for the use and exploitation of territorial sea, waterways, beaches, federal sea-land, and reclaimed land [13]. Hence, they must be regulated at a federal level. However, the states and municipalities in which these mangroves are located are also greatly involved in the management of these important environmental resources and could have a say in some aspects of the design of this financial instrument.

Mangroves play an important role in greenhouse gas mitigation, as pointed out above. This function has not yet been recognized on Mexican environmental policies. Hence, these ecosystems are very vulnerable. This paper proposes the design of a payment instrument for atmospheric services provided by mangrove forests.

Such payment could be made in very different ways: payment may be voluntary or mandatory; may be borne by the population of the municipality or municipalities where the mangrove is located, by the relevant state or states or even related to activities which generate high levels of greenhouse gas emissions at a federal or international level, in order to balance or offset these emissions. Another important aspect to be considered is that of payment collection which can be performed independently or at the time in which the payer complies with any other obligation

Moreover, it is also important to define who will profit from the payment; i.e., where will these resources be placed. The financing of conservation efforts, which include the monitoring and restoration of mangroves, would be the most logical choice; those who help keep mangroves healthy, despite not being geographically located in or around the mangrove, are also a good choice. In some cases, for example, the highlands of certain basins would be suitable.

Finally, it is necessary to define the resource management procedure; one option would be to make it through the Fund for Federal Climate Change, which is, as mentioned above, managed through a trust.

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