Research Paper

Price of the collapse of the environment: the case of Mexico.

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ABSTRACT: *Environmental economics is one of the branches of the study of economics, it studies various aspects of the actions of the human being by the environment. In this article we present a documentary review about the elements that make up the object of study of environmental economics. The objective of this paper is to show how and how much companies affect the deterioration of the environment in the case of Mexico, for which an analysis of data is carried out calculated by the Ministry of Environment and Natural Resources. CONRICYT databases and search engines such as Google Scholar were consulted. The analysis was made of scientific and academic texts published in different parts of the world.*
KEYWORDS: *environmental economics, environmental economic evaluation, environmental studies*

I. INTRODUCTION

Faced with a situation in which it is not known how much the cost of our actions is for the environment, it is vitally important to know the economic value generated by prices and / or income, which allows us to generate the measurement of variations environmental quality and in turn make the comparison between welfare measures.

There is evidence that economic activities generate a negative impact on the environment, which in many cases is difficult to recover. Such is the case of tourist activities. Rolon and Yances Castillo [1] mention that "the disadvantages that this economic activity brings are generally environmental; deforestation, loss of fauna and flora, destruction of ecosystems, among others ".

It is important to note that there are various methods for conducting the economic evaluation of the environment. One of them is the well-known displacement cost method and there are others called hedonic methods, which are very important for the economic evaluation of the environment. [2]

The objective of this work is to show how and how much companies affect the deterioration of the environment in the case of Mexico, for which an analysis of data calculated by the Ministry of Environment and Natural Resources is carried out.

II. METHODOLOGY

Kind of investigation

A research work of an exhaustive review type is developed, since it is an article of annotated bibliographies, it is a broad work and it is not specified in a single topic, but rather generalizes more aspects of agreement On the main topic, scientific articles and books on the subject of environmental economics were mainly reviewed.

Sources consulted

3 search engines were used to consult information: academic Google, Google books and the CONRICYT search platform.

III. RESULTS

3.1. THE MARKET FORCE OF SUPPLY AND DEMAND

First, let's start by presenting some market definitions. For Mankiw [3] "a market is a group of buyers and sellers of a particular good or service. Buyers are the group that determines the demand for the product and sellers are the group that determines the supply of said product. "

Another interesting concept is proposed by Labandeira, León, and Vázquez [2], who affirm that the market "is an institution that has the virtue of allocating economic resources in a decentralized way, without the use of mechanisms. to supervise the flows of materials and money that participate in the intermediation processes. "

Supply and demand refer to the behavior of people when interacting with each other in a competitive market. "A competitive market is a market in which there are many buyers and sellers, so each has a negligible impact on the market price." [3]

3.2. THE ENVIRONMENT AND MARKET FAILURES

The market exists for a need that must be addressed. Since ancient times, it has been studied how the market meets the needs of the population. "The market can lead to the social optimum, that is, to the maximization of the collective welfare of society. In this context, to solve a problem of equity in the allocation, it would only be necessary to modify the initial endowment of wealth of the individuals. " [2].

According to Labandeira et al [2], non-compliance is called «market failure», that is, "the market fails to obtain an efficient allocation of resources because the starting assumptions for the fulfillment of the first theorem of welfare economics ".

These assumptions are:

1. Markets are complete, with a good definition of property rights, and agents can freely trade for any potential or contingent transaction.

2. Consumers and producers behave competitively as price takers, carrying out rational optimization plans that involve maximum benefits and minimum costs.

3. Prices are known to all economic agents, both companies and consumers.

4. Transaction costs are zero and pricing does not involve the use of resources. Therefore, market failures mainly occur when:

5. The information is not complete or perfect, that is, when there are agents who have more information than the rest.

6. There is monopoly power in agents, that is, an agent can set prices and control demand.

7. Markets are incomplete because property rights are not well defined for some goods and services.

3.3. ECONOMIC EVALUATION OF THE ENVIRONMENT

Faced with a situation in which it is not known how much the cost of our actions is for the environment, it is vitally important to know the economic value generated by prices and / or income, which allows us to generate the measurement of variations environmental quality and in turn make the comparison between welfare measures.

It is important to note that there are various methods for conducting the economic evaluation of the environment. One of them is the well-known method of the cost of displacement and there are others called hedonic methods, which are very important for the economic evaluation of the environment. [2]

3.4. THREATS TO GLOBAL SUSTAINABILITY

Theoretically, population growth is "the increase (or decrease) of the population per year in a given period due to natural increase and net migration, expressed as a percentage of the population of the initial or base year". [4]

The level of consumption has remained stable in the last 5 years. In the graph Final consumption expenditure of households (% of annual growth) presented at

https://datos.bancomundial.org/indicador/ne.con.prvt.kd.zg it can be seen that in 2016 there is a rate world consumption of 2.12%.

In contrast to the growth rate, which according to the same source indicates that it has decreased worldwide. In my opinion, population growth is declining while consumption tends to increase and only decreases only when there is an economic crisis (in 2009 it decreased to 0.7%); For this reason, I consider that consumption is more worrying than population growth.

3.5. GOOD OF FIRST NECESSITY OR A LUXURY GOOD

The environment sow is and will be a commodity of first necessity. The environment is constituted by the set of external physical, chemical and biological components with which living beings interact. How could these items be a luxury good? Rather, they should be considered essential.

The concept of sustainability is global, since it represents the solution to an international problem, which must be addressed from all locations and regions. However, it seems that in the modified scenario in which we find ourselves, other elements are given more importance, with the environment becoming of secondary importance.

Luis Jiménez Herrero, former director of the Spanish Sustainability Observatory, warns that not preventing climate change would be "an act of criminal responsibility because it threatens the lives of thousands of people".[5]

Although it is necessary to act at a global level, it is vitally important at the local level, in which an economic, social, institutional, political and, above all, urban transition is also necessary.

3.6. CULTURAL AND SOCIO-ECONOMIC CHARACTERISTICS AND ENVIRONMENTAL VALUATION METHODS

The population is made up of cultural and socioeconomic characteristics that vary from one location to another. Undoubtedly, if a study is to be carried out on the valuation of the environment, it is essential to consider aspects of society and culture, in addition to economic ones.

The valuation methods are direct market methods, (which are based on the use of prices and quantities observed in the markets, and which estimate environmental impacts through physical impacts in these magnitudes) and indirect market methods, which also use market prices, but indirectly, that is, through a market good that is related to the environmental good to be studied. [2]

The cultural and socio-economic characteristics are a variable to consider when choosing the environmental assessment method, since both groups of methods revolve around the market and the characteristics of the consumers. It is important to remember that these characteristics help to regulate prices and demands for products, and that this depends directly on cultural aspects (ethnic groups, religion, traditions and customs, etc.)

For example, according to Labandeira et al. [2] in the method of travel cost, the study studies "the economic valuation of natural spaces that are the object of human visits for various reasons, such as recreation, leisure, spending the day, camping, walking, etc." . In this method, cultural and socio-economic variables unquestionably influence, to name a few: lifestyle, socioeconomic stratum, safety of public spaces, beliefs and customs.

An additional example could be the one proposed by Colina and García [6] who mention that "an alternative to approach the valuation of travel time can be based on the analysis of people's behavior at the time of exchanging leisure time in exchange for a certain monetary cost "when referring to people's behavior, different elements of a socio-cultural type can be identified. In the same research, the authors identify 5 different reasons for visiting the natural site, and most of the causes coincide in socio-cultural aspects such as lifestyle (recreation and sports)

The most widely used indirect methods are the travel cost method and the hedonic prices method. I consider that the specialist in environmental impact assessment would have to make a careful selection of the methods to be used, since as it is possible to appreciate, the current valuation methods are very diverse and have application depending on the environmental good from which they are used.

3.7. GOVERNMENT INTERVENTION IN ENVIRONMENTAL ASSESSMENT

Labanderia [2] begins by arguing that the government can intervene mainly in two ways "through direct controls or with so-called market instruments" and that in addition to these two large groups there is a greater diversity of options for inter- public sale.

For Pérez [7], in Mexico "economic instruments have been organized into three types: a) Those that have been translated into fiscal policy tools and that generally punish polluters; b) Subsidies coupled with production; and, c) Payments to reward environmentally desirable behavior "

Labanderia distinguishes conventional MC regulations which are emission standards, immission standards, technological standards, product standards and planning standards. In each country, the market instruments applicable to each standard are generated, mainly the following instruments are identified: taxes, subsidies and markets.

The following table shows a comparison of the mandate and control regulations and their forms of implementation in Mexico.

Table 1. Rules applicable to mandate regulations

MC regulations	Description	Form of implementation
Emission standards	Norms on the emission of pollutants that regulate. These are sometimes referred to in the literature as "operating standards."	NOM-167-SEMARNAT-2017
Immission rules	Norms on the immission of pollutants that refer to the maximum concentrations of contamination allowed in a given location at each moment in time.	NOM-025-SSA1-2014 NOM-021-SSA1-1993
Technological standards	Technological standards, which require the application of a specific production technology or the introduction and operation of decontamination measures. These are sometimes referred to in the literature as "design standards."	NOM-CCAM-001-ECOL /1993 Norma Técnica Complementaria para la Revisión de la Seguridad Estructural de las Edificaciones (NTC-RSEE)
Product standards	Rules on final or intermediate goods that regulate, for example, the energy consumption of automobiles or the polluting content of certain fuels.	NOM-163-SEMARNAT-ENER-SCFI-2013
Planning rules	Planning norms that regulate, for example, the use of the territory, the conditions of buildability or the noise levels.	NMX-AA-164-SCFI-2013 NOM-011-STPS-2001

Note: Own elaboration with data from the Official Gazette of the Federation (Government of Mexico)

Therefore, it is important that a hybrid solution be generated for environmental policy, since I believe that it would be strengthened with the great diversity of existing instruments at the international level.
Given the environmental crisis that we are experiencing in Mexico and globally, it is important that public policies on environmental matters are designed and implemented efficiently. In Pérez's words [7]:
To solve the environmental problems facing the country, it is necessary to use all the tools available. The mission of solving the complexity of the problems of deforestation, soil erosion, overexploitation of aquifers, and water and air pollution will require a change in the behavior of households, companies -as and governments, because the economic decisions of these three agents are the most important force for transformation and use of natural resources.

3.8. COSTS OF THE DEPLETION OF NATURAL RESOURCES AND ENVIRONMENTAL DEGRADATION. (MEXICO).
We live in a time in which survival is sought in any way, and when the existing alternatives are analyzed, it is identified that the means to achieve it is through work. The work can be in an existing company or through the creation of a new one. Something that few businessmen or entrepreneurs know is the impact that their companies generate or the price that they have to pay for the environmental resources consumed or sacrificed.
In Mexico, a recount of environmental accounts is carried out through which valuable data can be produced to carry out an environmental assessment. The body in charge of these studies is the Ministry of the Environment and Natural Resources [8].
The calculation refers to the value of the costs that society as a whole would have to incur to remedy, restore or prevent the depletion and degradation of natural resources and the environment, as a result of the processes of production, distribution and human consumption.
For the purposes of this study, the classification of economic activities is taken, it is based on the SCIAN 2013 and the Estimates of the System of Economic and Ecological Accounts of Mexico, which is based on the System of Economic and Environmental Accounting prepared by the UN, OECD , BM and EUROSTAT. [8]
The comparison is made between the following economic activities:
1. Agriculture, livestock, forestry, fishing and hunting
2. Mining
3. Generation, transmission and distribution of electrical energy, supply of water and gas through pipelines to the final consumer
4. Construction
5. Manufacturing industries

6. Commerce and other services (43, 46, 51, 52, 53, 55, 56, 62, 71, 72 and 81)
The records from the years 2003 to 2016 are compared and it is found that the activities that present a higher cost of the depletion of natural resources are (1) Agriculture, livestock, forest use, hunting fishing and (2) Mining in the most of the years studied, followed by households that in a year represent the second of the costs of resource depletion.
The following table shows the detail:

Table 2. Cost of depletion in Mexico

Year	Economic activities						
	I.	II.	III.	IV.	V.	VI.	VII.
2003	**27,898**	**84,604**	201	403	219	908	6,826
2004	**17,591**	**69,519**	201	359	225	919	8,622
2005	**25,639**	**76,978**	237	433	283	1,089	9,303
2006	17,828	**121,038**	196	383	334	1,192	12,522
2007	13,954	**88,626**	345	476	348	1,159	14,942
2008	10,265	**175,899**	295	555	355	1,040	16,446
2009	**39,483**	**150,931**	356	720	441	1,254	15,904
2010	26,746	**175,686**	382	451	579	1,289	16,194
2011	14,407	**179,253**	449	322	639	1,479	15,226
2012	7,839	**232,940**	495	428	748	1,758	**33,681**
2013	**29,782**	**232,988**	580	421	883	2,174	22,847
2014	18,716	**130,056**	622	300	970	2,293	20,669
2015	26,249	**80,395**	625	367	961	2,375	19,525
2016	24,925	**78,620**	689	330	1,050	2,671	17,472

Note: Expressed in millions of pesos at current prices. I. Agriculture, livestock, forestry, fishing and hunting. II. Mining. III. Generation, transmission and distribution of electrical energy, supply of water and gas through pipelines to the final consumer. IV. Construction. V. Manufacturing industries. SAW. Commerce and other services (43, 46, 51, 52, 53, 55, 56, 62, 71, 72 and 81). VII. Households

With these data it is shown that the activity that presents the highest cost of resource depletion is mining, which had a very high growth in 2013 and that in the last 3 years has decreased considerably.
Another interesting comparison is that in the case of Mexico, companies of the "mining" class are very scarce. In reality, according to the DENUE (INEGI), there are less than 8092 companies throughout the country, in contrast to other economic activities in which the proportion of companies is much higher.[9]

IV.   CONCLUSIONS
The depletion of resources is a consequence of the actions of the human being, it is a result of its own nature, and it is very important to verify the level of impact that it generates on the environment. Through this exercise, it is possible to identify the type of companies that have the greatest impact on the environment and the evolution it has presented during the study period.
Regarding environmental valuation methods, I find the hedonic pricing methodology very interesting and applicable to many contexts, since it is easy to calculate, through the opinion of customers, the satisfaction of the use of the environmental good. In the words of Becker (1965) and Lancas-ter (1966) cited by Labandeira et al. [2], "the source of people's utility is not the quantities of goods consumed, but their characteristics, which have their expression in the production method of consumers."

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