

## **PAYMENT FOR ENVIRONMENTAL SERVICES: POTENTIAL AND LIMITATIONS IN THE XOPOTÓ RIVER WATERSHED - MG, BRAZIL.**

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### **ABSTRACT**

The studies of environmental economy are based on the understanding that environmental conservation and improvements can be executed through the use of economical instruments. However, to use these instruments, it is necessary to know the economical value of the environment. Inside of this perspective, is underway The Environmental Agent Project, an initiative of the Xopotó Institute in partnership with the Federal University of Viçosa. The project aimed to promote the sustainability of small and medium-sized farms, through adjustments and improvements in rural production, without compromising the natural resources. The first stage of the project consisted of a socioeconomic and environmental diagnosis in the Xopotó River Watershed with the intention of estimate the environmental value of 280 farms distributed in fourteen cities of this watershed. Through the adaptation of the Willingness to Pay methodology, was estimated the Willingness to Receive (WTR) by each farmer to immobilize areas on their farms to guarantee the provision of environmental services. The Willingness to Receive was estimated at R\$203,21/ha.ano (~116,12 USD) for the farmer to maintain preserved areas of important environmental functions in their farms. This value can be considered a mark for public politics elaboration that recognize farmers as environmental services producers, motivating them to continue exercising these fundamental services for the human survival. The average value found through the adopted methodology of economic valuation is close to the one used by the Green Grant Program. This Program is the System of Payment for Environmental Services of the State of Minas Gerais. However this policy has not

realized yet for the farmers from the Xopotó River Watershed due to numerous bureaucratic obstacles and difficulties in accessing information regarding this public policy to encourage environmental conservation in Minas Gerais. The State Law N°. 17.727/08 determines that the incentive, known as Green Grant, is granted for the identification, recuperation and preservation of areas necessary to protect the riparian formations and aquifer recharge, and areas necessary to protect the biodiversity and sensitive ecosystems. For the Green Grant payment, farmers whose properties areas are less than four fiscal modules will have priority. As required by the law, the benefit is granted to farmers according to the score obtained after analysis of the criteria established by the Program Executive Committee. Since its implementation, the Green Grant did not have comprehensive and enlightening disclosure. Therefore relevant information does not reach stakeholders such as farmers and entities involved in rural development programs. The program determines the effectiveness of partnerships with entities that carry out agricultural extension, but does not direct any financial resource for partners, setting only the obligations of accredited entities. In addition, some criteria defined by the Manual of Procedures for the Green Grant Program allow different interpretations, further hindering the development of technical processes to the Executive Committee review. Applications forms to register farmers on the Green Grant Program demands on dedication from the responsible technicians and thus, financial expenses. It happens because farms need to be inspected and georeferenced for validation and to collect documents necessary for participation in the program, which reinforces the operational and financial obstacles to be overcome by the authorized entities. Despite the existence of a public policy that establishes an economical instrument to encourage environmental conservation in the State of Minas Gerais, it is notoriously hard to make it effective face existing obstacles. Evaluating the vast potential of the Green Grant in related to environmental protection and biodiversity of biomes, it is necessary the extensive involvement of different stakeholders. So they can actively participate in this process, successfully achieving the objectives of the program.

## **KEYWORDS**

Environmental economy, environmental services, environmental compensation.

## **INTRODUCTION**

The traditional economic theory does not recognize the goods and ecosystem services as components of the economic system (LEFF, 2001). However, as the environmental degradation is aggravating, experimental techniques of economic valuation of natural resources appears with the objective of estimating the monetary value of goods and ecosystem services.

In spite of the existence of this branch of the science, it is necessary to carry out researches to guide the decision makers to formulate public policies that recognize farmers as environmental services producers. These public policies may become economic instruments to motivate farmers to maintain and protect natural resources ensuring the ecosystems sustainability.

The studies of ecological economy are based on the understanding that environmental conservation and improvements can be executed through the use of economical instruments. However, to use these instruments, it is necessary to know the economical value of the environment. Inside of this perspective, is underway the Environmental Agent Project, an initiative of the Xopotó Institute in partnership with the Federal University of Viçosa. The project aimed to promote the sustainability of small and medium-sized farms, through adjustments and improvements in rural production, without compromising the natural resources. Thus, this study has aimed at present the Environmental Agent Project which is being developed in Doce River Watershed-MG, Brazil.

## **DESCRIPTION OF THE STUDY AREA**

The Xopotó River Watershed is on the head of the Doce River Watershed. The Doce River is considered one of the most important river of Minas Gerais State. It is located in the Coastal Hydrographic Region of Southeast (NATIONAL WATER AGENCY – ANA 2009). The Xopotó River Watershed is inserted on the Atlantic Forest biome, being almost entirely covered by semideciduous forests. It has high biological diversity, harboring a significant number of endemic species (WATERSHED COMMITTEE OF THE DOCE RIVER - CBH DOCE RIVER, 2005). The main

tributaries of the Xopotó River are founded in 5 municipalities (Senhora dos Remédios, Rio Espera, Dores do Turvo, Divinésia and Senhora de Oliveira) (Figure 01).

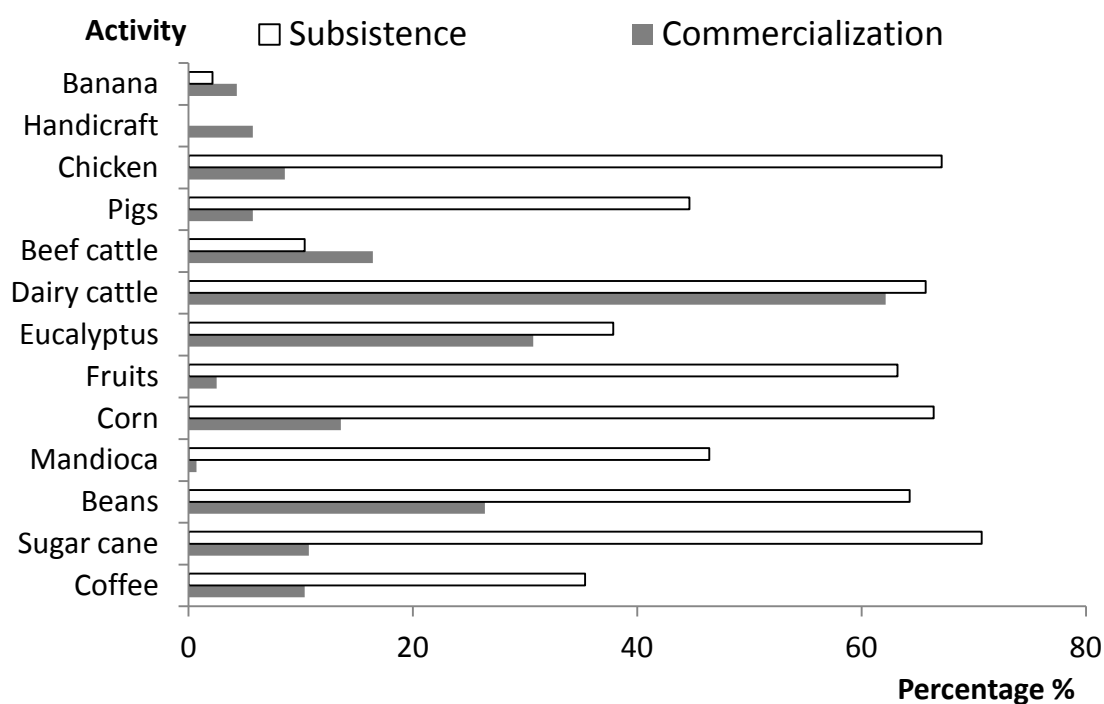


**Figure 01** – Limit of Xopotó River Watershed and Map of Minas Gerais with detail for Doce River Watershed (Adapted from INSTITUTO MINEIRO DE GESTÃO DAS ÁGUAS - IGAM, 2008).

## **SOCIOECONOMIC AND ENVIRONMENTAL FEATURES OF THE FARMS**

A socioeconomic and environmental diagnosis was carried out involving the farmers that participated in this study in 2008, 2009 and 2010. In that process a technique called “traverse walk” was used, as suggested by Coelho (2005). It consists in walking through the farm with the farmer, looking mainly for information about the environment, historical report and soil uses. Moreover socioeconomic and environmental questionnaires were applied for knowledge of the farmers’ reality.

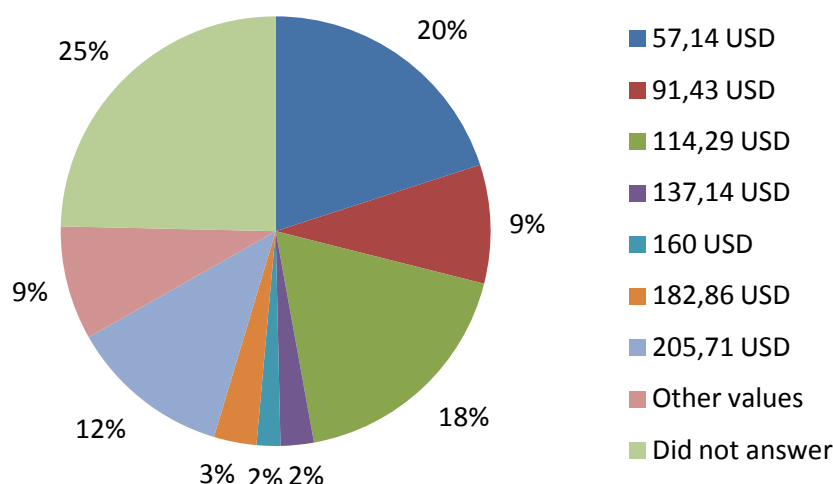
During the environmental diagnosis it was possible to identify the main activities carried out for family subsistence and commercialization (Figure 02). It appears that the major source of income in this region is dairy farming. The main activities for subsistence are production of sugar cane, corn, beans, vegetables, fruit and livestock. Growing sugar cane is practiced by 87.5% of the farmers, mainly used to feed cattle. Currently, few farmers use sugar cane for human consumption, which is an ancient tradition of rural culture that was lost by the introduction of new eating habits.



**Figure 02** – Main rural activities developed for subsistence and commercialization on farms of the Xopotó River Watershed, MG.

## VALUATION METHOD

The first stage of the project consisted of the socioeconomic and environmental diagnosis in the Xopotó River Watershed with the intention of estimate the environmental value of 280 farms distributed in fourteen cities of this watershed. Through the adaptation of the Willingness to Pay methodology, was estimated the Willingness to Receive (WTR) by each farmer to immobilize areas on their farms to guarantee the provision of environmental services. The Willingness to Receive was estimated at R\$203,21/ha.ano (~ 116,12 USD) for the farmer to maintain preserved areas of important environmental functions in their farms (Figure 03).



**Figure 03** – Willingness to Receive (WTR) manifested by farmers from the Xopotó River Watershed, MG.

This value can be considered a mark for public politics elaboration that recognize farmers as environmental services producers, motivating them to continue exercising these fundamental services for the human survival. The average value found through the adopted methodology of economic valuation is closed to the one used by the Green Grant Program. This Program is the System of Payment for Environmental Services of Minas Gerais State.

## GREEN GRANT

Systems of Payment for Environmental Services (PES) can make forest conservation an attractive option for farmers and thus induce them to adopt this new option. The basic premise for PES systems development is to compensate the agents who manage the environment and natural resources, producing environmental goods and services that benefit society in particular, whether local, regional or even global.

Currently, it is possible to find some initiatives in Brazil and around the world in which farmers are benefited by the conservation of native vegetation on their farms. These farmers are being recognized as environmental services providers. Minas Gerais is a pioneer state in establishing consolidated forest law and its structure. The State created the instrument called Green Grant by State Law 17.727/08 which was regulated

by State Decree 45.113/09. This instrument allows, through an annual remuneration, farmers recognition for environmental services production.

The State Law N°. 17.727/08 determines that the incentive, known as Green Grant, is granted for the identification, recuperation and preservation of areas necessary to protect the riparian formations and aquifer recharge, and areas necessary to protect the biodiversity and sensitive ecosystems. For the Green Grant payment, farmers whose properties areas are less than four fiscal modules will have priority. As required by the law, the benefit is granted to farmers according to the score obtained after analysis of the criteria established by the Program Executive Committee (Table 01 and 02).

Table 1: Analysis criteria defined by the Executive Committee of the Green Grant for the Mode of Maintenance of Vegetation Cover (MINAS GERAIS, 2010).

<b>First criteria: individual or collective</b>	<b>Score</b>
<b>1.a</b> - Individual demand.	1
Collective demand of farms, geographically closed, observing the criteria of watersheds, as the following score:	
<b>1.b</b> - From 02 to 10 farms.	3
<b>1.c</b> - From 11 to 20 farms.	6
<b>1.d</b> - From 21 to 30 farms.	8
<b>1.e</b> - Up to 31 farms.	10
<b>Second criteria: sum of individual score</b>	
<b>2.a</b> - The farm has area with native vegetation coverage above the minimum established for legal reserve, except Permanent Preservation Areas (PPA).	6
<b>2.b</b> - The farm has area with native vegetation coverage that meets the minimum established for legal reserve, except PPA.	4
<b>2.c</b> - The farm has legal reserve endorsed by the Commitment.	3
<b>2.d</b> - The farm has permanent preservation areas preserved.	5
<b>2.e</b> - Farms in which the sum of areas of Legal Reserves and Permanent Preservation Areas exceeds 50% of the total area of the property.	3
<b>2.f</b> - Farms where there is no use of pesticides.	1
<b>2.g</b> - Properties where biological or agroecology controls are used.	3
<b>2.h</b> - Farms where agroecological production and systems of integrated production are used.	3
<b>2.i</b> - Farms that use practices of soil, water and wildlife conservation.	2
<b>2.j</b> - Farms located in areas of direct contribution to the public water supply.	6

*Continues...*

Table 1 – Continuation.

<b>2.l</b> - Farms object of funding application in the line of environmental conservation or agroecological, such as PRONAF / ECO.	3
<b>2.m</b> - Farm linked to public projects in the field of social inclusion, duly attested by the public institution responsible for the project.	3
<b>2.n</b> - Farms that participate in projects of associative production.	5
<b>2.o</b> - Farms belonging to Traditional Peoples.	3
<b>2.p</b> - Farms linked to public policies intended to rural youth.	4
<b>2.q</b> - Farms linked to rural settlement or resettlement projects.	3
<b>2.r</b> - Farms located in protected areas in a situation of expropriation and on a situation of pending regularization about the land tenure.	6
<b>2.s</b> - Areas of native vegetation on Private Reserves of Natural Patrimony.	5
<b>2.t</b> - Farms located within Areas of Environmental Protection – APA.	3
<b>2.u</b> - Farms located in areas defined by the Master Plan or approved by municipal law as urban areas and urban expansion, having area of native vegetation larger than one hectare and water springs.	5
<b>2.v</b> - Farms located in areas defined by the Master Plan or approved by municipal law as urban areas and urban expansion, having area of native vegetation larger than one hectare.	3

Adapted from IEF, 2010.

Table 2: Analysis criteria defined by the Executive Committee of the Green Grant for the Mode of Restoration of Vegetation Cover (MINAS GERAIS, 2010).

<b>First criteria: individual or collective</b>	<b>Score</b>
<b>1.a</b> - Individual demand.	1
Collective demand of farms, geographically closed, observing the criteria of watersheds, as the following score:	
<b>1.b</b> - From 02 to 10 farms.	3
<b>1.c</b> - From 11 to 20 farms.	6
<b>1.d</b> - From 21 to 30 farms.	8
<b>1.e</b> - Up to 31 farms.	10
<b>Second criteria: sum of individual score</b>	
<b>2.a</b> - The restoration proposal includes Permanation Preservation Areas (PPA) defined by the Law 14.309/02 (sections II, III e IV). Those areas are informally called by humid PPA. It situated along water courses, around natural or artificial reservoirs and around water springs, even though intermittent.	6
<b>2.b</b> - The restoration proposal reaches areas of PPA from sections V, VI and IX, Article 10, from Law 14.309/02. Those areas are informally called dry PPA. Examples: hilltops, areas with slopes greater than 45 degrees, and areas with altitude above 1,800 m.	5

*Continues...*



Table 2 – Continuation.

<b>2.c</b> - The restoration proposal includes legal reserve already endorsed by the commitment.	2
<b>2.d</b> - The restoration involves areas proposed for the regularization of the legal reserve.	9
<b>2.e</b> - The restoration proposal includes areas with erosion problems or soil degradation.	4
<b>2.f</b> - The restoration proposal includes PPA from sections I, VII, VIII, IX, X of Article 10, Law 14.309/02.	6
<b>2.g</b> - Farms where there is no use of pesticides .	1
<b>2.h</b> - Properties where biological or agroecology controls are used.	1
<b>2.i</b> - Farms where agroecological production system and systems of integrated production are used.	1
<b>2.j</b> - Farms that use practices of soil, water and wildlife conservation.	1
<b>2.k</b> - Farms located in areas of direct contribution to the public water supply.	6
<b>2.l</b> - Farms object of funding application in the line of environmental conservation or agroecological, such as PRONAF / ECO.	3
<b>2.m</b> - Farm is linked to public projects in the field of social inclusion, duly attested by the public institution responsible for the project.	3
<b>2.n</b> - Farms that participate in projects of associative production.	5
<b>2.o</b> - Farms belonging to Traditional Peoples.	3
<b>2.p</b> - Farms linked to public policies intended to rural youth.	3
<b>2.q</b> - Farms linked to rural settlement or resettlement projects.	3
<b>2.r</b> - Farms located around protected areas, as defined by the official institution.	6
<b>2.s</b> - Farms located within Areas of Environmental Protection – APA.	3

Adapted from IEF, 2010.

## DISCUSSION

Since its implementation, the Green Grant did not have comprehensive and enlightening disclosure. Therefore relevant information does not reach stakeholders such as farmers and entities involved in rural development programs. The program determines the effectiveness of partnerships with entities that carry out agricultural extension, but does not direct any financial resource for partners, setting only the obligations of accredited entities. In addition, some criteria defined by the Manual of Procedures for the Green Grant Program allow different interpretations, further hindering the development of technical processes to the Executive Committee review.

Applications forms to register farmers on the Green Grant Program demands on dedication from the responsible technicians and thus, financial expenses. It happens because farms need to be inspected and georeferenced for validation and to collect documents necessary for participation in the program, which reinforces the operational and financial obstacles to be overcome by the authorized entities.

This policy has not realized yet for the farmers from the Xopotó River Watershed due to numerous bureaucratic obstacles and difficulties in accessing information regarding this public policy to encourage environmental conservation in Minas Gerais.

In Minas Gerais, in the first year of the Green Grant payment, proposals of 978 owners had been approved, totaling an area of 28,000 hectares for conservation of native vegetation (IEF, 2011). This economic incentive can make significant changes in the relationship between farmers and the environmental protection.

In April 2011, the Xopotó Institute was accredited by the Executive Committee to submit proposals of farmers from the Xopotó River Watershed to the Green Grant. The third phase of the Environmental Agent Program is a partnership between the Federal University of Viçosa - UFV/ National Council for Scientific and Technological Development - CNPq, Xopotó Institute and the Brazilian Biodiversity Fund (FUNBIO). At this moment, 34 proposals were submitted for consideration by the Executive Committee of the Green Grant. Of this amount, a total of 28 farmers had their proposals approved and will receive an amount of R\$ 200.00/ha.year (~114.28 USD/ha.year) for maintenance of 335 hectares of preserved native vegetation, distributed in five different municipalities. The main reason why the other six proposals submitted were not accepted was that the areas of native vegetation were in early stages of forest succession and not in middle or advanced stage (according to CONAMA Resolution 392/ 2007).

Thus, it is possible to say that the Environmental Agent Program - Phase III was implemented for 28 farms, which were recognized for providing environmental services. For other municipalities in the watershed, the Xopotó Institute is seeking funding to implement the actions of the project and fully achieve its objectives.

For the Green Grant Program of the year 2011, 24 new proposals were prepared by Environmental Agent team and sent for analysis by the Executive Committee of the program. Only farmers who fall into the mode of maintaining native vegetation were covered by the Green Grant, whereas the second method, restoration of the vegetation

has not yet entered into force. According to Silva (2011), the main difficulty to be overcome in the Green Grant Program concerns to the implementation of the second mode, restoration of native vegetation. This will require a greater amount of financial resources and technical capacity strengthened for the development of technical projects that will indicate the best practices to forest fragments restoration in Minas Gerais State.

## **CONCLUSION**

Despite the existence of a public policy that establishes an economical instrument to encourage environmental conservation in the State of Minas Gerais, it is notoriously hard to make it effective face existing obstacles. Evaluating the vast potential of the Green Grant in related to environmental protection and biodiversity of biomes, it is necessary the extensive involvement of different stakeholders. So they can actively participate in this process, successfully achieving the objectives of the program.

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