

Lessons Learned from Mexico's PES Program for National-Level REDD+ Strategies

by

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## **Abstract**

Reducing Emissions from Deforestation and forest Degradation (REDD+) strategies are currently being created in developing countries across the world as a means of mitigating climate change. REDD+ programs often include Payment for Ecosystem Services (PES) programs, which provide financial incentives for landowners to conserve, as part of larger policy strategies to slow deforestation. PES programs have a relatively long history of implementation in countries around the world. Despite the value of considering experiences from established PES programs, existing literature fails to apply detailed knowledge on PES program design to a REDD+ framework. This study is based on a detailed policy analysis of Mexico's national PES program and interviews conducted with individuals involved in program design, implementation, operation and evaluation. Results demonstrate the importance of clearly delineated program objectives, coordination of cooperation across scales, prioritization of environmental criteria in selecting participants and differentiated payment schemes adapted to the context of each region. By taking lessons learned from this well-established PES programs, these unprecedented REDD+ strategies can be more effectively designed in order to facilitate significant emissions reductions and socioeconomic development.

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## INTRODUCTION

As climate change continues to be at the forefront of environmental discussions, there is a growing urgency to agree upon means of mitigation. Since emissions from deforestation have been reported to contribute 15-35% of global carbon emissions, the international community has been targeting forests for more than fifteen years as a means of establishing mitigation efforts in the form of an international scheme (Gullison, Frumhoff et al. 2007; IPCC 2007; Holloway and Giandomenico 2009; Lederer 2011; Richter and Houghton 2011). Reducing Emissions from Deforestation and forest Degradation (REDD+) strategies aim to reduce emissions, increase forest conservation, promote sustainable forest management and enhance forest carbon stocks by providing incentives for developing countries to lower their deforestation and forest degradation levels/rates. In the 17<sup>th</sup> UNFCCC Conference of Parties (COP17), an agreement was reached to continue moving forward supporting REDD+ initiatives in pilot countries, including Mexico and Indonesia. However, there remain many questions to be answered, plans to be made and research to be conducted before the implementation phase of REDD+ can commence.

Valuable lessons can be learned regarding program design and implementation from similar schemes, such as Payment for Ecosystem Services (PES) programs. For more than twenty-five years, PES programs have been proliferating across the globe (Glaser 1986; Engel, Pagiola et al. 2008; Porras, Grieg-Gran et al. 2008; Huang, Upadhyaya et al. 2009; Southgate and Wunder 2009; Arriagada, Ferraro et al. 2010) as incentive-based mechanisms that compensate landowners for activities that provide ecosystem services, such as carbon sequestration, watershed services and biodiversity (Wunder 2005; Engel, Pagiola et al. 2008). These activities usually involve land retirement, which leads to forest conservation. In a sense, REDD+ programs themselves can be viewed as international PES schemes since there is an ecosystem service provider (i.e. developing countries, some of whom have the highest deforestation rates in the world) being given financial incentives to conserve its forest by an ecosystem service user (i.e. developed countries and other financing entities). Considering the related objectives, target locations and nature of these initiatives, forestry-related PES programs can be used as guidance for the development of REDD+. Experiences from established PES programs will prove to be particularly beneficial as REDD+ strategies develop national or regional level PES programs will likely be a component of the REDD+ policy packages that participating countries will implement.

The positive impacts that have been associated with PES programs throughout Latin America and Asia further support obtaining guidance from these programs (Ferraro and Simpson 2002; Pagiola 2008; Southgate and Wunder 2009; Arriagada, Ferraro et al. 2010). Using an econometric model, Tattenbach et al. (2006) estimated that the Costa Rican PES program avoided 108,000 hectares from being deforested in 2005 (Pagiola 2008). Meanwhile, China's Grain for Green program facilitated the conversion of 8.22 million hectares to forestland from 1999-2008 (Liu and Wu 2010).

Despite the value of considering experiences from established PES programs, existing literature fails to apply detailed knowledge on PES program design to a REDD+ framework. For instance, Pagiola gives detailed information about the origin and development of Costa Rica's program yet does not survey its potential relation to REDD+ (2008). Similar literature focuses solely on evaluating or providing recommendations for specific PES programs (Ribaudó 1989; Uchida, Xu et al. 2005; Sanchez-Azofeifa, Pfaff et al. 2007; Arriagada, Sills et al. 2008; Arriagada, Ferraro et al. 2010). In terms of REDD+ literature, there have been numerous contributions addressing several areas of the program since the initial idea of REDD+ entered discussion tables (Angelsen 2009; Bond, Grieg-Gran et al. 2009; Lederer 2011; Lederer 2012). Angelsen highlights several issues and key points that must be addressed in the design of REDD (2008). In the months preceding COP17, there was a multitude of policy briefs and articles published listing recommendations for the design of REDD+, which was one of the principal topics discussed in the aforementioned conference (2011; Daviet 2011). However, the link to PES programs, if any, was minimal throughout the literature produced, and even more minimal was the connection to PES program design. Considering that one of the most important elements of REDD+ is its design, this is an important link that should not be overlooked.

Two of the most important components of program design are the criteria used to select, or target, participants and the payment scheme used to pay participants (Babcock, Lakshminarayan et al. 1997; Alix, de Janvry et al. 2003; Wunscher, Engel et al. 2006; Alpizar, Blackman et al. 2007; Chen, Lupi et al. 2010). Targeting criteria provides the first opportunity to interpret the program objectives and decide how those objectives will be fulfilled. Therefore, it is important to be as specific as possible in order to maximize efficiency without excluding any of the target population. Payment schemes refer not only to the payment rates, but also the criteria used to differentiate the rates, if any, given. These rates are basically the bait to attract participants whose land retirement would ideally contribute to a reduction in deforestation. Therefore, programs do not want to set payment rates significantly below the ideal participants' opportunity cost because then the ideal participants will not apply, but programs do not want to overpay either because again, they are trying to maximize budgetary efficiency (Wunder 2005; Engel, Pagiola et al. 2008; Jack, Leimona et al. 2009). It is because of this necessary balance that payment schemes are an important component of program design for PES programs, and will similarly be an important consideration for REDD+. Considering the significant impact well-designed targeting criteria and payment schemes can have on the overall success of a PES program, this study focuses on these two components of program design.

In the aftermath of COP17, there is a rising demand to gather more empirical data related to REDD+ in order to build confidence in and support for future steps in the development of a REDD+ framework. The overall aim of this paper is to provide an understanding of how lessons learned from the design and implementation of established PES programs can be applied to a REDD+ framework. This study is based on a detailed

policy analysis of Mexico's national PES program and interviews conducted with individuals involved in program design, implementation, operation and evaluation.

To the best of my knowledge, this paper is the first study to offer an in-depth analysis of the targeting criteria and payment schemes of a national PES program and their applicability to the design of REDD+. To fulfill the overall purpose of this paper, three specific objectives are outlined. The first objective consists of developing a conceptual understanding of various approaches to establishing targeting criteria and payment schemes and describing the potential benefits and drawbacks of such methods. Second, the Hydrological Services branch of Mexico's Payment for Ecosystem Services (PSA-H) program is examined as a case study. The targeting criteria and payment schemes the program has utilized throughout its lifespan and, more importantly, the gains and shortcomings of these methods as seen by the program implementers are described. Lastly, I provide specific lessons that can be taken from the tradeoffs present in Mexico's PSA-H program for implementing PES programs under a REDD+ framework.

## **MATERIALS & METHODS**

### **Materials**

The materials collected for this project included a combination of primary and secondary sources. The rules of operation established by the implementing agencies of the Mexican, Costa Rican and Ecuadorian programs served as primary sources of information and the basis of understanding of each program's current design. Informal conversations with program experts were also held on two occasions, which complemented the documents previously read. Interview recordings and transcripts from conversations with the personnel responsible for designing and implementing the Mexican PES program also served as primary sources. In terms of secondary sources, material culture, such as conference proceedings, on forest conservation program design and the specific programs of the USA, Costa Rica, China, Mexico and Ecuador were reviewed.

### **Methods**

For this study, qualitative research methods were employed, starting with a literature review focused initially on REDD+, PES program evaluations and theoretical concepts of program design. As more information was needed, the review expanded to more specific subject areas and programs, strengthening my understanding of both program design and the PES programs highlighted in this paper.

Using the government documents previously mentioned, I then conducted a policy time series analysis highlighting the main shifts in focus the Mexican national PES program has had in terms of design since its commencement. This analysis then helped shape the largest component of my project, which consisted of semi-structured interviews. Nineteen

interviews were conducted with individuals involved in the design, implementation, operation or evaluation of primarily the Mexican PES program, but also of other national level PES programs (e.g. Costa Rica, Ecuador and China). Most of the interviews (11) were conducted via phone, while 5 were conducted in-person, and 3 were completed via Skype. The in-person interviews were done at the central office of Mexico's National Forestry Commission (CONAFOR), the implementing agency of the PES program, in Guadalajara, Jalisco, Mexico. All interviews, with the exception of one in English, were conducted in Spanish.

At the start of each interview, participants were given a consent form explaining the confidentiality principles established by the Office of Research Support at Duke University. These forms also contained my contact information as well as that of the Office of Research Support in case further inquiries rose concerning their rights as interviewees.

I developed four interview guides based on the interviewees' connection to the Mexican PES program. Therefore, I formulated guides for 1) CONAFOR employees at the central office, 2) CONAFOR employees at the state offices, 3) individuals that had taken part in the initial design of the Mexican PES program but no longer worked for CONAFOR and 4) individuals working on other PES programs. I established these qualifications to obtain a broad spectrum of perspectives that reflect early and modern ideas about PES program design and implementation.

For the first category of interviewees, CONAFOR employees at the central office responsible for designing and administering the program, interviews were conducted in-person during a visit to Mexico. The goal with this group was to conduct interviews with as close to a census of the key actors who had been involved in the program for long periods of time and in various capacities and who could therefore provide an array of perspectives on the history and strengths and weaknesses of the program's design and implementation from the administrative perspective.

The participants in the second category of interviews were either the Head of the Department of Ecosystem Services in their state or program operators for the Department, who are in charge of the verifications of participant requirements and have the most contact with program participants. They were chosen based on their length of time working for CONAFOR on the PES program. Using this criterion, my pool of potential interviewees was limited in size and fairly dispersed across the country. Therefore, I decided to use snowball sampling to choose my interviewees, meaning I would identify interviewees and use their referrals to reach more interviewees who met my criteria (O'Leary 2005). I began by contacting a colleague who had established a network of state-level connections in the agency during the previous summer. With those initial referrals, I started to form my own network of contacts at the state-level, taking recommendations from interviewees for qualified interviewee candidates. The quality of a potential interviewee was primarily evaluated based on the number of years working on the PES program. Because there are significant geographic, socioeconomic and demographic

variations among the states participating in the program, an effort was made to portray as much of that variation as possible in this study as it is an important factor to weigh. Therefore, I aimed to maximize the number of interviews conducted in this category in order to have a greater opportunity of including states with various characteristics while still prioritizing individuals' length of time working on the program. As a result, the majority of my interviews (8) came from this category.

The third category was created to capture the ideas of the initial program designers and implementers of Mexico's PES program; therefore, the focus was on the role they had as founders of the Mexican PES program, not their current positions. This was also a small pool of candidates since there are a limited number of founders. Therefore, key actor selection was the most logical approach to take in identifying these interviewees (O' Leary 2005).

The last category of interviewees was generated to form as well-rounded an understanding of other programs as possible. Therefore, interviewees were chosen based on their knowledge about the program in multiple capacities. Speaking with employees from the implementing agencies was ideal to get solid, verifiable information about the program at the same time as first-hand experiences designing and implementing the program. For this category, key actor selection was also relied upon to gain a broad, but simultaneously concrete understanding of the program, which would most readily be facilitated through conversations with important figures.

The following is a compilation of information gathered on interviewee characteristics:

<b>Current position</b>	<b>Length of time working on program (years)</b>	<b>Design, implementation, operation &amp; evaluation</b>
<b>Federal Officials at CONAFOR</b>		
General Coordinator of Production and Productivity	10	D & I
Director of Forest Ecosystem Services	9	D & I
Director of International Negotiations and Climate Change	10	D
Sub-Director of Operations	6	O
Sub-Director of Participant Relations	4	D & O
Head of Department for Technical Instruments	5	O
Head of Department for Competing Funds	3	E
Head of Department for Monitoring Carbon Forest Projects*	6	I & O
<b>State Officials at CONAFOR</b>		
Head of Department, Federal District (DF)*	6	I & O
Program Operator, Queretaro	7	I & O

Head of Department, Oaxaca	8	I & O
Program Operator, Guanajuato	2.5	I & O
Head of Department, Puebla	6	I & O
Program Operator, Hidalgo	4	I & O
Program Operator, Chihuahua	2	I & O
<b>Non-CONAFOR Employees</b>		
World Bank staff member	9	D & I
World Bank staff member	10	D & E
<b>Officials in other PES Programs</b>		
General Director	13	D & I
Specialist in Management of Community Partnerships	1	I & O

\* indicates the person had another PES-related position prior to their current position. The length of time working on the program reflects the combined time in both positions. The Head of Department for the DF previously was a Program Operator at another state office, and the Head of Department for Monitoring Carbon Forest Projects previously was the Head of Department at a state office.

Following the semi-structured interview protocol, an interview guide was drafted for each category of interviews to serve as the foundation for the interview. The guides varied depending on the category, but remained grounded on inquiries about previous and current targeting criteria and payment schemes. There were factual questions asked to verify information previously collected, but most of the interviews were centered around inquiries about the interviewees' thoughts on specific program design decisions taken in their respective program, the advantages and disadvantages of these decisions and key points for improvement.

The consent form provided to interviewees and the four interview guides prepared are available in English in the Appendix. All interviews were audio-recorded and transcribed. A grounded theory approach was then utilized to analyze the resulting transcripts, coding and categorizing transcript data into common themes found across interviews. Using these codes, I was able to see how frequently and in-depth each theme was covered in order to structure final recommendations. The qualitative data analysis software used was NVivo 9.

## **PROGRAM DESIGN: THEORY & PRACTICE**

This section highlights the primary options proposed by scholars for targeting and setting payment rates for PES programs and their potential implications. Afterwards, the experiences encountered by five nationwide programs regarding these components of program design are described.

## **Theory: Targeting Criteria**

Targeting criteria is very much dependent on the particular environment in which the PES program resides, as programs differ in geographic scale, location, funding, ecosystem services provided and political environment to name a few categories. However, the main conceptual issue that causes differences among targeting criteria is the interpretation of program objectives.

A program cannot have maximum environmental effectiveness, cost efficiency and equity simultaneously (Mayrand and Paquin 2004). Maximum environmental effectiveness involves extracting the most environmental benefit possible. In some cases, the most environmental benefit is found in highly-valued land that is likely owned by average or wealthy property owners, which then decreases cost efficiency and equity (Mayrand and Paquin 2004). Maximum cost efficiency involves recruiting the most land cover given a monetary budget. The emphasis on quantity over quality will likely decrease equity and environmental effectiveness, since large areas of land usually belong to wealthy property owners and are not necessarily high quality (Mayrand and Paquin 2004). Equity involves bridging the gap between the wealthy and the poor, which means supporting, and usually giving preference to, poor landowners with limited land cover. It is important to note that although PES programs are by nature environmental, most have taken on a social component as well, directly or indirectly. When equity is prioritized, efficiency will likely decrease since total land cover may stay the same but transaction costs will increase due to the increase in number of participants. Environmental effectiveness will likely decrease as well since poor landowners tend to have low-value land. If we follow this logic, we realize that there will be significant trade-offs involved when selecting targeting criteria, which is why this area of program design is so pivotal.

It is impractical to claim there is a list of ideal criteria that can be applied in each country and the perfect PES program will be produced. However, considering the financial realities that most PES programs face, it is vital for these programs to have targeting criteria when selecting program participants in order to obtain a high level of environmental benefit. There are a number of combinations of criteria that can be made to produce a program's targeting criteria. In this respect, program design can be a daunting task, for there are a number of combinations which can lead to a deviation from the program's goals. Therefore, when formulating a list of targeting criteria it is important to remember the overall objectives of the program. Particular program objectives will vary depending on the service being provided and other factors; however, the underlying goal that all programs share is the continued availability of ecosystem services.

Keeping in mind the different dynamics that each PES program works under, the following is a compilation of the primary options proposed for targeting. In a subsequent section, five country examples are given, highlighting the development of their targeting criteria throughout their programs' lifetime.

### *Benefit-Cost Targeting*

Numerous studies have concluded that benefit-cost targeting is the most cost effective targeting mechanism in terms of obtaining the highest level of environmental benefit given a fixed budget (Babcock, Lakshminarayan et al. 1996; Wu, Zilberman et al. 2001; Alix, de Janvry et al. 2003; Gauvin, Uchida et al. 2010), especially when there are high levels of heterogeneity in the value of environmental benefit and opportunity cost within the applicant pool (Babcock, Lakshminarayan et al. 1997; Wunscher, Engel et al. 2006; Chen, Lupi et al. 2010). The underlying theory is to maximize the benefit to cost ratio by selecting land with the highest environmental benefit and lowest cost. Therefore, properties are ranked from highest to lowest considering their benefit to cost ratio, and applicants are selected until the funds are exhausted.

One approach to obtaining this benefit to cost ratio is to create an environmental benefit index using data on participants' location and the resource's quality (Alix et al. 2003). To facilitate the derivation of the value of environmental benefit, researchers have included site-specific proxies, which include biological or physical characteristics of the terrain such as resource quality and location (Alix, de Janvry et al. 2003; Chen, Lupi et al. 2010). To minimize cost, the opportunity cost of the property needs to be derived. In all cases studied, different proxies have been used to determine the opportunity cost of land parcels, including physical and household characteristics such as distance from urban centers and risk of deforestation (Alix, de Janvry et al. 2003; Chen, Lupi et al. 2010).

While benefit-cost targeting does maximize environmental benefit within a given budget, it requires a significant amount of data collection and analysis, which can prove to be an obstacle for some programs. The feasibility of using this approach mainly depends on four factors: 1) the scale of the program 2) the geographic variability of the land 3) the capacity of the implementing agency and 4) the financial funds of the program. The use of this approach will require an increasing investment of funds and time as the scale of the program increases. The greater the geographic variability of the land, the smaller the capacity of the implementing agency and the more limited the financial funds. In a local or regional program, data is more readily available and less costly in comparison to a national-scale program which incurs greater transaction costs and requires more cooperation across the country. The variability of the terrain in which the program is located is also important because more diverse terrain requires a greater understanding of the processes occurring in the ecosystem, which leads into the capacity of the implementing agency. If the agency does not have the knowledge or technological capacity to derive such information, it will be a costly investment of money and time to produce a resulting ranking.

Another shortcoming of benefit-cost targeting is that it tends to aim at only one type of environmental benefit. For instance, if a program is targeting biodiversity and carbon sequestration, cost-effective targeting done for biodiversity would not provide optimal targeting for carbon sequestration. If there is a positive correlation between the

environmental benefits, cost-effective targeting for one will increase the level of the other benefit (Chen, Lupi et al. 2010). If there is a negative correlation, cost-effective targeting for one benefit will hinder the optimal level of the other benefit. In these situations, it is important to consider the value of each environmental benefit more in-depth.

When using benefit-cost targeting, there also exist tradeoffs between efficiency and equity. In regards to efficiency, if we assume that the environmental value and economic value of land are positively correlated, then in order to obtain high benefit to cost ratios we need to either select high value, high cost parcels or low value, low cost parcels. The resulting mixture of types of land parcels will likely not represent the maximum amount of land potentially obtained within a budget. If we also assume that highly-valued land parcels belong to wealthy landowners and low-valued land parcels belong to poor landowners, a mixture of wealthy and poor participants also results which does not represent maximum equity (Gauvin, Uchida et al. 2010).

#### *Benefit or Cost Targeting*

The concept behind benefit targeting and cost targeting is simple: maximize quality or quantity, respectively. Keeping in mind the assumption that the environmental value and economic value of land are positively correlated, we find that the characteristics of the selected land parcels will be significantly different under each targeting scheme (Wu, Zilberman et al. 2001). Using benefit targeting, there will be a maximization of resource quality, which may lead to a reduction in the total amount of land selected or other tradeoffs (Engel, Wunscher et al. 2007). Using cost targeting, there will be a maximization of the total amount of land selected, which may lead to a reduction in the environmental value of the program.

By opting for one of these targeting schemes instead of benefit-cost targeting, there is a loss in environmental effectiveness. The magnitude of this loss is dependent on the correlation and spatial variation between costs and benefits (Babcock, Lakshminarayan et al. 1997). For the most part, we have assumed that there is a positive correlation between costs and benefits; however, there are cases in which the opposite is true. When considering the design and targeting criteria of a program, it is important to be aware of these relationships as they can readily predict the types of benefits that can result. For instance, if there is a negative correlation between cost and benefit, cost targeting and benefit targeting are more likely to select the same land parcels (Wu, Zilberman et al. 2001).

#### *High-Benefit, High-Risk Targeting*

Aside from putting emphasis on maximizing benefit, cost or a combination, others have proposed adding the level of risk related to the ecosystem service's reduction or disappearance (Alix, de Janvry et al. 2003; Alpizar, Blackman et al. 2007; Engel, Wunscher et al. 2007). Alix et al. include deforestation risk in their benefit-cost targeting model

(2003), while Alpizar et al. add the susceptibility of a watershed to a decline in the service (2007). There are proxies that can be used to predict the level of risk and a number of variables that can be explored to prevent strategic behavior and obtain a fair interpretation of risk. If the program is at a national scale and the country is rather large, regional variability may play a role in the determination of risk level. The main downfall of this targeting scheme is that risk is innately uncertain.

### *No Targeting*

Setting no targeting criteria is also an option; however, not a recommended one. By selecting participants on a first-come, first-serve basis, programs essentially open the door for any resources, with varying leaves of benefit and cost, to enter. This represents a huge risk that, depending on the amount of time and money invested in the program, may not be worth taking. Since the resulting pool of participants is essentially unpredictable, there is the possibility of missing the objectives of the program. Pioneer PES programs, such as Costa Rica's national program, did not have much information on which to base their program's initial design on and so adopted the first-come, first-serve rule. However, as more PES programs are created worldwide, hopefully, it is becoming second nature to assume that a targeting scheme is necessary and will significantly contribute to the overall impact of the program. Additionally, programs have the opportunity to examine the pros and cons of each approach utilized in established PES programs.

## **Theory: Payment Schemes**

Payment schemes are another integral part of program design as they define the interest level of participants given a program's limited budget. Due to these financial realities, it is imperative for program designers to provide the adequate level and structure of monetary incentive that will attract the ideal participants. If payments are set too high, the program will not be obtaining the maximum benefit possible given its budget. If payments are set too low, enrollment rates may be low as well since the payments may not be equal or greater than the landowner's opportunity cost, or the payments may attract the wrong participants (i.e. those with poor land quality).

As provided for targeting criteria, the following is a sample of the primary alternatives proposed for setting payment rates in PES initiatives. In the following section, five country examples underline modifications in payment schemes throughout their programs' lifetime.

### *Differentiated Payments*

One of the most commonly used payment schemes is differentiated payments. Ideally, landowners would be paid for the ecosystem service they provide. However, ecosystem service valuation has not been developed enough to implement such measures. Therefore, most programs assess the level of the ecosystem service provided by the

participant by evaluating the foregone opportunity costs (Jack, Leimona et al. 2009). The variation among program payment schemes mainly depends on the type of ecosystem service and how its opportunity cost is determined.

In some forest-related PES programs, participants are paid depending on the type of forest they are entering into the program, which is usually seen as a proxy for benefit (Eschavarria, Vogel et al. 2003; Alix-Garcia, De Janvry et al. 2005), and at times also on the level of protection and security they provide for the forest (Madrigal and Alpizar 2008). Likewise, silvopastoral ecosystem management projects in South America pay farmers depending on their land use (i.e. condition of pasture) and additionally for improving their land use practices (Mayrand and Paquin 2004). Other studies have integrated the targeting criteria and payment scheme and based payment levels on their targeting options. Alpizar et al. (2007) and Alix-Garcia (2008) pair high-benefit, high-risk targeting with payment rates in their respective studies on watershed services and forest programs.

In general, opportunity costs may be derived through a number of approaches, the most common of which include cost-flow models, stated and revealed preference methods, auctions and use of proxies or econometric analysis. Cost-flow models depend on observable land features to define cost estimates. Therefore, if there are discrepancies in costs from observable characteristics, the cost estimates will carry a level of inaccuracy (Jack, Leimona et al. 2009). Additionally, by basing cost estimates solely on observable characteristics, the model fails to consider other factors, such as time preferences and non-use values, which can be particularly relevant in the case of forest communities enrolled in PES programs.

Stated preference and revealed preference are categories of valuation methods that consider unobservable attributes of the land to different extents. In stated preference models, participants are given a hypothetical situation and subsequent questions about their reaction to the situation lead to an estimate of cost or value (Champ, Boyle et al. 2004). However, since participants are given a hypothetical situation and there is no clear link to the program, they are not motivated to provide an honest or meditated answer, leading to a bias in cost estimates. On the other hand, revealed preference relies on “data on observed market decisions” (Jack, Leimona et al. 2009). Therefore, it addresses the real-world deficiency of stated preference valuation models, but fails to consider non-use values. In the case of most PES programs, there is no established ecosystem services market from which data can be extracted. Therefore, this option is currently not available for most programs.

The use of auctions is based on the principle of willingness to accept (WTA), which is the minimum sum a participant requires to enroll in the program. Prospective participants provide sealed bids stating the sum they are willing to accept in return for entering their land in the program. In theory, bidders have an incentive to remain true to their actual WTA. If prospective participants over-bid, they run the risk of “losing the contract at a price they would have been willing to accept” (Jack, Leimona et al. 2009). If

they under-bid, they run the risk of losing utility from their land. The idea of using auctions in the design of PES programs is relatively new and as such needs refining and scaling; if it is developed empirically in local or regional programs, it may prove to be a useful cost estimation method.

An econometric analysis using different opportunity cost proxies, such as price of crops, can also be used (Alix, de Janvry et al. 2003; Muñoz-Piña, Alarcon et al. 2003; Chen, Lupi et al. 2010). Overall, the main setback of using opportunity cost as a partial determinant of payment sums is that opportunity cost may vary substantially across the land included in the program, especially if it is a nationwide program in a large country. Given this potential source of bias, policymakers need to consider and weigh alternative land uses and land values carefully in order to reach an adequate payment level.

The advantage to having differentiated payments is that it adds a sense of fairness to the project, which grants it legitimacy. However, this is also dependent on the level of transparency of the program. If payment levels are set with no description of how they are being differentiated or if unobservable criteria are used, program participants may grow wary and dissatisfied with the program. If the correct measures are taken though, a differentiated payment scheme may even motivate participants to increase the quality of the service they are providing. In the case of the silvopastoral ecosystem management programs in South America, if there is an improvement in the quality of their pasture, participants get a higher payment (Mayrand and Paquin 2004). In a more indirect sense, participants may be motivated to increase the quality of the ecosystem service simply by knowing that their land is being valued more than others. In forest-related programs for example, cloud forest is one of the most highly valued type of forest, environmentally and monetarily (Muñoz-Piña, Guevara et al. 2008). Therefore, if participants own cloud forest and they see how their forest is clearly important and greatly valued over other types of forests, they may be inclined to care for their forest beyond the amount required by the program.

### *Auctions*

Aside from serving as a way to derive participation cost, auctions can also be used as a stand-alone payment scheme. In an auction, the applicant would provide the given amount they would be willing to accept to enter the program and retire their land. Programs using this method are few and far between due to its variable outcomes and magnitude in effort implementing it. However, a stand-alone auction system does have the advantages mentioned above. Additionally, it can be combined with the program's targeting criteria, such as benefit targeting to spot the most ideal candidates (Latacz-Lohmann and Van der Hamsvoort 1997).

### *Flat Payment Rate*

Many PES programs provide a flat rate per hectare for all participants. In some cases, different payment levels are made depending on the number of hectares a landowner enrolls. However, it remains a flat rate in the sense that the only variable considered is the number of hectares. The rates are usually based on the opportunity cost of the land. A detailed sample of opportunity cost estimation methods is provided under “Differentiated Payments”. In terms of simplicity and ease of implementation, a flat payment rate scores high. In fact, it is because of this ease of implementation that many PES programs used this scheme in their initial phases (Muñoz-Piña, Guevara et al. 2008; Pagiola 2008). Other programs may be inclined to continue using this rudimentary form of payment due to lack of funds, which is a valid reason. However, when a flat payment rate is implemented, tradeoffs will take place, particularly between efficiency and equity.

Since flat payments provide equal amounts for all, it can be seen as a more equitable approach than differentiated payments. However, the efficiency of the program will suffer given that it will be overpaying a percentage of the participants, providing them with more money than their land is worth. Very few, if any, participants will be underpaid since it would not be logical for landowners to agree to get a lower amount of compensation than their land is worth. Therefore, a flat payment rate can provide positive outcomes, mainly in the social aspect; however, more environmental gains can be achieved by opting for a more tiered payment scheme.

#### *Hybrid Payments*

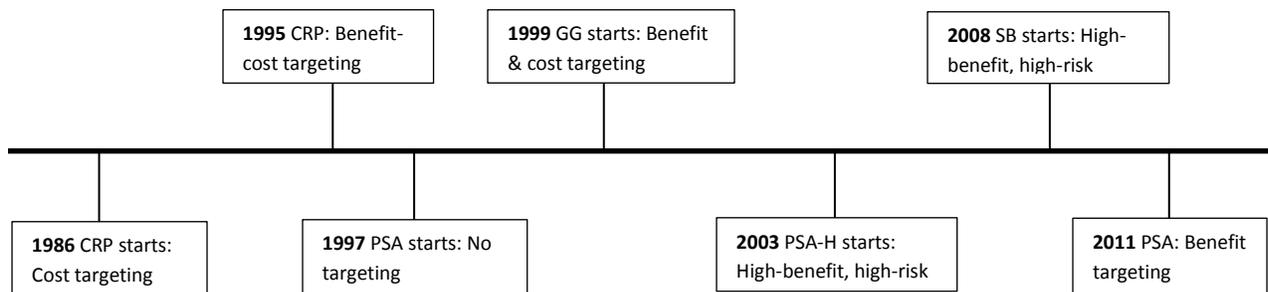
Hybrid payments describe payment schemes that create tiers of payments based on one technical characteristic of the land, such as location and number of hectares (Uchida, Xu et al. 2005; 2011). This payment scheme is a step in the right direction in regards to moving away from a flat payment because it acknowledges the fact that not all land parcels are created equal.

### **Practice: Targeting Criteria & Payment Schemes**

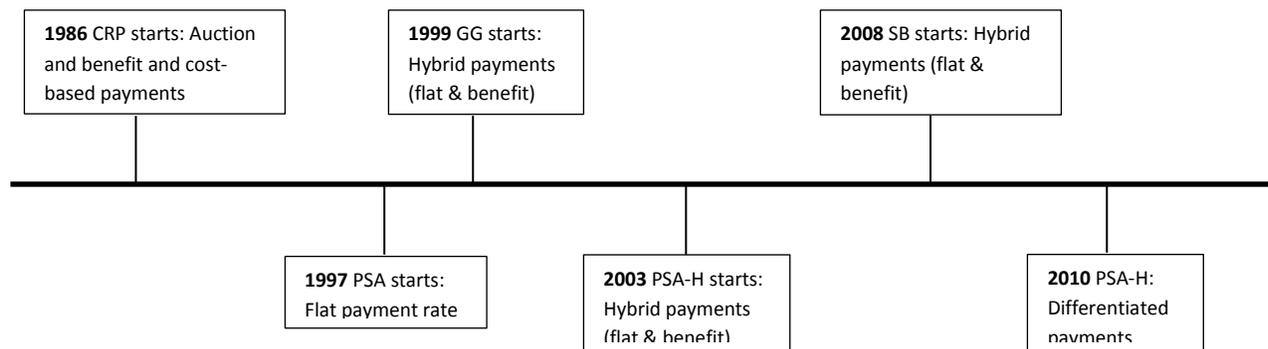
Some of the previously mentioned studies applied their theories to real-world national programs, such as those in Costa Rica (Wunscher, Engel et al. 2006), Mexico (Alix, de Janvry et al. 2003), China (Chen, Lupi et al. 2010) and the U.S. (Babcock, Lakshminarayan et al. 1997). While incorporating these suggestions into policy is not always a viable option, be it for logistical, political, social or economic reasons, most PES programs have adopted some form of targeting and payment scheme. The historical and current criteria for selecting participants and payment mechanisms in five well-established, national programs are displayed below to show the varying degrees of targeting that have been put into practice.

In viewing this table, it may also be of use to consider the different objectives of each program, stated below:

- USA’s Conservation Reserve Program: To reduce soil erosion by removing land from production (Babcock, Lakshminarayan et al. 1997)
- China’s Grain for Green Program: To prevent soil erosion mainly by increasing forest cover through the restoration of forests and to enhance the rural economy (Uchida, Xu et al. 2007; Gauvin, Uchida et al. 2010)
- Costa Rica’s PES Program: “To maintain and recuperate forest cover in the hands of private property owners” (Sanchez 2012)
- Mexico’s PES Program: “To promote the conservation of forest ecosystems and compensate both the opportunity cost derived from undertaking activities that damage ecosystems and the costs of good land management practices” (CONAFOR 2011)
- Ecuador’s Socio Bosque Program: To
  - “Protect 4 million hectares of forests and other native ecosystems and their ecological, economic and cultural values
  - Reduce deforestation rates and their associated greenhouse gas emissions
  - Improve the livelihoods of those who protect forests, mainly the poorest rural communities of the country” (Environment 2011)



**Figure 1. Timeline with development of targeting criteria for the USA’s Conservation Reserve Program (CRP), Costa Rica’s Payments for Environmental Services program (PSA), China’s Grains to Green program (GG), Mexico’s Payment for Ecosystem Services-Hydrological program (PSA-H) and Ecuador’s Socio Bosque program (SB).**



**Figure 2. Timeline with development of payment schemes for the USA’s Conservation Reserve Program (CRP), Costa Rica’s Payments for Environmental Services program (PSA), China’s Grains to Green program (GG), Mexico’s Payment for Ecosystem Services-Hydrological program (PSA-H) and Ecuador’s Socio Bosque program (SB).**

From the timelines, we can see that most programs have utilized combinations of targeting criteria approaches and payment schemes to design their program. It is a critical point to note in order to understand the balance between theory and reality. In theory, each program would employ “pure” targeting criteria, using one approach. However, in reality, there are limited resources, conflicting interests, multiple objectives and institutional arrangements that must be considered and at times prevent theoretical concepts from translating into practical use. Each of the countries mentioned has needed to implement a combination of approaches at one point. In the following sections, each program’s targeting criteria and payment schemes are discussed as well as how they adjusted theoretical concepts in program design to fit their country’s needs.

#### USA’s Conservation Reserve Program (CRP)

The CRP began in 1986 under the US Department of Agriculture in an effort to incentivize farmers to retire their land in order to reduce erosion. While its targeting criteria have remained relatively pure throughout its lifetime (Latacz-Lohmann and Van der Hamsvoort 1997), its payment scheme employs both auctions and benefit-cost consideration. The voluntary program grants land retirement contracts to farmers based on a competitive bidding scheme. Farmers indicate in their bids how much they need to be paid in order for them to conserve their land (Babcock 1997). The program then ranks bids based on environmental benefits and costs (Agriculture 2012).

#### Costa Rica’s Payment for Environmental Services (PSA) Program

In 1997, Costa Rica became the first developing country to establish a formal, national PES program (Pagiola 2002). Within the voluntary program there are different divisions: reforestation, forest protection and agroforestry. Overall, the program lacked targeting criteria for its first fifteen years. However in 2011, the National Forestry Financing Fund (FONAFIFO), which is in charge of implementing the program, began to prioritize areas which provide environmental benefits such as protection of hydrological resources. Aside from environmental prioritization, the program also incorporated social criteria for selecting participants as a result of the Costa Rican government’s involvement in the United Nations Millennium Project, which seeks to improve the well-being of those with most need (2012). Therefore, there was no direct initiative on behalf of FONAFIFO to set social criteria in the program; however, political responsibilities required them to do so. Changes have also been made to the method for determining payment amounts, even though the payment scheme has remained as a flat payment rate (2012). Initially, the payments were set based on the opportunity cost related to agricultural production, which was the main driver of deforestation. Afterwards, they began to consider the value of the different ecosystem services in available markets (2012). However, they only changed the amounts given to participants not the structure of payments. For relatively small countries

like Costa Rica, program implementers may consider a flat payment rate appropriate since there are few, if any, significant regional variations to consider.

#### China's Grains to Green (GG) Program

China's GG program began as a pilot program in 1999; however, it quickly expanded into the national program it is now. Similarly to the CRP, the program's goal is to reduce soil erosion by granting 8-year, land retirement contracts (Chen, Lupi et al. 2010). However, the targeting for the GG is very different. The literature sites the steepness of the slope as being the main targeting criterion when selecting participants, implying there are other criteria being considered (Uchida, Xu et al. 2005; Chen, Lupi et al. 2010; Gauvin, Uchida et al. 2010). However, in conversation with two experts on the program only slope was mentioned as a criterion (Chen and Song 2012). If slope is considered the only targeting criterion, the program is using a benefit targeting criterion. Depending on the region of the country, land with a slope greater than 25-15 degrees is eligible for the program. The program's payment scheme can be considered an advanced flat payment scheme since it has only two payment levels which serve as flat payments within each region of the country. If the land is in the upper reaches of the Yangtze River, the farmer will get a higher payment than if the land is in the upper reaches of the Yellow River. This distinction is made due to the higher opportunity costs in the Yangtze River (Chen, Lupi et al. 2010). Assuming a higher opportunity cost implies better land and a higher environmental benefit, it can be said that their payment scheme is a combination of a flat payment rate and an environmental benefit criterion.

#### Mexico's Payment for Ecosystem Services (PSA) Program

The PSA program began in 2003 in an effort to conserve forested areas and provide an incentive for forestland owners to participate in this initiative. The program is implemented by the National Forestry Commission (CONAFOR) and is designed as a voluntary, performance-based program in which participants are required to undertake a number of activities to maintain their forest healthy and standing during their 5-year contracts in exchange for annual payments. Applicants are screened in two phases. First, their land parcels must be located within the eligibility zone. If they are, they are ranked according to a point system. Each criterion is given a certain point value; the parcels with the highest number of points accumulated get accepted. The targeting criteria are modified each year; however, few, if any, drastic changes occur from one year to the next. Consideration of environmental benefits and deforestation risk has always been part of the selection process for the program; however, the way they have been utilized has varied throughout the years. For the first two years of the program, the deforestation risk was considered in the eligibility zone determination (2012). However, beginning in 2005 it became a stand alone targeting criterion (Chapingo 2006). The scale, variables and

modern-day applicability of the deforestation risk model is an area of contention within the program that will be debated in further detail in a subsequent section.

In 2006, the program was added onto a broader CONAFOR program named ProArbol, whose main objective was to reduce the poverty level across the Mexican population (CONAFOR 2007). Similarly to Costa Rica, these socioeconomic objectives led to the incorporation of social targeting criteria onto PSA's prioritization scheme. The effects these criteria have caused are also a point of contention that will be discussed in a later section.

Overall, the program can be considered as implementing a high-benefit, high-risk targeting approach. Each year, an average of 500,000 hectares of land are enrolled; this represents 1 out of 5 applications and merely 1% of the eligibility zone (2012). As a result, the size of the eligibility zone is also subject to dispute.

The payment scheme of the program has also had its modifications. The initial payment rate was dependent on the amount of funding CONAFOR had at the time for the program and used Costa Rica's payment rate as a reference (2012). At the time, Costa Rica paid more than \$30/hectare/year, which amounted to 300 pesos/hectare/year for Mexico. The length of the contract was also taken from Costa Rica's program (2012). In 2005, they changed their payment scheme, but not necessarily the payment amounts or valuation of payments. They decided to make payments in reference to the average minimum salary in the Federal District to prevent the devaluation of payments throughout the course of the contract period.

In 2008, they began trying to incorporate opportunity costs into the program. At first, they wanted to have 15 different payments based on opportunity costs, implementation costs, deforestation risk, poverty level and multi-service potential of an area (2012). However, the institutional costs were too high; they would need more funding to hire more personnel and do more monitoring and verifications. Considering these realities, this manner of determining payment levels was dropped, and in 2010 the current payment scheme was launched using the type of ecosystem and deforestation risk as differentiating criteria and the opportunity cost of foregone alternative activities to set the payment sums. The program attempted to incorporate each ecosystem's main alternative activity in the evaluation of opportunity cost, but in some instances, such as pine forests, the opportunity cost was too high, so the payment had to be lowered below the opportunity cost (2012). In general, the payments are mainly based on the opportunity cost but do not represent the full amount participants could have made if they were involved in alternative activities. However, the payments have been framed as incentives not sustainable sources of income; therefore, it makes sense that they do not cover the full opportunity cost.

### Ecuador's Socio Bosque (SB) Program

SB was launched in 2008 with the goal of conserving more than 3,600,000 hectares of forest by providing 20-year contracts to forestland owners. Similarly to other PES programs, the SB program is a voluntary program that not only has environmental targeting criteria but also social criteria; the program prioritizes areas with high deforestation threats, high importance for ecosystem services and high poverty levels (Environment 2011). Therefore, their targeting criteria can be described as high-benefit, high-risk. In terms of payment schemes, the program utilizes a flat payment rate, but has decreasing payment categories depending on the number of hectares in the property enrolled; therefore, it can be considered a hybrid payment scheme.

## **THE MEXICAN PES PROGRAM**

Mexico's national PES program can serve as an excellent source of knowledge and experience as it is one of the most well-known PES programs in the international community. Between 2003 and 2011, 3.11 million hectares of forest were placed in the program with the assistance of US\$470 million provided as direct payments to 4,893 participants across 28 states (CONAFOR 2012). The program divides into two separate programs to provide hydrological and biodiversity services through forest conservation. The focus of this study was the Payment for Hydrological Services (PSA-H) program, which pays participants to conserve forest upstream from population centers with the goal of increasing the quality and quantity of available water.

Deforestation in Mexico has been a continual problem. According to the Food and Agriculture Organization (FAO)'s State of the World Forests 2010 Report, Mexico has a forest area of approximately 64.8 million hectares, a 3% decrease from 2000 (FAO 2011). On average, national estimates of annual deforestation rates range between 0.6-2.4% depending on the type of forest (Alix-Garcia, De Janvry et al. 2005). The main drivers of deforestation in the country are, and have been for decades, conversions to agriculture and cattle ranching (Alix-Garcia, De Janvry et al. 2005; Muñoz-Piña, Guevara et al. 2008).

Forestland is found in the majority of the states, signifying it is an issue that affects most regions of the country. The ownership of forests, however, is not as evenly divided. 70-80% of the forestland in Mexico belongs to *ejidos* and *comunidades*, which are rural communities (Alix-Garcia, De Janvry et al. 2005). In *ejidos*, there can be individual and communal property rights, while *comunidades* are usually entirely communal. Within *ejidos*, individual plots of land tend to be used for agriculture and communal areas for pasture and forest (Alix-Garcia, De Janvry et al. 2005). As a result, there tends to be a higher deforestation on average in *ejidos* and *comunidades*. Considering the fact that the majority of forest areas are in *ejidos* and *comunidades*, their higher deforestation rate provides a unique dynamic in forest conservation. Additionally, most forest communities are marginalized or low-income due to their location and in some cases difficulty in accessing

urban centers. For the remainder of the paper, *ejidos* and *comunidades* will be referred to jointly as *ejidos* since they do not differ significantly in the context they will be discussed in.

Before the PES program was established, the Mexican government tried to reduce deforestation using other policy tools, such as land use regulations, subsidies for sustainable forest management and police enforcement, to halt illegal cutting. However, there were two main problems with these attempts. The main drawback was the scope of the regulations and subsidies. They could not regulate small-scale land use changes due to capacity restrictions, and since less than 10% of the country's forests are commercial, they were not having the desired impact (Muñoz-Piña, Guevara et al. 2008). Possibly also due to capacity restrictions, police enforcement was limited in helping reduce illegal cutting. Therefore, the PES program was created as a means to fill in the gaps left by these policy tools, addressing non-commercial forest property.

The program was established as a voluntary, performance-based program implemented by the National Forestry Commission (CONAFOR). The rules of the program are fairly simple; landowners, individual and communities, are given a direct payment in exchange for conserving their primary forest cover. There are a number of activities all participants are required to do to help guarantee the conservation of forest cover and additional activities some participants are required to do if the forested area exceeds a certain amount. All participants are provided with a list of *asesores tecnicos*, who serve as advisers for participants mainly regarding how participants should carry out the requirements of the program. To a certain extent, *asesores tecnicos* are expected to capacitate participants and educate them on forest conservation and sustainable forest practices; however, the level of involvement of each *asesor tecnico* differs case by case. Payments are given at the end of each year during the five-year contract, after which they can choose to reapply.

Aside from the program's environmental focus, the program has also taken on rural development goals, directly or indirectly. In 2006 the program became part of a larger program in CONAFOR called ProArbol, which has as one of its main objectives reducing the poverty index and marginalization. Since most forest communities are *ejidos*, which tend to be marginalized and low-income, there was reason to believe this additional focus would be complementary to the program's environmental aims. This dual objectivity has now become a point of dispute among policymakers because of the effect it has on how the program is perceived. This topic will be discussed in further detail in a subsequent section.

In 2008, a similar initiative as the national PES program was launched by CONAFOR but at the local level. Its main goal is to connect the beneficiary and provider of the service in a more direct manner in order to develop a market for these ecosystem services, which will lead to a more sustainable form of conservation. In the national PES program, the payments given to landowners are partly funded by federal water fees, so to some degree there is a connection between the service beneficiary and provider. However, the fact that there is not a complete awareness of that relationship on both ends hurts the overall

impact of the program and the level of support it has. Local PES mechanisms are now working to complement the national PES program and have also influenced to a certain extent how the national PES program is designed.

On the international level, Mexico has been designated as one of the pilot countries for REDD+. There are a number of ways a country can choose to implement their REDD+ strategy. One commonly seen component is to create or expand a PES program. Mexico plans to utilize its PES program as a tool in their REDD+ strategy, but does not intend on focusing solely on PES. Rather, Mexico is viewing REDD+ as an opportunity for socioeconomic development, particularly in rural areas, which is where the poorest and most marginalized communities are located. As Mexico's PES program continues evolving, the lessons learned during the process could provide guiding points in the development of REDD+.

## **RESULTS**

Nineteen interviews were conducted amounting to a total interview time of 19 hours and 37 minutes. The average interview took approximately 1 hour. The results are divided into categories including program objectives, internal cooperation, state demographics, specific targeting criteria and payment schemes content, points of disagreement in program design, general tendencies in the program's direction and recommendations for the program. Most of the results stem from interviews regarding Mexico's PES program; when other PES programs are discussed, they are clearly identified as such.

### **Program Objectives**

Overall, there was a great variety of opinions about the objectives of the program. The most commonly mentioned objectives were:

- Promote the conservation of the current forest cover we have in Mexico by providing landowners with a monetary incentive to maintain and in some cases improve the service they are providing. (10)
- Generate a market where ecosystem services providers are given a payment for its conservation. We are still at the beginning of the process, so currently we are just paying service providers to conserve their forest, but in the long run we want them to be independent and to have a service buyer that is not the federal government. We want them to connect with other institutions and be paid for their service by these institutions. (2)
- Mitigate poverty by helping forest communities (4) which are usually the most marginalized. (1)

- Promote an understanding of the value of ecosystem services that are provided by forests (2) and how forests can serve as a source of income (1). One option would be through sustainable forest management. (2)
- Reduce deforestation. (2)

(#) represents the number of interviewees who stated that as the program's objective

## **Internal Cooperation**

In terms of institutional development, it was mostly state officials who were discontent with the manner of designing the program. Although the central office asks state officials to provide feedback on the Rules of Operation before they are finalized, some state officials felt the amount of time given to state offices to review the Rules is usually not enough to conduct a comprehensive analysis and consult with technical advisers who are on the ground and would have a good opinion of what is working and what is not. Additionally, several state officials mentioned they were not told how the Rules were eventually decided on or what other states had suggested. Rather, state officials were made aware of the final decisions once the Rules were published with no explanation given as to how changes were decided on. Aside from not knowing how the final Rules of Operation were produced, most state officials had no idea how the payment schemes were formed nor how the deforestation risk model was used. A couple of state officials directly stated they would like for state opinions to be heard and seen more in the Rules, since their experiences can have a tremendous impact on the program's design and implementation.

## **State Demographics**

Federal District (DF):

- Majority of applicants have large properties (>5000 hectares)
- Few, scattered small properties
  - Not a big opportunity for joint applicants
    - Only 1 joint applicant in 2010
- A biological corridor passes through part of the DF, so the state can use that criterion
  - The properties also border each other, so there is a corridor formed among them as well
- One of the states with the highest overall points in criteria because of its geographical conditions
- Does not have municipalities in the 100x100 strategy, so the state cannot use that criterion (The 100x100 strategy targets the 100 most marginalized communities in the country)
- Most people are in area 3 of the payment levels

Queretaro

- Most applicants are in a biosphere reserve where they form a biological corridor, so they can use that criterion
- Most of the land belongs to private property owners
  - Only ~3% belongs to ejidos
  - Causes the state to have more joint applicants than most states
- Has had less applicants enroll in the program after 2008 probably because of the 100 hectare minimum requirement set for private properties
- Overall low deforestation risk among participants

#### Oaxaca:

- One of the states with the highest marginality index
- Criteria most frequently used: indigenous communities, Natural Protected Areas (ANP), priority watershed areas, aquifer recharge zone
- Participatory Monitoring Committee criterion not used often
  - Communities form monitoring committees but usually they are not accredited
- Has municipalities in the 100x100 strategy, so it can use that criteria
  - In 2007, it was one of the criteria that was most often used

#### Guanajuato

- Does not have municipalities in the 100x100 strategy, so the state cannot use that criterion
- Only 1% of applications are from joint applicants
- Overall low deforestation risk among participants

#### Puebla

- Most of the applications are from *ejidos*
- Do not receive a significant number of joint applicants
- Biological corridor criterion is not applied, but corridors are forming indirectly
  - When individuals realize their neighbor is in the program, they want to join too
- Not a lot of participants reapply
  - In 2011, 1 out of 10 reapplied
- Principal threat to forests: forest fires
- Has two municipalities in the 100x100 strategy, so the state can use that criteria
- Overall low deforestation risk among participants

#### Hidalgo

- Number of joint applicants has been decreasing
  - Last year there was only one

- Criteria most frequently used: indigenous communities, marginalized communities
- Does not have any municipalities in the 100x100 strategy, so the state cannot use that criterion
- Overall low deforestation risk among participants

#### Chihuahua

- Most of the participants are *ejidos*
- Criteria most frequently used: marginalized communities
- Does not have any municipalities in the 100x100 strategy, so the state cannot use that criterion

#### San Luis Potosi

- Most of the participants are *ejidos*
- Does not have any municipalities in the 100x100 strategy, so the state cannot use that criterion

### **Targeting Criteria**

In regards to the targeting criteria, there were a few points where the majority of interviewees agreed. There was unanimous support for the continued spread of biological corridors. Along the same vein of thought, most of the interviewees agree that the focus of the program is and should continue to be *ejidos*, which is reflected in the targeting criteria. Support for favoring the selection of *ejidos* over small landowners is both environmentally and socially based. The majority see *ejidos* as a cost-effective way of using and spreading the resource to obtain higher environmental benefits. Others support favoring *ejidos* because of the socioeconomic improvement that comes with the resources provided to them. State officials were the main proponents of the opposing side. In one state in particular, their main constituency were small landowners; therefore, their constituency is negatively affected by targeting criteria that favor *ejidos*.

### **Payment Schemes**

Most of the interviewees considered the current payment scheme the most effective scheme in terms of providing a just payment to people with different land qualities. The current payment scheme uses differentiated payments based on the type of ecosystem and the risk of deforestation. However, those interviewees that were aware of the deforestation risk model's origin were not satisfied with the output of the model, variables used and lack of information on the methodology used. Additionally, the majority of that subset of interviewees considered the model, which was created using data from 2000, to be outdated and in need of refining.

## Points of disagreement

The main disagreements on targeting criteria and payment scheme stemmed from the weight given to social criteria and the risk of deforestation. Several interviewees expressed preferring a greater amount of emphasis placed on the social standing of participants both in the targeting criteria and payment scheme. For instance, three state officials recommended lowering the minimum number of hectares needed for private property owners to get in the program so more people can receive a payment. Two interviewees recommended lowering the maximum hectares allowed, also to allow the payments to reach more people. In terms of payments, one interviewee suggested including a social criterion like a marginality index, while two other interviewees suggested returning to a flat payment rate to promote equity.

There were also different opinions on how much the social aspect of the program should be emphasized. The main concern is how the program is being perceived by participants and how that can then hinder the environmental impact of the program. Some interviewees gave recommendations as to how to prevent this situation, mainly by putting more emphasis on environmental criteria. One suggestion was to reduce the eligibility zone. This was agreed upon by all officials at the national level, and the majority of the state level officials as well. However, national officials claim 60% of state officials request the eligibility zone to be expanded when the central office asks for suggestions from them; therefore, the results seen in this study may be an inaccurate representation of the overall sentiment by states concerning the size of the eligibility zone. Regarding payment rates, one interviewee suggested differentiating payments for technical advisers based on previously determined characteristics of program participants in order to incentivize the technical advisers to reach out to the most marginalized communities, which need the most help. By doing so, the level of environmental education of participants overall may be improved.

The other main point of contention is the weight given to the risk of deforestation. When asked whether an applicant who is not using their land and has no plans for using it should be allowed to enroll in the program, three different viewpoints were expressed: for paying applicants who were already conserving, against paying applicants who were already conserving and not against paying applicants who were already conserving. The majority of the respondents were not against paying these types of applicants. Most of them realize that while it is not an ideal situation, there can be some benefit gained from having these applicants in the program by providing a level of training of forest management and understanding of the value of the forest and ecosystem services. Those that supported paying people who were already conserving justified their support by stating that the applicant is still providing a service regardless of their past use of the forest. Their forest is still susceptible to natural and external threats, and they should not be denied a source of income. Those that were against paying people who were already

conserving claimed that doing so was not an efficient use of program funds since that forest surface would have been conserved regardless of the existence of the program.

### **Program Tendencies**

General tendencies include ideas that are being pushed by either national or state level officials to improve the program and that do not show any opposition at this point. These program tendencies include an increase in support or promotion of:

- Enhanced quality of technical guidance for participants
- Biological corridors
- Local PES mechanisms
- Inter- and intra-agency collaboration

### **Recommendations**

General recommendations were given to improve both components of program design discussed and the overall operation of the program. Several interviewees suggested moving towards a decentralization of program design, giving states more autonomy and decision-making power. One interviewee suggested analyzing and then comparing what criteria, whether environmental or social, was used more by accepted and rejected applicants to see whether the proportion of environmental versus social criteria align with the program's objectives. Since the primary objectives of the program are environmental, there should be a greater use of environmental criteria instead of social criteria by accepted applicants.

Specific recommendations for targeting criteria included adding criteria evaluating:

- The organization level of ejidos\*
- Active forest management\*
- Catchment areas of aquifers
- Carbon potential
- State-level criteria aside from national criteria\*

\* also suggested as a payment criteria under differentiated payments

## **DISCUSSION**

Given the results of the study, there are certain areas in program design that can be adjusted in order to fulfill the objectives of a PES program more thoroughly. In this section, the main categories mentioned in the results will be discussed, including program objectives, internal cooperation, points of disagreement in program design and recommendations for the design of PES programs.

## **Program Objectives**

The first step to achieving a program's objectives is setting them. For a variety of reasons, some programs struggle with or underestimate the value of establishing and voicing clear objectives. However, having all actors involved aware of the objectives of the program promotes transparency and uniformity. It provides a foundation for all employees to work toward a common goal. As seen in the results, no two interviewees gave the same definition for the objective of Mexico's program. This can have a significant effect on the impact of the program since program evaluations are dependent on how well the objectives are fulfilled. If there is no consensus on the objective of a program and each evaluation considers different objectives, the true impact of the program is not being portrayed. This is particularly important in program design because with variations of objectives, everyone has a different idea of what the program is trying to achieve and therefore, will evaluate the quality of a criterion or payment scheme with different rubrics. Additionally, having uniform objectives allows for a more efficient use of human and financial resources. One interviewee shared that because the current objectives are vague, each administration interprets them differently and re-designs the program to an extent, and by the time the employees implementing the program on the ground become aware of the new administration's vision for the program, there are more changes that need to be made. Therefore, the objectives of the program should be the first thing to be set, enforced and voiced clearly to all employees in the implementing agency, technical advisers and program participants. The objectives of the program should then dictate the design of the program, whether it seeks to maximize environmental effectiveness, maximize social equity or have a dual objectivity.

## **Internal Cooperation**

Lack of agency cohesion is one theme that rose in Mexico's case, beginning with the various interpretations of the program's objectives. Communication and collaboration between national and state offices can facilitate and improve the design, implementation and perception of PES programs. For one, it promotes uniformity and shows prospective program participants that the program can be trusted. Because most PES programs are implemented in developing countries and sometimes there exists governmental corruption, a sense of security and trust is important to gain from communities. Also, the more informed state officials are, the more informed participants are of program decisions, logistics, requirements, etc.

In Mexico, there is a lack of information sharing between the offices. For instance, state offices are not given details as to how final participants are chosen. They are not told what criteria each participant was able to fulfill or how close participants were to being accepted. Meanwhile, rejected applicants approach state officials demanding to know why their application was rejected. Since state officials do not know, some admit to giving them their most educated guess as to why their application was rejected. However, because the

relationship with these applicants is so close at the state level, this backlash of unsatisfied community members at times discourages state officials from further promoting the program. They do not feel confident about their knowledge base, and they also comfort themselves in knowing that regardless of program promotion, there is a high demand for the program. However, this high demand does not mean that the people demanding it are necessarily the best candidates for the program. In this manner, not having the adequate information to share with program applicants prevents state officials from searching for ideal program participants who would provide more benefit to the program.

Other pieces of information not communicated to state officials include how the rules of operations were finalized, why payment schemes changed, how payment schemes and amounts were formulated and how the model of deforestation risk originated. A couple of state officials admitted they were given a reason for the setting of payment rates, but they did not believe it. This lack of information and distrust creates a barrier for communication and collaboration. States have a wealth of experience and knowledge because they are the ones interacting with the participants on a daily basis; they know what works in their communities and what can be improved. More importantly, they want to be part of the decision-making process. With a large and geographically diverse country like Mexico, regional differences are going to abound. State offices acknowledge it is a difficult task to accommodate the vast number of requests; however, the majority of state officials admit that the central office rarely, if ever, implements their recommendations or grants their requests. Additionally, several officials at both the national and state level mentioned that there needs to be a shift toward decentralization to make the program more effective due to the country's vast regional differences. The movement toward decentralization would be facilitated by states knowing how the program works more thoroughly.

If more time is invested communicating with state offices and, more importantly, among state offices, it is more likely that greater common ground can be reached and better ideas can flourish from such collaboration. This can be achieved by providing state offices with more than a couple of days to send their recommendations. This would not only give them time to consult with technical advisers and program operators, but also with other state offices. If states know what suggestions other states are promoting, it is possible that they also agree with that suggestion and can jointly present the idea to the national office and have a greater chance of having the recommendation considered. In the long-term, a forum or venue to facilitate communication among state would be ideal. Providing state officials with details as to how program participants were selected is also important to give state officials more confidence in their authority and standing and to allow them to communicate the information to applicants. The specific information is available since the national office had to calculate enrollment; it is a matter of communicating it to state offices.

## Points of disagreement

Partly due to the ambiguity surrounding the objectives of Mexico's program, two main points of disagreement have arisen: the social role of the program and the importance of considering deforestation risk in selecting and paying participants.

In Mexico and Costa Rica, the PES programs took on social objectives because they became part of a larger program with broader goals of national, socioeconomic development. Therefore, they are obliged to consider socioeconomic well-being in their criteria. While nobody expressed a desire to get rid of social criteria in Mexico's PES program, there were varying opinions regarding how much this aspect of the program should be emphasized. The main concern is how the program is perceived by participants and how that can hinder the environmental impact of the program. In Mexico, it has come to the attention of program implementers and evaluators that sometimes the program is seen as social subsidy. This case is more prone to occur in *ejidos* rather than private properties due to the chain of information. The *ejido* leader along with a committee of three *ejido* members is the one in charge of interacting with CONAFOR. *Ejidors* hold meetings resembling town hall meetings where a variety of communal decisions are made, including whether to apply for the PES program. How much the program is explained to the rest of *ejido* members is unknown. They vote and provide CONAFOR with an Assembly Act stating the *ejido's* interest in applying. If they are accepted, sometimes the *ejido* leader does not tell the rest of the *ejido* members where the money is coming from and *ejido* members simply see the payments as social subsidies since they are in marginalized communities and Mexico has a number of social subsidies directed toward them. In other cases, the *ejido* leader and committee members keep the payments for themselves; *ejido* members are not even aware payments exist. In both cases, *ejido* members are not aware of the environmental purpose of the program. They see the land use change, and they might see the payments, but they do not make the connection between them. They do not realize they are getting paid for conserving the forest, and hence miss understanding that there is a value to the forest. If the value of forests and ecosystem services is not grasped, the program's environmental objective is hindered. After the five-year contract is over, they will continue treating their land as per usual, and no environmental gain will be made. Since *ejidos* make up the majority of applicants in the program, this misconception represents a large problem for Mexico and potentially also for other countries with similar communal properties.

Deforestation is a difficult topic for many reasons. The most relevant question in regards to targeting criteria and payment schemes is whether to pay someone that would have conserved the forest regardless of the existence of the program. The question has several dimensions and arguments to it. Those in favor of providing people that were already conserving with payments have five main arguments. One argument tugs at how the program is intended to be viewed versus how it is viewed. Two interviewees mentioned that if the people that are conserving are not paid and those that are currently

not conserving are paid, this can be seen as rewarding bad behavior instead of good behavior, which may lead those that are conserving to stop conserving and begin deforesting in order to be rewarded later for “starting” to conserve. Another argument is that if a program targets only those areas with high deforestation rates, after the contract period is over, those participants will start to deforest again because there is no more monetary incentive to offset the cost of halting alternative uses of the forest. It is not a ploy against forests, but more of a need for survival; if they were dependent on the forest before the program, they will likely continue being dependent on the forest after their participation if no other source of income is found.

A strong argument is one of equity; since people who were already conserving represent a large percentage of low-income landowners, they should not be excluded from the program. However, since most of the participating *ejidos* are marginalized and hence difficult to reach, their risk of deforestation tends to be very low to low since it would not be economically profitable for external actors or internal community actors to cut down the forest. They have no productive use for the forest or the resources to invest in forest projects. By default, they would most likely be excluded from the program if it did not allow people who were already conserving the forest to enter.

More technical arguments were given by interviewees in this study. Some claimed that they should be granted enrollment because they are providing an ecosystem service regardless of their previous land use, while others mentioned that even though their deforestation risk is low, they are still susceptible to illegal cutting, plagues and forest fires. If they have some form of management, like that required by PSA-H, the forest will be healthier and will provide better ecosystem services.

Some of these arguments can be refuted to some extent. The likelihood of participants with a high deforestation risk returning to their deforesting activities after their contract period is highly dependent on the amount of environmental knowledge that is instilled in the participants. If participants that previously deforested their land are instructed on sustainable forest management practices or other ways to produce revenue from their forest, they may opt to do that instead of deforesting. Through monetary incentives, PES programs lure participants into the program. Once they are in the program, it is the responsibility of the program to increase their knowledge of the environmental value of the forest and ecosystem services and how participants can use these two concepts to benefit them, via sustainable forest management activities or participation in a local PES mechanism.

If this instructive part of the program is not fulfilled, it can also be argued that the program is “wasting” its time on people that would have conserved anyway because their forest practices would not have changed after the five years either. The validity of the equity argument is dependent on the program’s objectives; if social factors are being prioritized, it is likely that applicants in marginalized communities will not be denied enrollment in the program.

Those interviewees against paying people who were already conserving before entering the program have an environmental argument. If there is no land use change, there is no environmental gain. The majority interviewees did not support either extreme. While they realized paying these applicants was not an ideal use of program funds, they were not against doing so because they saw some benefit to having them in the program. One interviewee stated:

“I believe that even though it’s an error and you pay areas that were not going to be deforested, the benefit the program is getting from this is that you generate an environmental consciousness in people. Therefore, eventually you’re generating this understanding of the value of the forest and ecosystem services. In this sense, we see it as an investment; we’re planting the seed of what are ecosystem services and what is their value. I don’t think it’s a waste of resources; I think it’s an investment in changing their perception and behavior.”

There are two main reasons that support this statement. For one, the reality that Mexico faces, and possibly other developing countries, is that it does not have the capacity to exclude these applicants. This would require the implementing agency to do a pre-assessment of the more than 3,000 applicants’ land; considering the facts that in Mexico, only 1 out of 5 applications are accepted and that CONAFOR agents do verifications of the land enrolled only 4 times during the 5-year contracts, pre-assessments would represent a tremendous increase in personnel and resource use. Secondly, one of the inherent goals of a PES program is in fact to instill in people a sense of environmental awareness, which is not necessarily dependent on their risk of deforestation. In this sense, enrollment of properties that were already being conserved can be seen as no less important than enrollment of properties at risk of deforestation.

Other interviewees considered intervention in low deforestation risk areas to be warranted when the cost of intervening is low and the benefit of avoiding damage is high. For instance, there is one community in the state of Colima that is situated in a biosphere reserve; since the area is protected against cutting, the surrounding forest’s risk of deforestation is low. However, the watershed in the area supplies such high quality water for the city downstream of approximately 250,000 people that it does not require a treatment plant. They treat it with chlorine to kill bacteria, and then it is provided to the consumers. This watershed represents large cost savings for the community that could be put at risk if the surrounding forest was not involved in the PES program.

By shedding light on other benefits that can be achieved aside from increased forest cover and on country realities, the inclusion of forestland that was already being conserved in PES programs can be justified. The level of justification is dependent on the stated objectives of the program. If a purely environmental program is sought, the level of justification will be lower since social benefits will not be considered.

## Recommendations

As mentioned previously, program objectives should dictate the design of the PES program. Therefore, recommendations are discussed in this section based on three possible program objectives: maximize environmental impact, maximize social impact or have dual objectivity. For each option, key points in a program's targeting criteria and payment scheme are listed that would facilitate achieving program objectives, considering environmental and/or social tradeoffs.

If the program's goal is to maximize environmental effectiveness, it should:

- Have a reduced priority/eligibility zone\*
- Have a greater number of environmental criteria\*
- Have an accepted deforestation risk model\*
- Give deforestation risk greater weight than other targeting criteria
- Exclude social criteria
- Have a greater number of payment criteria in a differentiated payment scheme\*

\* represents suggestions supported by one or more interviewees

Currently, in Mexico the eligibility zone is 50 million hectares, and only 500,000 hectares are accepted annually. If only 1% of the eligibility zone is accepted into the program, this means that the first phase of screening applicants is not being used effectively. PES programs need to target more environmentally-rich areas like biological corridors, biosphere reserves and those most vulnerable. Additionally, reducing the eligibility zone would reduce the number of rejected applications and hence the number of hours spent processing them. In Mexico's case, 80% of the time spent processing applications is spent on rejected applications. With limited personnel, this is not an efficient use of personnel hours. However, there is a social tradeoff to reducing eligibility zones. If they are reduced, this means that fewer communities will qualify to receive payments from PES.

One way to improve the second screening phase in the selection of participants, which is the targeting criteria, is by increasing the number of environmental criteria. A couple of interviewees suggested including more hydrological criteria, including one for the catchment areas of aquifers. Currently, there are criteria prioritizing areas with water quantity or quality problems and overexploited aquifers. However, the importance of different areas of aquifers and the relevance of each to different ecosystems is not considered. One interviewee went further into discussing the need to start considering stricter targeting criteria to prepare for REDD+. This includes prioritizing areas that help to mitigate climate change by avoiding deforestation or forest degradation while forming biological corridors that are conducive for the conservation of biodiversity and supporting critical recharge areas of aquifers. Through this prioritization, eligibility zones could also be reduced.

If the focus of a PES program is going to be environmental, the main factor to consider is additionality. Is there an increase in forest cover being observed? In order to prioritize areas where land use changes can increase forest cover, there needs to be an appropriate deforestation risk model. One of the main topics discussed in several interviews was the current model of deforestation risk used in Mexico. Since the payments are based on the type of forest and its level of deforestation risk, the main attribute that can vary is the evaluation of deforestation risk. The current model was created in 2003, but was not used as a differentiating factor in the payment scheme until 2010. No part of the model was modified or updated, which causes suspicion as to the relevance of its results and variables used. The payment sum in turn is based on the opportunity cost of foregone land use activities; the reference activity used was the harvest yield of one hectare of corn. Several interviewees mentioned that not all the land in the country has the potential to harvest corn; there are other more relevant land uses for them that can yield higher or lower opportunity costs. Therefore, in countries where geographical differences abound, it would be more accurate to utilize regional values for opportunity cost than a national one.

Once an appropriate and accepted deforestation risk model is constructed, more weight should be given to the risk of deforestation as a targeting criterion. From the state officials interviewed, half claimed their state had a low deforestation risk, meaning that a good portion of payments are being given to people who are not likely to deforest. If an environmental impact is what is being sought, resources need to be re-directed to those states or communities with higher risks of deforestation. If a country is using a differentiated payment scheme, the deforestation risk should be included as a payment criterion.

A purely environmentally-focused PES program would require the exclusion of social criteria. However, in many countries, this might represent a politically unfeasible task. In Mexico, most of the payments stem from federal fiscal revenues which are conditional on the program benefiting the poor. Therefore, the program would lose significant political and financial support by not prioritizing poor communities.

In terms of payment schemes, one interviewee recommended differentiating payments based on the management activities necessary for each ecosystem or region of the country. Similarly to the deforestation risk model, this would require an in-depth analysis of regional characteristics; however, it would greatly benefit the environmental effectiveness of the program. If an area is not prone to forest fires, there is not a significant benefit in putting fire breaks. Instead, they can be focusing on preventing other forest threats like illegal cutting. It would also serve as a good opportunity to get states involved in designing the program and using their regional knowledge.

Differentiated payments for technical advisers were also suggested. There are several ways in which technical advisers can help participants in Mexico's program. At the very least, technical advisers are supposed to help participants decide what land to enroll in the program and what activities to do to fulfill their program requirements, and to train

participants on forest management activities. Additionally, they can be a source of knowledge for alternative conservation options, such as local PES mechanisms, other government conservation programs or productive forestry management. Unfortunately, some technical advisers fall short of providing even the bare minimum assistance. A state official mentioned that sometimes participants choose to enroll land that would have been more beneficial in forest management, but they were unaware of that option; a decision that should have been guided by the technical adviser. In the most recent version of the rules of operation, technical advisers are paid their quota directly, whereas before the program participant was given the payment to deliver to the technical adviser. With this new payment distribution, state officials are increasingly informing participants of the responsibilities of technical advisers and pushing participants to be in constant contact with their technical advisers to prevent advisers from neglecting their duties. One state official recommended differentiating payments for technical advisers depending on previously selected applicant characteristics so technical advisers can be motivated to assist not only communities that are easily accessible, but also those that are in marginalized areas that, due to their location, may be less aware of the potential benefits of managing their forest and more neglected.

If the program's goal is to maximize social equity, it should:

- Have low surface area requirements\*
- Include more social targeting criteria\*
- Include social payment criteria in a differentiated payment scheme\*
- Opt for a flat payment rate scheme\*

\* represents suggestions supported by one or more interviewees

Targeting criteria not only includes prioritizing participants with certain factors; it also includes requiring participants to have certain characteristics. In Mexico's program, there are minimum and maximum surface area requirements. In 2010, the minimum number of hectares required by private properties increased five-fold from previous years. This change significantly affected the program demographics of several states and excluded a number of potential participants. High surface area requirements can be particularly detrimental to a program focused on social equity if we assume that low-income landowners have small properties. Having a low maximum surface area would also serve the purpose of channeling resources to participants with financial need.

An increase in social targeting and payment criteria would also benefit a socially-focused PES program. In Mexico's program, there are already a number of social criteria prioritizing indigenous and marginalized communities; however, more emphasis can be placed in the size of these communities in order to reach the largest communities. If a differentiated payment scheme is being used like in Mexico, some of the social criteria should be used to differentiate payments. For instance, payments can be differentiated by the marginality index. If a program is commencing, a flat payment scheme would be the

best option as it promotes the greatest level of equity. However, by placing a greater emphasis on equity the program loses environmental effectiveness and efficiency. Some properties are in regions or ecosystems that are not as environmentally beneficial to conserve or have a smaller deforestation risk in comparison to applicants chosen considering non-social criteria.

If the program is seeking dual objectives of environmental and social impact, it should:

- Implement a two-tiered system for targeting criteria,
  - Prioritize environmental criteria
    - Active forest management\*
  - Include “more tailored” social criteria
    - organization level of *ejidos*\*
- Reflect both objectives in its payment scheme\*
- Participate in inter- and intra-agency collaborations\*

\* represents suggestions supported by one or more interviewees

A two-tiered system would mean having both environmental and social criteria but giving more weight, the upper tier, to environmental criteria. Additionally, there can be criteria added that provide both environmental and social benefits, such as the level of organization of *ejidos* or communities and active forest management. Several officials at the national and state offices in Mexico suggested considering the organizational level in communities. They reasoned that organized *ejidos* with internal rules and regulations are more likely to administer their payments in a fair and reasonable manner and potentially re-invest a portion of them in the forest or a sustainable project. Unfortunately, the level of organization of a community cannot be easily monitored through a GIS layer. However, one implementation option provided by state officials was to require a territory act, which is a document that demonstrates there is a level of participation in the decision-making process of the community regarding how communal lands are managed, particularly those in conservation. If they have communal statutes, this guarantees that they have internal rules in the community for the use of resources and hence are more likely to use them more efficiently.

Forest management is sometimes ill-perceived in terms of conservation efforts. However, in purely environmental terms forest management is necessary; it is not healthy for the forest to remain untouched. Additionally, it is unrealistic to assume that landowners are not going to need to use their land for income eventually. By promoting sustainable forest management practices, programs are not only providing communities with a source of income, but they are also promoting the conservation of the land, taking into consideration that relative to land use changes made for agriculture or livestock, forest management is significantly less harmful. Sustainable forest management practices can be encouraged through inclusion in a program’s targeting criteria and/or as a payment bonus

dependent on the activity undertaken. In this sense, promoting forest management activities can be a win-win situation for the environment and forest owners. However, it will require assistance from technical advisers and state officials on the ground to educate participants on proper forest management practices.

In terms of establishing the payment levels, the founders of the PES program in Mexico had the most insight as to what they had initially envisioned. The payments should be determined by opportunity cost of foregone land use activities, the implementation costs by the agency, the risk of deforestation, a marginality index and the environmental richness of the property, determined by the number of ecosystem services it provides. This payment model was not able to be incorporated fully because of the limits on CONAFOR's funds; however, it provides a balance of what factors should be considered when trying to value and influence a landowner's land use decisions.

On a long-term scale, a couple of interviewees suggested initiating interagency collaborations with other agencies, such as the Secretariat of Social Development (SEDESOL) and the Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA). Agencies can meet, discuss their priority areas or populations and strategize how they can assist or complement each other's objectives. These collaborations would allow the program to expand its outreach by assessing, with the help of other agencies, what a particular community needs. For instance, if a community is at a stage where it requires more social development than environmental guidance, the SEDESOL can be the main agency in charge of working with the community. Once that community is at a stage where it can begin looking at more complex arrangements, such as participation in forest conservation, PES can step in. In this manner, PES is guaranteed to invest a greater amount of its resources on environmental objectives while still remaining involved in social development.

For REDD+, a dual objectivity will likely be sought as many countries are not only viewing it as a PES program, but also a strategy for increased rural development.

## **CONCLUSION**

As REDD+ strategies continue to develop, they can be compared to international PES schemes in the sense that there exists ecosystem service providers and buyers and a common goal of slowing deforestation. In fact, many strategies have a PES program component in their REDD+ strategies. However, most developing countries involved, including Mexico, are not seeing REDD+ translate solely into a national PES program. Nevertheless, they do see a national or regional PES program being part of the package of tools that is going to be used to implement their REDD+ strategy. Therefore, the lessons learned from established PES programs can be used to guide the development of PES programs under the framework of a REDD+ initiative. From Mexico, we can obtain valuable

insight as to the balance between environmental and social objectives and the weight given to deforestation risk.

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## **APPENDICES**

### **Appendix 1**

#### **DUKE UNIVERSITY & UNIVERSIDAD DE WISCONSIN-MADISON Consent form and information for interviewee**

**Title of Project:** Utilizing Mexico's national Payment for Ecosystem Services program to guide REDD+ development.

**Investigator:**

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**Principal Investigator:**

Jennifer Alix-Garcia (phone number: 608-262-4499) (email: [alixgarcia@wisc.edu](mailto:alixgarcia@wisc.edu))

#### **PROJECT DESCRIPTION**

You are invited to participate in an investigative study over the evolution of the design of the Payment for Ecosystem Services (PES) program implemented by CONAFOR in Mexico. The purpose of the study is to understand what the most important lessons in regards to selection criteria and payment schemes are in order to apply this information to the design and development of REDD+.

This study will be used to fulfill the investigator's graduation requirements for a master's program at Duke University's Nicholas School of the Environment. The study is also part of a larger project concerning the socioeconomic impacts of the payments from the Mexican PES program on forest communities. This long-term project involves faculty and students from Duke University and the University of Wisconsin at Madison.

#### **PARTICIPATION GUIDELINES**

If you decide to participate in this study, you will be asked to answer questions about your experience with the PES program, including questions about the design and implementation of the program. Your participation is voluntary; therefore, you can choose not to answer any questions. We do not anticipate any risk for participants, nor do we anticipate any direct benefit for participating. Your participation will be for one session.

This study is anonymous. No identifying information, including your name, will be documented in the final report.

#### **QUESTIONS?**

If you have any type of question regarding confidentiality or the project itself, you can contact:

Selene Castillo  
[selene.castillo@duke.edu](mailto:selene.castillo@duke.edu)  
(956) 639-7478

If you are not satisfied with the answers provided by the contact person, have more questions or would like to talk to someone about your rights as a study participant, you should contact the Office of Research Support at the University of Wisconsin-Madison at (608) 263-2320.

## Appendix 2

### Background & General Info

- How long have you been working in your current position?
- Could you describe what you do in your current position on a day-to-day basis? If there is no routine, what you expect to deal with on a regular basis.
- Before this position, were any of your jobs related to the PES program (design, implementation or evaluation)?
  - How long were you in this position?
- What do you consider the objective of the PSA-H program?
- When Pro Arbol began in 2006, its #1 objective was “to diminish the poverty line”. In 2010, that priority point went down to #4, with “overall economic well-being for all Mexicans” coming in at #1. Do you feel the implementation of the program has reflected this change in priorities? How?
  - Do you think the current targeting and payment schemes were put in place considering this objective?

### Targeting Criteria

- Throughout the years, CONAFOR has continued to increase the number of priority criteria on their list, including biomass density, soil degradation, potential for biological corridors and the presence of local environmental services in areas.
  - Do you think this expansion from simple requirements, such as being in the vicinity of an overexploited aquifer, has had a negative or positive impact on the effectiveness of the program? As far as using financial resources most efficiently to complete the objectives set forth for the program.
  - Do you anticipate there being a change/addition to the current set of criteria soon?
- There has also been a greater emphasis on participating in the program as part of a group or association in the past couple of years, from a forest landowner group (in 2007) to a Participatory Environmental Monitoring Committee (in 2009).
  - Why do you think CONAFOR did this?
  - On a similar note, in 2009 CONAFOR narrowed the margin of hectares allowed for private property owners to 100-200 ha yet allowed communities 200-3000 ha.
    - Do you think this was supposed to be a disincentive for private property owners to participate? Or an attempt to reduce transactions cost from the “little fish”?
- On a very similar topic, there has been a push for participants to work together to provide more wholesome and sustainable ecosystem services starting in 2006 when participants presenting a pending contract with an ecosystem service buyer were given priority and then in 2007 applicants submitting with owners of adjacent land that could form a biological corridor were also granted priority.
  - In your state, how effective/successful has it been to include this type of targeting criteria?

- Is there a significant incentive to make the extra effort to collaborate w buyers and other landowners?
  - [Considering that payment rates are set according to number of hectares and type of forest, if people already satisfy a good number of other priority criteria (a woman in a marginalized area), there may not be enough incentive to participate in the making of a biological corridor. ]
- In 2010, CONAFOR gave priority to applicants who had never received support from Pro Arbol.
  - Why do you think this was done?
  - Do you agree with this move?
  - The same year applicants involved in the 100x100 strategy were also given priority. However, I couldn't find a description of this strategy. Could you explain what it entails?
    - Has this strategy significantly impacted your state's applicants?
- Are there any other overall trends you believe are occurring in CONAFOR in regards to who participates in the program?
  - How effective/successful have they been in getting these groups of people involved?
- In your opinion, what targeting criteria are missing?
  - What populations are not being included or given enough priority?
  - On the other hand, what populations or targeting criteria should not be included or given as much weight as they are currently?

### Payment Schemes

- In 2010, the payment scheme was divided into areas depending on the type of forest and level of risk of deforestation.
  - What is this current payment point system based on? Opportunity cost, contingent valuation, etc.
  - Why did this change occur?
  - Do you feel this change had a negative or positive impact on the overall effectiveness of the program? In what sense (environmental, social, economic, etc.)?
  - How did new/old participants react to this change in payments? How did it affect participants from previous years?
  - Was there a change in budget distribution because of this change in payments? Ex. more money on monitoring.
    - Is there a specific percentage of the PSA budget that is designated for direct payments? Monitoring? Evaluating?
  - Do you anticipate there being a change in the payment point system soon?
- In 2005, there was a change in payment rates for cloud forest from \$400 pesos/hectare to 8.5 smvdf/hectare/year and a similar change for other types of forests.
  - Why did this change occur?
  - Do you feel this change had a negative or positive impact on the overall effectiveness of the program? In what sense (environmental, social, economic, etc.)?

- How did new/old participants react to this change in payments? How did it affect participants from previous years?
- Do you recall how the original payment rate of \$400 pesos/hectare for cloud forest and \$300 pesos/hectare for all other types of forest was set in 2003?
- If you could recommend any particular method of setting payment rates for the program, what would be your recommendation?
  - What do you consider has been the most effective payment rate scheme in terms of moving forward the objectives of the program?

### REDD+

- In 2005, applicants in areas of high risk of deforestation began to be prioritized.
  - How has the evaluation of deforestation risk changed throughout the years?
  - Do you consider this a fair assessment of the risk of deforestation?
  - Considering the problem of additionality, do you consider the program to be putting enough emphasis on obtaining participants with high risk of deforestation?
  - What other approaches is CONAFOR taking to address this problem?
    - What approaches do you think they should be taking?
- If an applicant was not using his forest at all before he applied to the program, therefore, there was no risk of deforestation, do you think he should be allowed to participate? [or under what conditions? low soil degradation, high biomass density, location...]
  - Do you think the current targeting criteria and methodology for assessing deforestation risk reflect your thoughts?
  - How big/trivial do you consider this problem?
  - What progress/effort has there been towards improvement?
  - How do you see this continuing/When do you anticipate a substantial change?
- It is my understanding that Mexico is also a pilot country for REDD+. Are you involved in the preparation for this new initiative? Is there anyone in your office that is involved?
  - How do you see the objectives of PES and REDD+ overlapping and differing?
  - How do you see the targeting criteria of PES and REDD+ overlapping and differing?
  - Do you think the current payment scheme for PES can or should be used for REDD+? Why or why not? Would a previously used payment scheme work better?
  - Has there been any preference for a particular payment scheme(s) mentioned?
  - REDD+ also faces the problem of additionality. Overall, do you think the PES program has addressed the problem of additionality effectively? If so, how? And how can this be used to educate or lead the design of REDD+?

### Closing

- Are there any recommendations or additional comments regarding targeting criteria, payment rates, REDD+ or any other area of program design that you would like to mention?
- Considering the questions I have asked you, is there anyone you would recommend me talking to now at the state or national level?
  - How could I reach them?

- If I am able to contact them, would you mind if I mentioned that you recommended I contact them for this project?

## Appendix 3

### Background & General Info

- How long have you been working in your current position?
- Could you describe what you do in your current position on a day-to-day basis? If there is no routine, what you expect to deal with on a regular basis.
- Before this position, were any of your jobs related to the PES program (design, implementation or evaluation)?
- What do you consider the objective of the PSA-H program?
  - When Pro Arbol began in 2006, its #1 objective was “to diminish the poverty line”. In 2010, that priority point went down to #4, with “overall economic well-being for all Mexicans” coming in at #1. Do you feel the implementation of the program has reflected this change in priorities? How?
  - Do you think the current targeting and payment schemes were put in place considering this objective?
- Are there regional evaluations done? In these program evaluations, what do you evaluate? How? What are your indicators? How long does an evaluation take? Who does them?
  - Do the evaluations show any trends? (program getting better, worse)
  - When was the last evaluation done? Is it available to the public online?

### Targeting Criteria

- Throughout the years, CONAFOR has continued to increase the number of priority criteria on their list, including biomass density, soil degradation, potential for biological corridors and the presence of local environmental services in areas.
  - Do you think this expansion from simple requirements, such as being in the vicinity of an overexploited aquifer, has had a negative or positive impact on the effectiveness of the program? As far as using financial resources most efficiently to complete the objectives set forth for the program.
  - Do you anticipate there being a change/addition to the current set of criteria soon?
- There has also been a greater emphasis on participating in the program as part of a group or association in the past couple of years, from a forest landowner group (in 2007) to a Participatory Environmental Monitoring Committee (in 2009).
  - Why do you think CONAFOR did this?
  - On a similar note, in 2009 CONAFOR narrowed the margin of hectares allowed for private property owners to 100-200 ha yet allowed communities 200-3000 ha.
    - Do you think this was supposed to be a disincentive for private property owners to participate? Or an attempt to reduce transactions cost from the “little fish”?
- On a very similar topic, there has been a push for participants to work together to provide more wholesome and sustainable ecosystem services starting in 2006 when participants presenting a pending contract with an ecosystem service buyer were given priority and

then in 2007 applicants submitting with owners of adjacent land that could form a biological corridor were also granted priority.

- In your state, how effective/successful has it been to include this type of targeting criteria? Is there a good number of applicants satisfying that criteria?
- Is there a significant incentive to make the extra effort to collaborate w buyers and other landowners?
  - [Considering that payment rates are set according to number of hectares and type of forest, if people already satisfy a good number of other priority criteria (a woman in a marginalized area), there may not be enough incentive to participate in the making of a biological corridor. ]
- In 2010, CONAFOR gave priority to applicants who had never received support from Pro Arbol.
  - Why do you think this was done?
  - Do you agree with this move?
  - The same year applicants involved in the 100x100 strategy were also given priority. However, I couldn't find a description of this strategy. Could you explain what it entails?
    - In your state, has this criteria had a significant impact on the applicant pool? [Do you receive a good number of applicants satisfying this criteria?]
- Are there any other overall trends you see occurring in CONAFOR in regards to who participates in the program?
  - How effective have they been in getting these groups of people involved?
  - In your particular state, what priority criteria do you see most often fulfilled?
- In your opinion, what targeting criteria are missing?
  - What populations are not being included or given enough priority?
  - On the other hand, what populations or targeting criteria should not be included or given as much weight as they are currently?

### Payment Schemes

- In 2010, the payment scheme was divided into areas depending on the type of forest and level of risk of deforestation.
  - What is this current payment point system based on? Opportunity cost, contingent valuation, etc.
  - Why did this change occur?
  - What do you consider to be advantages and disadvantages of this payment scheme?
  - Do you feel this change had a negative or positive impact on the overall effectiveness of the program? In what sense (environmental, social, economic, etc.)?
  - How did new/ol participants react to this change in payments? How did it affect participants from previous years?
  - Do you anticipate there being a change in the payment point system soon?
- In 2005, there was a change in payment rates for cloud forest from \$400 pesos/hectare to 8.5 smvdf/hectare/year and a similar change for other types of forests.
  - Why did this change occur?

- What do you consider to be advantages and disadvantages of this payment scheme?
- Do you feel this change had a negative or positive impact on the overall effectiveness of the program? In what sense (environmental, social, economic, etc.)?
- How did new/ol participants react to this change in payments? How did it affect participants from previous years?
- Do you recall how the original payment rate [of \$400 pesos/hectare for cloud forest and \$300 pesos/hectare for all other types of forest] was set in 2003?
- If you could recommend any particular method of setting payment rates for the program, what would be your recommendation?
  - What do you consider has been the most effective payment rate scheme in terms of moving forward the objectives of the program?

### REDD+ related

- In 2005, applicants in areas of high risk of deforestation began to be prioritized.
  - How has the evaluation of deforestation risk changed throughout the years?
  - Do you consider this a fair assessment of the risk of deforestation?
  - Considering the problem of additionality, do you consider the program to be putting enough emphasis on obtaining participants with high risk of deforestation?
  - What other approaches is CONAFOR taking to address this problem?
    - What approaches do you think they should be taking?
- If an applicant was not using his forest at all before he applied to the program, therefore, there was no risk of deforestation, do you think he should be allowed to participate? [or under what conditions? low soil degradation, high biomass density, location...]
  - If I were to ask 10 other people in your office, would the majority agree with your answer?
  - Do you think the current targeting criteria and methodology for assessing deforestation risk reflect your thoughts?
  - How big/trivial do you consider this problem?
  - What progress/effort has there been towards improvement?
  - How do you see this continuing/When do you anticipate a substantial change?

### Closing

- Are there any recommendations or additional comments regarding targeting criteria, payment rates, REDD+ or any other area of program design that you would like to mention?
- Considering the questions that I have asked you, is there anyone you would recommend me talking to now?
  - How could I reach them?
  - If I am able to contact them, would you mind if I mentioned that you recommended I contact them for this project?

## Appendix 4

### Background & General Info

- How long have you been working in your current position?
- Before this position, were any of your jobs related to the PES program (design, implementation or evaluation)?
- What do you consider the objective of the PSA-H program?
  - Do you think the current targeting and payment schemes were put in place considering this objective?
- Do you think the objectives of the program have changed since its start?

### Targeting Criteria

- Could you describe the current targeting scheme?
- Are there any overall trends you see occurring in the program in regards to who participates in the program? Intentionally or unintentionally.
- How is the program, through its targeting criteria, addressing the problem of additionality?
  - Do you think there is enough emphasis on this topic/problem?
  - What other approaches aside from targeting criteria is [country/agency] taking to address additionality?
  - What approaches do you think they should be taking?
- If an applicant was not using his forest at all before he applied to the program, therefore, there was no risk of deforestation, do you think he should be allowed to participate? [or under what conditions? low soil degradation, high biomass density, location...]
  - Do you think the current targeting criteria and methodology for assessing deforestation risk reflect your thoughts?
  - How big/trivial do you consider this problem?
  - What progress has there been toward improvement?
- In your opinion, what targeting criteria are missing?
  - What populations are not being included or given enough priority?
  - On the other hand, what populations or targeting criteria should not be included or given as much weight as they currently are?
- Do you see any changes in the targeting criteria occurring in the near future?

### Payment Schemes

- Could you describe the current payment scheme?
  - What is this scheme based on? Opportunity cost, contingent valuation, etc.
  - Since when has it been in use?
  - Do you feel this payment scheme has had a positive or negative impact on the overall effectiveness of the program? In what sense (environmental, social, economic, etc.)?
  - What do you consider the advantages and disadvantages of this payment scheme?

- Do you anticipate this current payment scheme changing in the near future?
- How did the previous payment scheme work?
  - Were you working on the program during the change between schemes?
    - Why was it discarded?
    - What was that scheme based on?
    - How long was it used for?
    - What do you consider were the advantages & disadvantages of that payment scheme?
    - Do you feel that payment scheme has had a positive or negative impact on the overall effectiveness of the program? In what sense (environmental, social, economic, etc.)?
- How many significant changes to the program's payment scheme has there been?
  - What changes do you recall aside from the one previously mentioned?
  - Why did such changes occur?
  - What do you consider were the advantages & disadvantages of that payment scheme?
- What do you consider has been the most effective payment rate scheme in terms of moving forward the objectives of the program?
- If you could recommend any particular method of setting payment rates for the program (previously used or not used yet), what would be your recommendation?

## Appendix 5

### Background & General Info

- How long have you been working in your current position?
- Before this position, were any of your jobs related to the PES program (design, implementation or evaluation)?
- What do you consider the objective of the PSA-H program?
  - Do you think the current targeting and payment schemes were put in place considering this objective?
- Do you think the objectives of the program have changed since its start?

### Targeting Criteria

- Could you describe the current targeting scheme?
- Are there any overall trends you see occurring in the program in regards to who participates in the program? Intentionally or unintentionally.
- How is the program, through its targeting criteria, addressing the problem of additionality?
  - Do you think there is enough emphasis on this topic/problem?
  - What other approaches aside from targeting criteria is [country/agency] taking to address additionality?
  - What approaches do you think they should be taking?
- If an applicant was not using his forest at all before he applied to the program, therefore, there was no risk of deforestation, do you think he should be allowed to participate? [or under what conditions? low soil degradation, high biomass density, location...]
  - Do you think the current targeting criteria and methodology for assessing deforestation risk reflect your thoughts?
  - How big/trivial do you consider this problem?
  - What progress has there been toward improvement?
- In your opinion, what targeting criteria are missing?
  - What populations are not being included or given enough priority?
  - On the other hand, what populations or targeting criteria should not be included or given as much weight as they currently are?
- Do you see any changes in the targeting criteria occurring in the near future?

### Payment Schemes

- Could you describe the current payment scheme?
  - What is this scheme based on? Opportunity cost, contingent valuation, etc.
  - Since when has it been in use?
  - Do you feel this payment scheme has had a positive or negative impact on the overall effectiveness of the program? In what sense (environmental, social, economic, etc.)?
  - What do you consider the advantages and disadvantages of this payment scheme?

- Do you anticipate this current payment scheme changing in the near future?
- How did the previous payment scheme work?
  - Were you working on the program during the change between schemes?
    - Why was it discarded?
    - What was that scheme based on?
    - How long was it used for?
    - What do you consider were the advantages & disadvantages of that payment scheme?
    - Do you feel that payment scheme has had a positive or negative impact on the overall effectiveness of the program? In what sense (environmental, social, economic, etc.)?
- How many significant changes to the program's payment scheme has there been?
  - What changes do you recall aside from the one previously mentioned?
  - Why did such changes occur?
  - What do you consider were the advantages & disadvantages of that payment scheme?
- What do you consider has been the most effective payment rate scheme in terms of moving forward the objectives of the program?
- If you could recommend any particular method of setting payment rates for the program (previously used or not used yet), what would be your recommendation?