Periódico Eletrônico
Fórum Ambiental da Alta Paulista
ISSN 1980-0827 – Volume 18, número 2, 2022

Synthesis and Analysis of Experiences in Ecosystem Services

Bruno Scarazatti
Master Analist, Embrapa, Brazil
bruno.scarazatti@embrapa.br

Lauro Rodrigues Nogueira Junior
PhD Researcher, Embrapa, Brazil.
lauro.nogueira@embrapa.br

Periódico Eletrônico
Fórum Ambiental da Alta Paulista
ISSN 1980-0827 – Volume 18, número 2, 2022

SUMMARY

Considering that the initiatives of payment for environmental services (PES) are already a reality in Brazil, the present work aimed to promote a critical analysis of experiences in ecosystem services, so that new initiatives can take advantage of it to overcome difficulties in the implementation of PES projects and programs. Using systematization methods, ten experiences were synthesized and analyzed (Oásis Project; Bolsa Floresta Program; Conservador das Águas Project in Extrema/MG; Water Guardian Program; Ecosystem services in APA da Fazendinha; Quintais Amazônicos Project; BioREC Project – Mamirauá; REDD+ projects in practice and the evolution of voluntary markets; REDD+ opportunities for the Amazon; Carbono RECA Project). They were presented and discussed at the Amazon Ecosystem Services Experiences Seminar (online), held between March 23 and 26, 2021. PES projects are consolidated as important instruments to support the recovery and conservation of natural areas, and can contribute, in a transitional way, to other sustainable development initiatives in the Amazon. In deforested regions, crop converted lands, and regions under pressure of illegal deforestation, PES can support reforestation initiatives, combined or not with production systems, for the purposes of biodiversity conservation, carbon sequestration and water supply. Combining nature conservation through PES with sustainable production systems (Agroforestry, Forestry and Non-Timber Forest Products Management, Fisheries management and aquaculture, Regenerative Agriculture, Agroecological Livestock, among others) presents itself as a good alternative for the sustainability of the Amazon and for their people.

KEYWORDS: Amazon. Payment for environmental services. Systematization of experiences.

INTRODUCTION

The starting point:

To make the initiatives of valuation and payment for environmental services (PES) in the Amazon more cohesive, we understood that it is necessary to create conditions for the exchange of knowledge between different institutions, actors involved and interested in the subject. The synthesis, analysis and systematization of experiences can generate knowledge that facilitates the sustainability of ongoing initiatives and the design of new ones. In addition, it can help identify gaps in knowledge and possibilities for PES expansion.

Due to the great importance of ecosystem services for the sustainability of Brazilian agriculture, the Brazilian Agricultural Research Corporation (Embrapa) has a portfolio of Environmental Services, which gathers 34 projects operating in all country biomes, in different themes and with different partners (EMBRAPA, 2021). The portfolio works to ensure the various environmental services and the conservation of biodiversity in agricultural and forestry production systems in rural, peri-urban and urban areas of Brazil. Among several attributions, the portfolio has provided technical support in the elaboration of some draft laws, such as the National Policy for Payment for Environmental Services (PES) (BRASIL, 2021). Specifically for the Amazon, Embrapa develops, in a partnership with the Brazilian National Development Bank (BNDES) and using resources from the Amazon Fund, the Integrated Project for the Production and Sustainable Management of the Amazon Biome (PIAmz), which comprises a set of 19 projects (EMBRAPA, 2021; FUNDO AMAZÔNIA, 2021). The projects involve agricultural research and technology transfer actions that are aligned with the following themes: Deforestation monitoring and forest degradation and ecosystem services; Restoration, forest management and extractivism; Sustainable technologies for the Amazon; and Aquaculture and Fisheries. PIAmz actions were designed to meet the scientific criteria and strategic merit and the guidelines of the Amazon Fund.

The Project "Knowledge construction and systematization of experiences on valuation and payment for ecosystem and environmental services in the context of Amazonian family agriculture (ASEAM)" is one of the 19 PIAmz projects. It is the result of several discussions promoted by Embrapa through seven regional workshops, held in the Brazilian North region cities with the support of local Embrapa research units. In all workshops, environmental services were a recurring theme, and a lack of basic and advanced knowledge by both the farmers and the agents who work directly with this theme was detected. In this context, the ASEAM project was planned and is being developed by a group of Embrapa's researchers, analysts and partners.

In fact, experiences with ecosystem services in Brazil are already a reality; some are over 13 years old (FUNDAÇÃO AMAZÔNIA SUSTENTÁVEL, 2021; FUNDAÇÃO GRUPO BOTICÁRIO DE PROTEÇÃO À NATUREZA, 2021; PREFEITURA MUNICIPAL DE EXTREMA (MG), 2021). Such experiences have different characteristics, due to local specificities, types of beneficiaries, financiers, kind of environmental service contemplated, institutions involved, among others. The number of experiences that have PES as their ultimate objective has been increasing every year, however this increase could be higher if there were greater exchange of knowledge and greater joint effort between the actors. Therefore, the sharing of knowledge and experiences can allow new groups to take better advantage of the already consolidated experiences to overcome the challenges that may arise.

Why systematize?

The systematization of experiences is a methodology that helps to understand a situation experienced by a group of people by looking at what happened, how it happened and why it happened (HOLLIDAY, 2006; LIMA; DUTRA, 2017). It aims to rescue, record, analyze and share the knowledge built collectively. Through this, it may be possible to understand the experience and reveal difficulties, limitations, lessons learned and recommendations. In the process of interpretation and reflection, knowledge is generated from practice. The flow of knowledge creation begins with doing, living, goes on through telling, reflecting, synthesizing, learning, and culminates in sharing. The learned lessons and generated recommendations from collective reflection can inspire other groups and contribute to the consolidation of socio-environmental transformations in other territories.

OBJECTIVE

Within the scope of the ASEAM Project and in the present work, the systematization of project experiences on the valuation of ecosystem services and payments for environmental services aims to promote a critical analysis from the perspective of different actors, so that new initiatives can take advantage of it to overcome difficulties in the implementation and continuity of PES projects and programs.

ANALYSIS METHOD

The method of synthesis and analysis of information, as well as the structuring of the text, was conceptually based on the publications of Holliday (2006) and Lima and Dutra (2017).

What experiences do we want to systematize?

The ASEAM Project foresaw the holding of an in-person seminar, where experiences from projects featuring valuation of ecosystem services and PES would be presented and discussed, followed by workshops to systematize the experiences with the actors involved in the projects. Thus, in August 2019, experiences in the Amazon were identified, through a questionnaire sent to representatives of various institutions. Experiences with specialists were also identified. Ten experiences were selected, six from the questionnaire applied and four indicated by specialists.

Due to the health crisis related to COVID-19, the seminar that would have been in person was converted into an online seminar open to public participation. The seminar "Experiences in Ecosystem Services – Amazon (online)" was held on March 23 (opening), 24, 25 and 26, 2021. The ten selected experiences were presented and discussed in three round tables (Table 1). Even though they are not located in the Amazon, two experiences (Project Oasis and Project Conservador das Águas in Extrema/MG) were selected for their pioneering role, development time and previous analyses.

Table 1: Roundtable, responsible institution and presenter of the experiences exhibited and debated at the seminar "Experiences in Ecosystem Services – Amazon (online)".

Experience presented	Responsible institution	Presenter
1st roundtable: experiences of foundations and municipalities for the development of projects and programs on ecosystem services		
Oasis Project	Boticário Group Foundation for Nature Protection	Juliane Cruz de Freitas
Bolsa Floresta Program	Sustainable Amazon Foundation	Victor Salviati
Conservador das Águas Project in Extrema/MG	Environmental Department of the Municipality of Extrema/MG	Paulo Henrique Pereira
Guardião das Águas Program (Olhos D'Água da Amazônia Project)	Environment Directorate of the Development Department of the Municipality of Alta Floresta/MT	José Alesando Rodrigues
2nd roundtable: experiences on ecosystem services with different protagonists in protected areas		
Ecosystem services in APA da Fazendinha: bases for decision-making and participatory management	Okearô Social and Environmental Solutions	Verena Cristina de Almeida
Quintais Agroflorestais Project	Center for the Study of Culture and the Environment of the Amazon – Rioterra	Fabiana Barbosa Gomes
BioREC Project – Mamirauá: Conservation and Sustainable Use of Biodiversity in Conservation Units	Mamirauá Institute for Sustainable Development	Claudio Roberto Anholleto
3rd roundtable: experiences in reducing emissions from deforestation and forest degradation		
REDD+ projects in practice and the evolution of voluntary markets	Biofílica Environmental Investments S.A.	Caio Gallego
REDD+ Opportunities for the Amazon	Institute for Conservation and Sustainable Development of the Amazon – Idesam	Pedro Soares
Carbono RECA Project	Small Agroforestry Growers Association of the RECA Project	Fabio Vailati e Gicarlos S. de Lima

The roundtables and questions were moderated by the Embrapa Territorial team, and videos of the presentations and debates are available on the Embrapa YouTube channel (SEMINÁRIO…, 2021a, 2021b, 2021c).

What central aspects of these experiences do we want to systematize?

The presentations contained information about: institution; historic; partners; actors (users, executors and providers/beneficiaries); coverage; goals; contemplated environmental

service; method of quantification, monitoring and verification; legal instruments and related public policies; execution period; difficulties and challenges; main results. After the seminar, this information was transcribed and synthesized as part of the process to facilitate the analysis. At the beginning of each presentation, the speaker was invited to narrate the experience and, at the end, he answered questions from the seminar organizers and the audience on YouTube. At the end of the roundtables, the speakers answered new questions, as well as interacted and made joint reflections, having as a guiding principle the role of ecosystem services and PES projects in catalyzing sustainable development in the Amazon. As a background reflection of the systematization, the critical analysis from the presentations was grouped into the following questions:

1. How important are PES projects to providers/beneficiaries and nature conservation?
2. What is the trajectory – mobilization, methodology, legal instruments – of the construction of a PES project?
3. What are the difficulties in implementing and continuing a PES project?
4. What are the possible funding mechanisms and opportunities?

RESULTS

Synthesis of the main characteristics and results of the experiments

Six institutions responsible for the experiences are non-governmental (NGO and foundation), two of them are private (company) and two are governmental (municipality). As for the experiences, seven were in force until March 2021 (Table 2). Considered as a form of PES, the financial resources contemplated four experiences and the resources to support the structuring activities (investment/costing) of conservation and production contemplated six. *Ribeirinhos* (riverside people) appeared as providers/beneficiaries in four experiences, indigenous people, family farmers, women and rural settlements/communities in two, and cooperative/association in one. In terms of scope, there are conservation units (UCs), urban water supply micro basins, communities, settlements and rural properties. Among the types of environmental services contemplated are water production/conservation, conservation and management of biodiversity/landscape and carbon stock/sequestration. For the quantification and valuation of environmental services, the experiments use their own protocol for monitoring, reporting and verification, as well as a pre-defined certification/protocol standard. However, three experiences did not quantify and valuated environmental services. In general, the experiences were related to federal, state and municipal public policies.

Table 2: Summary of the main characteristics and results of experiences in ecosystem services.

Main features*	**Challenges and results**
Oásis Project	
● Objectives: Conservation of natural areas and biodiversity, water production, and increase in the income of the landowners involved; encourages the creation of municipal and state PES laws, regulation of mechanisms and enabling long-term actions. ● Type of ecosystem service: Water.	● Main challenges: Governance and definition of executors, providers and beneficiaries. ● Main results: > 19 PES cooperation partnerships; > 52 processes for the elaboration of public policies on PES;

● Methodology: Own, standardized and flexible method for valuing PES; operates on a national scale through partnerships and collaborative networks. ● Execution period: Developed since 2006.	> 30 sanctioned PES legal sanctioned; > 839 properties with PES contracts; > Approximately 21 thousand ha with positively impacted management; > Estimated 8 million people indirectly benefited.
Bolsa Floresta Program	
● Objectives: PES program in the state of Amazonas created through the State Plan for Climate Change (Law no. 3,135/2007); It aims to maintain the carbon stock through forest conservation, benefiting riverside populations, residents and users of the UCs. ● Type of ecosystem service: Carbon. ● Methodology: Access to the Program based on an initial community diagnosis, with registration of families, primarily carried out on behalf of women; Participatory management for monitoring and evaluation. ● Execution period: Developed since 2007.	● Main results: > 57 million Brazilian reais invested between 2008-2020; > 16 Conservation Units covered in approximately 11 million ha; > 53% reduction in deforestation in the areas served in the period between 2008 and 2019; > 581 communities served with 8,623 families benefited in 2020.
Conservador das Águas Project in Extrema/MG	
● Objectives: To maintain the quality of the watersheds in Extrema and promote the environmental adequacy of rural properties. ● Type of ecosystem service: Water and carbon. ● Methodology: Created through Municipal Law no. 2,100/2005; Municipal fund for PES to rural landowners established through Municipal Law no. 2,482/2009; Legal framework for establishing institutional partnerships. ● Execution period: Developed since 2005.	● Main challenges: Difficulties in negotiating environmental adequacy. ● Main results: > 186 contracts and 6,135 ha of APP conserved between 2007 and 2015; > 1,000 rainwater containment basins and 40,000 meters of terrace construction (2007-2015); > 262.00 Brazilian reais paid per ha contracted in 2016.
Guardião das Águas Program (Olhos D'Água da Amazônia Project)	
● Objectives: Recovery of Permanent Preservation Areas in the public supply watersheds. ● Type of ecosystem service: Water. ● Methodology: Alta Floresta/MT was on the list of the most deforested municipalities, in 2008 creates the Environment Department, in 2009 starts the Olhos D'Água da Amazônia project, in 2010 creates the PES Program inspired by the experience of Extrema/MG; Municipal Laws no. 2,040/2013 and 2,159/2014, Decree no. 197/2014; ● Execution period: Developed from 2010 to 2016.	● Main results: > 100 families benefited, from 87 properties and 9 communities; > 535 ha of protected APPs; > 250-280 Brazilian reais paid per ha year.
Ecosystem services at APA da Fazendinha (Macapá/AP): bases for decision-making and participatory management	
● Objectives: To create sustainable alternatives and rational use of resources by local communities; to support elaboration of Management Plan and strengthen governance. ● Type of ecosystem service: Biodiversity. ● Methodology: Methodology for Integrating Ecosystem Services into Development Planning; To structure the APA Management Council. ● Execution period: Developed from 2012 to 2019.	● Main challenges: Management Plan. ● Main results: > Construction and strengthening of governance, with consensual decision-making; > Identification of opportunities to improve lowland ecosystems and ecosystem services; > Expansion of the mobilization and involvement of people and institutions; > Mapping of potential funders and partners for future projects and actions.
Quintais Amazônicos Project	
● Objectives: Promote conservation initiatives, carbon sequestration, ecosystem services, recovery of degraded lands, environmental adequacy, agroecology and PES. ● Type of ecosystem service: Carbon, biodiversity. ● Methodology: Registration of family farmers and implementation of the Rural Environmental Registry (CAR) in partnership with the State; Diagnosis of the property for	● Main challenges: Farmers' understanding of ecosystem services and public policies (CAR, PRA). ● Main results: > 760 CARs carried out, which allowed for a better understanding of rural properties; > 1,017 farmers trained;

choosing the most appropriate Agroforestry System (SAF); Seedling nursery, support for fencing areas with livestock, recommendations and applications of limestone and fertilizer; Monitoring the restoration process; PES as a support component. ● Execution period: Developed from 2013 to 2018.	> 500 assessment diagnoses; Return of water in silted streams, gradual return of fauna, return of the natural succession of vegetation; > 1,200 families received support from Technical Assistance and Rural Extension; > 741 ha recovered in 505 properties; > 471 farmers awarded PES, within a total of R$ 439,238.00.
BioREC Project – Mamirauá: Conservation and Sustainable Use of Biodiversity in Conservation Units	
● Objectives: To support participatory and management actions, with research, development and dissemination of knowledge. ● Type of ecosystem service: Biodiversity. ● Methodology: 14 actions organized in six following lines: Forest ecology, environmental education, agroecosystem management; Forest management; environmental monitoring; environmental protection. ● Execution period: 2013 – currently (2021).	● Main challenges: Understanding and meeting the needs of communities, reconciling activities within their seasonality and production cycles. ● Main results: > 350 people from 64 communities trained in community management, agroecological livestock farming and as AFS multiplier; > House and solar energy system to process and store fruit pulp; > Forest management in 14 communities; > Sale of andiroba and copaiba wood and oils from forest management; > Estimated 13 thousand benefited people.
REDD+ projects in practice and the evolution of voluntary markets	
● Objectives: Conservation of native forests through the payment for environmental services. ● Type of ecosystem service: Carbon. ● Methodology: Areas with a scale that makes investments viable; Incentive to promote other bioeconomy initiatives, reconciling development and sustainable income generation; Project actions are appropriate and aligned with the UN's sustainable development goals; Certification of carbon emission reduction guided by an international standard (VCS and CCB); Contact landowners, public or private, establish partnerships and design projects. ● Execution period: Since 2008.	● Main challenges: Public governance and enforcement. ● Main results: > 6 REDD+ projects in the Amazon; > 1.2 million hectares under conservation and joint management with partners; > 15 partners for project execution and management; > 1.4 million tons of reduced CO_2/year (carbon credits/year); > PES project reversed to support conservation activities and social actions at RESEX Rio Preto Jacundá/RO and with communities in the areas of Grupo Jari.
REDD+ Opportunities for the Amazon	
● Experience accumulated since 2005 with REDD+ projects; ● Traditional protocols of the major certification standards (VCS and CCB – VERRA) and own methodological guide; ● SAFs are the basis of production areas.	● Technical coordination of the first two REDD+ projects validated and verified in Brazil.
Carbono RECA Project	
● Objectives: To recognize and reward conservation efforts, generating collective and individual benefits for participants. ● Type of ecosystem service: Carbon. ● Methodology: AFS consisting of at least 3 crops in consortium are the basis in production areas of family farmers organized in associations and cooperatives; In 2017, the sale of carbon credits to Natura begins, as a result of the reduction in deforestation; Monitoring system, certification, self-verification; products exchange among producers, to learn about other cultivation systems and exchanges of knowledge. ● Execution period: Developed since 2013.	● Main challenges: pressure and economic competition from livestock, inspection and combating deforestation. ● Main results: > 267 associate members (102 women; 165 men); > 148 cooperating members (44 women; 104 men); > More than 500 tons of organic fertilizer produced with agro-industry residues to fertilize the AFS; > Water treatment for product improvement and processing; > 10 production groups according to geographic location, with a leader and a coordinator, responsible for the organization, support of field

	work, production lines and representation with RECA; > R$ 1,667,112.10 in carbon credits (Carbono RECA Fund); > Acquisition of infrastructure and equipment for the common benefit of RECA; > Supplementary income for associates, maintenance of Legal Reserve areas.

*Information on: objectives, contemplated environmental service, methodology (project area, legal instruments, support mechanism, financing and payment, actors involved, quantification methodology, valuation, monitoring, reporting and verification, conservation and production system), time of development, etc. Source: Seminário… (2021a, 2021b, 2021c).

1. How important are PES projects for providers/beneficiaries and for nature conservation?

With the advancement of legislation for the regulation of PES projects and the increase in alternatives for environmental compensation, mitigation of climate change impacts, as well as the adoption of measures aimed at conservation and provision of environmental services, the trend of using PES has been increasing in Brazil and in the world. It became clear through the presentations that "the concept of project itself indicates an action that has a duration with a beginning, middle and end", and that, therefore, "works as a transition, a form of incentive, until others initiatives take shape" (GALLEGO, 2021). PES projects should not be seen as the only solution to problems in the Amazon, "because it is a mechanism, it is not the end in itself, it is a means to transform a territory" (SALVIATI, 2021).

Certainly, in the eyes of providers/beneficiaries of environmental services, PES is welcome, given that:

> [...] the maintenance of preservation areas is seen as a loss by producers who have their areas reduced by permanent preservation areas (APP) and legal reserves (RL). PES is an incentive that contributes to a change in mindset and ends up working as a recognition of those who help preserve nature and generate environmental services (RODRIGUES, 2021).

The importance of this recognition was also confirmed by the representatives of the Carbono RECA Project, who have worked for decades with diversified agroforestry systems. According to Vailati and Lima (2021), "the Carbon Project came to consolidate the works that exist and help supplement the income of the associates, in addition to contributing to the maintenance of RL areas, which until then were at the expense of the farmers". In Brazilian South and Southeast regions, most PES initiatives were conceived with the objective of strengthening conservation and protection actions for hydrographic micro-basins, since these regions' states and municipalities concentrate high population densities, a large part of their natural resources are degraded, and they often experience public water supply crises during the dry season and floods during the rainy season. Water is "one of the most important services in the understanding of farmers. When the same availability of water is no longer seen on the farm, this perception is a strong point of awareness" (FREITAS, 2021), because, in addition to providers, farmers are users of environmental services and depend on them for their economic activity.

In Extrema/MG, several studies were carried out in partnership with teaching and research institutions, and "a positive relationship was pointed out on the results of the parameters of quality and quantity of water, due to the protection and recovery of native vegetation" (PEREIRA, 2021). The experience of the municipality of Alta Floresta/MT, inspired by the example of Extrema/MG, followed the same steps:

> [...] more than 100 hectares of APP have been revegetated in the last 5 years, and it is possible to perceive the gradual increase in vegetation. The studies available on the website show improvements in environmental parameters and the importance of public policy programs to promote these improvements (RODRIGUES, 2012).

It is noteworthy that PES projects can be designed for different contexts. In deforested regions, consolidated croplands, or areas under pressure of deforestation, PES can help in reforestation initiatives (FREITAS, 2021; GOMES, 2021; PEREIRA, 2021; RODRIGUES, 2021; SOARES, 2021), combined or not with the use of agroforestry systems, for conservation, carbon sequestration and water supply purposes. In regions of continuous native vegetation, such as UCs and indigenous lands (GALLEGO, 2021; SALVIATI, 2021), or private areas with large extensions (GALLEGO, 2021), PES can be inserted in the form of resource transfer through Programs for Reducing Emissions from Deforestation and Forest Degradation (REDD+).

REDD+ is a financing mechanism that aims at Reducing Emissions from Deforestation and Forest Degradation, in addition to promoting (+) sustainable forest management, conservation and increasing forest carbon stocks (UNFCCC, 2021). Depending on the scenario, access is easier when it involves private partnerships, as reported by the experiences of Biofílica (GALLEGO, 2021) and Idesam (SOARES, 2021). Biofílica presented two experiences of direct transfer of resources from REDD+ "destined to finance both conservation and social actions' activities of the project", one in the RESEX Rio Preto Jacundá/RO, and another in a partnership with Grupo Jari Foundation, on the border between Pará and Amapá. In all, there are 1.2 million hectares with carbon credit resources, and "1.4 million tons of reduced CO_2/year (carbon credits/year)" (GALLEGO, 2021). The use of resources combined with an adequate institutional design helped to control deforestation in the region in partnership with the government. Despite the difficulties that limit access to REDD+ for small producers, the Carbono RECA Project, in partnership with Idesam and the Natura company, managed to create a customized methodology, which is applicable to other attempts to transform environmental service assets into resources in order to help small producers who work with sustainable systems in the Amazon. Thus, it became clear that REDD+ can be used both in public areas and for small producers.

In the Amazon region, both the Bolsa Floresta Program and the BioREC Project were developed in extensive vegetation areas within state conservation units. In short, the objectives reported by these two experiences aim to promote the conservation and sustainable use of nature, supporting local communities with the transfer of resources (Bolsa Floresta) and the development of alternatives for generating income through training, management processes, social empowerment and environmental inspection (ANHOLLETO JUNIOR, 2021; SALVIATI, 2021). Bolsa Floresta indicators "showed a 53% reduction in deforestation within the areas served in the period between 2008 and 2019, compared to previous years, while in the Amazon

as a whole there was an increase of 20%" (SALVIATI, 2021). The resources paid by Bolsa Floresta are mostly used by the benefited populations to meet basic needs, such as

> [...] food (almost 50% of the resource), cooking gas, fuel, purchase of transport tickets, payment of energy, monthly fees of the residents' association, among others. This demonstrates the importance of PES resources for food security and fighting poverty in these regions (SALVIATI, 2021).

These resources somehow also help to reduce the pressure for the exploitation of natural resources. However, structuring actions are needed to leverage income generation over a longer term, with the support of adequate public policies, partnerships and actions aimed at consolidating markets, adding value, strengthening governance, among others. Activities along these lines were presented by the two experiences (ANHOLLETO JUNIOR, 2021; SALVIATI, 2021): pirarucu (fish) management, guarana production chain, banking and circular economy, training of community leaders, forest management and monitoring researches. In Amapá, the works presented by Okêaro at APA da Fazendinha focus at conservation and feature tourism as an option for sustainable use and income generation.

The valorisation of natural environments, through financial mechanisms of economic incentive in partnership with small farmers, must take into account "that PES by itself is just one of the support instruments for protection and conservation, and that it can compose a range of tools for territorial development" (FREITAS, 2021). Thus, in all presentations we observed that PES (direct investment) was only one of the support elements, and that the diagnose, training, and monitoring of actions over time (indirect investments) were relevant for the success of the implemented actions.

2. What are the difficulties in implementing and continuing a PES project?

In some territories, secondary information may be scarce or often inaccessible to the communities that reside in or attend places that provide ecosystem services. Likewise, decision makers and managers often lack the information and understanding necessary to participate in the construction of a proposal.

> In ongoing projects, the 'coupling' that public agents who are more at the end of the process need to do to clarify how federal, state and municipal policies work for beneficiaries is a constant exercise (SALVIATI, 2021). A PES Program has to consider, within the territorial aspects, the different realities that exist (...).

Therefore, the methodology for the diagnosis must be appropriate for each local context, must consider the necessary and available resources, the time required to collect information, among other factors whose results may directly impact the design of the proposal and the success of its alignment with local realities.

> Governance is one of the main bottlenecks in PES projects. Solid governance requires clarity in defining who are the users of environmental services (public authorities, the private sector and society as a whole), who are the project implementers and who are the providers of environmental services (for example, rural landowners). These definitions enable the logic of a 'paying user', so that financial resources can support

> providers, with a local executor helping to intermediate these processes (contracting, payment and monitoring) (FREITAS, 2021).

The definition of a 'legal framework', the celebration of partnerships and the construction of adequate public policies are essential to guarantee the support and legal assurance necessary for perpetuity and continuity (FREITAS, 2021).

The political and economic situation, external to the project, is a factor of great influence for the conservation of forests. In the Amazon, as in other regions, the high price of meat encourages the expansion of livestock at the expense of more conservationist systems, such as agroforestry systems. As reported in the Carbono RECA Project presentation, "the economic logic of deforestation is more attractive than the logic of conservation". "The growth of the livestock chain in the surrounding areas (...) directly impacts the Project and the commitments to maintain areas with forests and carbon stock" (VAILATI; LIMA, 2021). To compete in this scenario, having consolidated economic alternatives is important, so that more sustainable production models become attractive to farmers, or to those who use natural resources.

Social organization is another key point, as reported by Vailati and Lima (2021): "our construction is very much based on the social foundation. If I had to give any tips and examples of success to be followed, I would mention those that consolidate the social base of the organization". In community projects, this process must always be strengthened.

The path of traditional protocols, within the great certification standards (VERRA, 2021), which are methodological packages with all the guidelines for the development of a project, has monitoring systems that work very well for larger coverage, large-scale projects, such as in protected areas or on properties with large areas. The use of customized methodologies, as in the example presented by the Carbono RECA Project, is still a novelty that needs to be replicated to expand the access to income generation alternatives for small farmers. Therefore, "the most consolidated methodologies of certification standards do not apply to the reality of a set of farmers, for reasons of immobility, due to a dynamic of fragmented deforestation in mosaics, in small areas" (SOARES, 2021).

> Although PES or REDD+ projects help preserve forests, the role of the state to control deforestation, territorial planning, as well as to monitor and prevent illegal activities, is fundamental to guarantee institutional security to generate the medium-term results. These are key actions to attract investors and reduce the risks of investments in PES and REDD+ projects (SOARES, 2021).

3. What is the trajectory – mobilization, methodology, legal instruments – of the construction of a PES project?

In most of the projects presented, mobilization took place by initiative of the executors and their partners, often starting in a municipal secretariat (municipalities of Extrema/MG and Alta Floresta/MT), or by articulation of professionals linked to research institutes or third sector (Rioterra, Idesam, Instituto Mamirauá), private companies (Biofílica, Okearô Soluções Ambientais), or foundations (FAS, Fundação Boticário). Mobilization for the construction of a proposal can be provoked by the organized civil society, however it needs to be involved with

the public power and with the local policies from the beginning, establishing the governance structure necessary for it to be successful and lasting. There was a consensus that the public interest has a significant weight to start a PES project.

In any of the different contexts presented, having secondary information and carrying out diagnoses for a consistent and coherent basis were fundamental for the alignment of projects with the local reality.

> For each territory, it is necessary to make a very careful diagnosis to understand how a particular public policy or private program will be implemented, so that the environmental service can be generated, have a payer and distribute the financial and economic benefits to the providers of these services in continuous way (SALVIATI, 2021).

> [...] the activities started by defining the beneficiaries, the first point of a PES, and the actors, interfaces with direct interests in the territory. Secondary data searches, interviews and sector meetings were carried out. There were invitations and lectures with the participation of experts to share knowledge. A participatory workshop was held to complement and validate the information. These events enabled equalizing knowledge with the target audience and facilitated the understanding of issues related to the theme 'ecosystem services', which triggered support for decision making. These processes allowed gains in terms of participatory management, focused on improvements in local governance processes, which are fundamental for decision-making by the actors (ALMEIDA, 2021).

In the APA da Fazendinha project (ALMEIDA, 2021), although no PES initiatives were implemented, the actions were directed towards structuring, regulating and using natural resources, which can be considered an important step towards PES. The methodology used was "Integration of Ecosystem Services into Development Planning" (DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT, 2012), which has six steps: 1) Define the scope of the study (levelling of expectations and construction of a common objective; definition of providers/beneficiaries and mapping of actors and sectors that interact with the unit; identification of information gaps, pre-definition of production chains, among others); 2) Evaluate and prioritize ecosystem services (understanding the territory, how the main agents that depend on/impact ecosystem services interact, analysis of risks and opportunities; identification of which ecosystem services are most relevant); 3) Identify the state, trends and trade-offs, analyze future projection of ecosystem services, how ecosystem services will be in a period of 10-30 years; 4) Analyze the institutional and cultural framework, look at existing institutions and structures, policies, laws, cultural aspects, values, among others that help or discourage conservation/sustainable management; 5) Prepare for better decision-making, choosing an economic focus for action and alternative actions with possible scenarios, in addition to activities to meet urgent needs, such as basic sanitation, solid waste management and solutions for conflicts, in the case of APA da Fazendinha. 6) Implement the changes, and this experience collected data to support the implementation of the UC management proposals and incorporated them into the Management Plan in partnership with SEMA and the APA Management Council.

As presented in the BioREC Project, structuring actions to diversify economic alternatives for the sustainable use of the forest can be carried out with the support of scientific research and direct involvement of local communities. Participatory management actions, along with research and development, were carried out with research and training on the following topics: 1) Forest ecology, with studies related to community forest management; 2) Environmental education, through projects with seedling production and community management; 3) Management of agroecosystems, with multiplication of agroforestry systems and processing of products; 4) Forest management, through training and practical management of timber and non-timber species; 5) Environmental monitoring, on-field and remotely; 6) Environmental protection, with the training of environmental agents to inspect territories. Actions like these are important to strengthen the involvement of partners and local communities, and can serve as basis for a PES project (ANHOLLETO JUNIOR, 2021).

In the presentation of the Bolsa Floresta program, Salviati (2021) highlighted a publication in partnership with the Inter-American Development Bank (IDB), the 'Bolsa Floresta Manual' (FUNDAÇÃO AMAZÔNIA SUSTENTÁVEL, 2017), which deals with technical issues regarding the implementation of the program, and a canvas, a simplified business plan template, featuring the following main points:

> Choosing the type of environmental service is the first point, as the evaluation metrics are different for each one. In Bolsa Floresta, the service aimed at maintaining the carbon stock through forest conservation; Definition of providers is another important point for identifying who participates in the maintenance/provision of environmental services; Definition of payment dynamics is another important factor, which, in the case of Bolsa Floresta, is based on family unit, due to difficulties related to land attribution issues as well as to the extension of the areas (10 million hectares); Finally, the definition of success metrics is another key point for the design of the program, which chose reduction of deforestation and reduction of GHG emissions, avoided by conserving a standing forest as its central metrics, associated with other sub-metrics such as poverty reduction, hotspots, among others (SALVIATI, 2021).

The Oasis Project has an experience of 11 PES projects structured on a “national scale through partnerships and collaborative networks, whether with the state, municipalities, river basin committees, management councils, among others, until it reaches the groups of landowners” (FREITAS, 2021). Three points for mobilization can be highlighted based on this trajectory’s experience: 1) Governance: definition of users of environmental services, project executors and providers of environmental services (FREITAS, 2021); 2) Legal framework: “the definition of a legal framework is of great importance to start a process of structuring a PES project” (FREITAS, 2021); 3) Partnerships: “the participation of different institutions is welcome and helps to give ‘robustness’ to the PES project” (FREITAS, 2021).

The Oasis Project created its own, standardized and flexible methodology for valuing payments for environmental services (YOUNG; BAKKER, 2014): PES = X * (1+N) * Z, in which X is the value basis, calculated according to the opportunity cost of the land (% of the opportunity cost evaluated in relation to the cost of the land); (1+N) is the property's environmental quality score (there are several criteria considered and analyzed in the field, such as the quality of the permanent preservation area, characteristics of the agricultural system used, especially

regarding the use of conservation techniques, among others), multiplied by the amount of natural area owned by the property (Z, in hectares) (FREITAS, 2021).

In REDD+ projects, to commercialize carbon credits in the voluntary market, there are methodologies that follow international quality standards, such as the traditional protocols Verified Carbon Standard – VCS –, and Climate, Community and Biodiversity Standards – CCB – (VERRA, 2021), for example, used by the projects presented by Gallego (2021). As mentioned, the application of these methodologies is more suitable for large areas, such as conservation units or private properties, which feature large extensions of continuous vegetation. Idesam, in partnership with the Natura company, implemented an alternative and customized methodology for the Carbono RECA Project, in areas populated by small farmers and featuring mosaic vegetation (SOARES, 2021; VAILATI; LIMA, 2021), which can be replicated in other contexts, except for the necessary conditions for governance and social organization. According to Soares (2021),

> [...] the state level is an interesting level to work with. Some states in the Amazon have advanced much more than the federal level, in terms of regulating environmental services and REDD+. This is the case of Mato Grosso and Acre, which were pioneers in regulating REDD+ with specific state policies, a defined governance structure, and concrete results in terms of investments and definition of programs to reduce deforestation and promote production chains. More recently, the states of Rondônia and Amazonas approved their environmental services laws, which passed through legislative assemblies. We still don't have a specific REDD+ law in Brazil to define the criteria, which are the good projects, how they should be integrated into national or state accounting, and how to maximize fundraising efforts. At the state scale, bilateral and international agreements that are being signed will require jurisdictional regulations as part of an investment project for environmental services. Brazilian states have been following this theme for many years on several fronts, forum of governors, forum of secretaries, governors' task force for climate and forest, there are a number of spaces in operation for a long time, seeking to attract the attention of binational governments.

The PES projects in Extrema/MG (PEREIRA, 2021) and in Alta Floresta/MT (RODRIGUES, 2021) started with internal political mobilization, followed by the search and establishment of partnerships, raising awareness among farmers and civil society. The investment of public resources to start activities (short-term PES for investments: supply of necessary inputs for planting and protection of areas) was considered fundamental, but with the progress of activities, approval of municipal laws and formalization of partnerships, it became possible to attract funds from other sources for PES payments in the form of a reward (long-term PES: direct transfer of funds for conservation and maintenance of areas). According to Pereira (2021),

> [...] when talking about consolidating a program, it is necessary to do it within the municipality's planning system – PPA, LDO, LOA – and the municipality must offer a minimum counterpart and then seek other forms of financing. It is necessary to create a mechanism so that one can be self-sufficient in programs like this, mainly for payments; for investment one can seek other forms of support.

For Almeida (2021),

> [...] ecosystem services have to be integrated into long-term planning, and planning involves instruments for territory management and resource management. For this

> we have: ecological-economic zoning, master plans for the municipality and/or metropolitan regions, management plans for UCs and other territories.

To summarize and complement: it is important to observe the definition of the environmental objectives in the PES programs, the institutional and governance arrangement (planning, implementation and monitoring), the technical framework (definition of environmental services and identification of providers/beneficiaries), the economic aspects and sources of funds to support the program. And bear in mind that these elements require a normative treatment for the regulation of a PES public policy, which can be found in the 'Guide for the formulation of state and municipal public policies on payments for environmental services' (GUIA..., 2017).

4. What are the possible funding mechanisms and opportunities?

In the presentations of the experiences that involved municipalities and farmers, the easiest way to start a short-term PES proposal was using public power's resources. According to Pereira (2021), from Extrema/MG, "the best way to start is with the municipal budget". Some possible funding sources, cited by Freitas (2021), were water basin committees, the municipality's ecological *ICMS* tax, and resources obtained from Terms of Conduct Adjustments (TAC), from the Public Ministry, can be directed to this end, among other ways. In addition to these forms of funding, in the Oasis Project (FREITAS, 2021) some sources of funds were verified: 1) The Rio Vermelho Water Producer project, São Bento do Sul/SC, was funded using resources from SAMAE, a public water supply company; 2) The Atlantic Forest Connection Project raised funds through the Global Environment Facility (GEF); 3) The São José Mais Água project, in São José dos Campos/SP, was funded by the municipal PES fund, using resources obtained from the Ecological ICMS and from the Paraíba do Sul River Basin Integration Committee (CEIVAP).

Some experiences received resources from the Amazon Fund, such as the BioREC project (ANHOLLETO JUNIOR, 2021), the Olhos D'Água da Amazônia project (RODRIGUES, 2021), and the Bolsa Floresta program (SALVIATI, 2021). The Quintais Amazônicos project (GOMES, 2021) was sponsored by Petrobrás and later by the Amazon Fund. The projects developed by Biofílica (GALLEGO, 2021) raised funds through the voluntary market for trading carbon credits within REDD+ concepts and international methodologies and protocols. Idesam has already used these resources among other initiatives, but together with the Association of Small Agroforestry Farmers of the RECA project it presented an alternative REDD+ proposal, customized for small farmers, and sponsored by Natura, a cosmetics company.

The creation of financial vehicles for capturing and applying resources can provide greater security for their management, whether public, private or mixed. These vehicles constitute funds that can be specific for PES, or even for environment, water resources, or climate change. They may have their own legal nature or simply exist as bank accounts or accounting funds linked to a formally constituted institution (GUIA..., 2017). There are, therefore, several mechanisms that can be accessed in different contexts.

Simply grouped, the possible sources of PES funding are: a) Own budget allocation, such as the budget (federal, state or municipal) destined for the environment, part of the ecological ICMS, etc.; b) Charges for the use or exploitation of a given environmental resource,

such as oil royalties, fees on energy generation, charges for the use of water, etc.; c) Loans or donations from public or private institutions, such as the Global Environment Fund (GEF), World Bank, Amazon Fund, national and international foundations, large companies and others; d) Markets for environmental assets, with the commercialization of well-defined ecosystem services and backed by assets originated from certified projects and programs, for example voluntary markets that sell carbon certificates (REDD+) and private investors that acquire environmental assets for their internal compensations.

In addition to these funding mechanisms, there are opportunities commented on by participants. For example, the Floresta+ program (BRASIL, 2021) was granted 100 million dollars by the Green Climate Fund (GCF), which is the main financial mechanism of the Paris agreement, as a result of the deforestation reduction/avoided deforestation in 2015 (UNEP, 2021). The Floresta+ program is still in the implementation phase, but has already articulated, in partnership with the United Nations Development Program (UNDP), opportunities to finance proposals aimed at conservation of natural resources and sustainable development through the Floresta+ Amazônia Project (2021) (SOARES, 2021).

Voluntary and regulated carbon markets are good opportunities for capturing through emissions offsets, which include, for example: ICAO's CORSIA, which sets targets for reducing greenhouse gas (GHG) emissions from the civil aviation sector; Results of the Paris Agreement, which foresees the definition of national policies to reduce carbon emissions after 2020; The purchase of credits by individuals who want to offset their emissions is another niche that tends to grow with services intermediated by different platforms and resources; Long-term contracts, which offer a solid market for companies that want to compensate future GHG emissions in the long term, either by purchasing carbon credits in bulk, or by participating in projects in their early stages (GALLEGO, 2021).

Other fundraising opportunities for projects in Brazil were also pointed out, such as the United Nations' (UN) Sustainable Development Goals (SDGs) and Decade on Ecosystem Restoration; conservation agriculture; investments in nature-based and ESG solutions that take into account environmental, social and governance criteria (ALMEIDA, 2021; GALLEGO, 2021; SOARES, 2021).

CONCLUSION

Payment for Environmental Services (PES) projects are consolidated as important support instruments for the recovery and conservation of natural areas and can temporarily contribute to other sustainable development initiatives in the Amazon. In deforested regions, areas consolidated and under pressure of illegal deforestation, PES can support reforestation initiatives, combined or not with production systems, for the purposes of biodiversity conservation, carbon sequestration and water supply.

In regions of continuous native vegetation, such as in areas of conservation units (UCs) and indigenous lands, or in private areas with large extensions, PES can be contemplated through the Reduction of Emissions from Deforestation and Forest Degradation (REDD+) mechanism. However, REDD+ initiatives already exist in areas of small farmers, with vegetation distributed in mosaics and customized monitoring and verification methodologies. The use of

REDD+ in private areas is more common than in public areas, due to the excessive bureaucracy for the use of public areas.

The transfer of financial or non-financial resources to the providers/beneficiaries of environmental services is important for the recognition of the role they play in nature conservation, with positive impacts on indicators related to biodiversity, carbon sequestration and water supply. In the Amazon, projects have focused on the conservation and sustainable use of natural resources, combined with activities to generate income through training, management processes, social empowerment and environmental control. The transfer of resources also contributed to reducing deforestation, as the resources were used to meet the basic needs of local populations.

PES can serve in a transitory manner until other sustainable economic initiatives are consolidated in longer terms. In this sense, the use of agroforestry systems enables both reforestation and income generation. As results are achieved, the transfer of resources to providers/beneficiaries of environmental services contributes to the maintenance of reforested areas. However, in different contexts, it is important to plan structuring actions, with training to strengthen social organization, develop local production chains and generate income from the sustainable use of natural resources, essential for the continuity of actions.

Generally, the development of PES projects occurs at the initiative of the executors and their partners (municipal and or state secretaries, professionals from research institutes, non-governmental organizations and private companies). The involvement of partners, as well as organized civil society with the public power from the beginning is important to strengthen the governance structure and to give continuity to the proposals.

The levelling of information between the actors and the detailed diagnosis were presented as the main difficulties to start a PES proposal. Therefore, collecting secondary information, carrying out diagnoses – social, economic and environmental – and participating in workshops for levelling information and validating the proposals are essential for the best development and success of the projects. It is noteworthy that, in order to overcome these two difficulties, the participation of all the actors involved in the project is essential.

Governance is another bottleneck for the implementation and continuity of a project. In order for resources to effectively support the maintenance of environmental services linked to the project, a solid governance consistent with the local reality requires an adequate definition of the environmental service addressed, the role and participation of those involved in the project, which includes users/payers, executors and providers/beneficiaries of environmental services. The definition of metrics/sub-metrics is a key point for governance, especially regarding the monitoring and verification of reported results.

The definition of a legal framework is an important step in governance, and constitutes a conditioning factor for starting a PES proposal. However, in order for it to be consolidated as a public policy, it must be inserted into the budget planning system of a municipality (Pluriannual Plan – PPA –, Budget Guidelines Law – LDO – and Annual Budget Law – LOA –), ensuring a minimum counterpart until other forms of financing can be sought. The generation of ecosystem services can be conceived within the instruments for long-term territorial management planning, such as ecological-economic zoning, municipal or metropolitan region master plans and UC management plans. In Brazil, several states are advanced in the elaboration of

environmental services and REDD+ laws with a defined governance structure, programs to reduce deforestation and established criteria for investment regulation and promotion of production chains.

It should be noted that external factors linked to the political and economic situation serve as a threat to PES projects, both in their implementation and continuity. For example, the pressure of illegal deforestation for logging and/or intensification of livestock production due to the increase in meat prices competes with production systems implemented in the projects, such as agroforestry systems or sustainable forest management.

There are several methodologies available and consolidated for the construction of PES projects in municipalities, such as the experiences of Alta Floresta/MT, or Extrema/MG, as well as the Oasis Project, from Fundação Boticário. REDD+ projects are also attractive alternatives for regions with large extensions of forests and can be applied, with a little more difficulty, in areas with mosaics of vegetation on small properties, as in the Carbono RECA Project.

Starting a proposal using one's own resources is always easier. However, there are financial mechanisms that can support PES projects, which have been grouped as follows: a) Federal, state or municipal budget for the environment, as part of the ecological ICMS; b) Charge for the use or exploitation of a given environmental resource, such as energy and public water supply; c) Resources from public or private institutions, such as the Global Environment Fund – GEF –, World Bank, Amazon Fund, national and international foundations and large companies; d) Voluntary carbon market backed by assets originating from certified projects and programs, such as REDD+ and internal emissions offsets.

Funds for the management of PES projects or programs, whether public, private or mixed, help provide greater security for fundraising in projects. These may have their own legal nature or be linked to some formally constituted institution. The following opportunities for expansion of initiatives and fundraising can be highlighted: a) The Forest+ program; b) Compensating GHG emissions via voluntary and regulated carbon trading markets; c) Results of the Paris Agreement; d) Specific platforms for the purchase of carbon credits by individuals; e) Long-term contracts to compensate company emissions; f) the United Nations (UN) guidelines, such as the Sustainable Development Goals (SDGs), and the Decade on Ecosystem Restoration; and g) Conservation agriculture, such as agroforestry systems or agroecological systems; h) Investments in nature-based and ESG solutions.

BIBLIOGRAPHIC REFERENCES

ALMEIDA, Verena Cristina de. Serviços ecossistêmicos na APA da Fazendinha: bases para tomada de decisão e gestão participativa. In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=g4ngnOmfrv8. Accessed on: 19 May 2021.

ANHOLLETO JUNIOR, Claudio Roberto. Projeto BioREC – Mamirauá: Conservação e uso sustentável da biodiversidade em unidades de conservação. In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=g4ngnOmfrv8. Accessed on: 19 May 2021.

BRASIL. Ministério do Meio Ambiente. **Ministério do Meio Ambiente lança Floresta+ Carbono**. Available in: https://antigo.mma.gov.br/informma/item/15875-minist%C3%A9rio-do-meio-ambiente-lan%C3%A7a-floresta-carbono.html. Accessed on: 19 May 2021.

DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT (GIZ). **Integração de Serviços Ecossistêmicos ao Planejamento do Desenvolvimento**: um passo-a-passo para profissionais com base na iniciativa TEEB. 2012. Available in: http://www.aboutvalues.net/es/data/six_steps/integr_ecosys_serv_in_dev_planning_pt.pdf. Accessed on: 19 May 2021.

EMBRAPA. Empresa Brasileira de Pesquisa Agropecuária. **Projeto Integrado para a produção e manejo sustentável do bioma Amazônia**. Available in: https://www.embrapa.br/fundo-amazonia. Accessed on: 01 June. 2021.

FREITAS, Juliane Cruz de. Projeto Oásis. In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=vfU6nB_Cu4g. Accessed on: 19 May 2021.

FUNDAÇÃO AMAZÔNIA SUSTENTÁVEL. **Desenhando arranjos inovadores de pagamento por serviços ambientais**. Manaus: FAS, 2017. 156 p.

FUNDAÇÃO AMAZÔNIA SUSTENTÁVEL. **Programa Bolsa Floresta**. Available in: https://fas-amazonia.org/componente/programa-bolsa-floresta/. Accessed on: 15 March 2021.

FUNDAÇÃO GRUPO BOTICÁRIO DE PROTEÇÃO À NATUREZA. **Projeto Oásis**: resumo executivo. Available in: https://www.fundacaogrupoboticario.org.br/pt/Biblioteca/Resumo%20executivo%20Oasis.pdf. Accessed on: 15 March 2021.

FUNDO AMAZÔNIA. **Projeto Integrado da Amazônia**. Available in: http://www.fundoamazonia.gov.br/pt/projeto/Projeto-Integrado-da-Amazonia/#. Accessed on: 29 October 2021.

GALLEGO, Caio. Projetos REDD + na prática e a evolução dos mercados voluntários. In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=9PuhbJRniZM. Accessed on: 19 May 2021.

GUIA PARA A FORMULAÇÃO DE POLÍTICAS PÚBLICAS ESTADUAIS E MUNICIPAIS DE PAGAMENTO POR SERVIÇOS AMBIENTAIS. [Brasília, DF: MMA], 2017. Available in: www.mma.gov.br/publicacoes/biodiversidade/category/143-economia-dos-ecossistemas-e-da-biodiversidade.html?download=1420:guiapara-a-formula%C3%A7%C3%A3o-de-pol%C3%ADticas-p%C3%BAblicasestaduais-e-municipais-de-pagamento-por-servi%C3%A7os-ambientais. Accessed on: 15 March 2021.

GOMES, Fabiana Barbosa. Projeto Quintais Amazônicos. In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=g4ngnOmfrv8. Accessed on: 19 May 2021.

HOLLIDAY, Oscar Jara. **Para sistematizar experiências**. Brasília, DF: Ministério do Meio Ambiente, 2006. 128 p.

LIMA, Denise Valéria; DUTRA, Mara Vanessa Fonseca. **Sistematização de experiências na Embrapa**: guia metodológico. Brasília, DF: Embrapa, 2017. 71 p.

PEREIRA, Paulo Henrique. Projeto Conservador das Águas em Extrema - MG. In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=vfU6nB_Cu4g. Accessed on: 19 May 2021.

PREFEITURA MUNICIPAL DE EXTREMA (MG). **Projeto Conservador das Águas**. Available in: https://www.extrema.mg.gov.br/conservadordasaguas/. Accessed on: 16 November 2021.

PROJETO FLORESTA+ AMAZÔNIA. **Sobre o projeto**. Available in: https://www.florestamaisamazonia.org.br/sobre-o-projeto/. Accessed on: 16 November 2021.

RODRIGUES, José Alesando. Programa Guardião de Águas (Projeto Olhos D'Água da Amazônia). In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas,

SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=vfU6nB_Cu4g. Accessed on: 19 May 2021.

SALVIATI, Victor. Programa Bolsa Floresta. In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=vfU6nB_Cu4g. Accessed on: 19 May 2021.

SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Parte 2. Available in: https://www.youtube.com/watch?v=vfU6nB_Cu4g. Accessed on: 19 May 2021a.

SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Parte 3. Available in: https://www.youtube.com/watch?v=g4ngnOmfrv8. Accessed on: 19 May 2021b.

SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Parte 4. Available in: https://www.youtube.com/watch?v=9PuhbJRniZM. Accessed on: 19 May 2021c.

SOARES, Pedro. Oportunidades do REDD + para a Amazônia. In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=9PuhbJRniZM. Accessed on: 19 May 2021

UNEP. United Nations Environment Programme. **Fundo verde para o clima**. Available in: https://www.unep.org/pt-br/sobre-o-pnuma/financiamento-e-parcerias/parceiros-de-financiamento/fundo-verde-para-o-clima. Accessed on: 16 November 2021.

United Nations Framework Convention on Climate Change (UNFCCC). **REDD+**. Available in: https://redd.unfccc.int/. Accessed on: 19 May 2021.

VAILATI, Fabio; LIMA, Gicarlos Souza de. Projeto de Carbono Reca. In: SEMINÁRIO EXPERIÊNCIAS EM SERVIÇOS ECOSSISTÊMICOS - AMAZÔNIA (on-line), 2021, Campinas. **Projeto ASEAM**. Campinas, SP: Embrapa Territorial, 2021. Available in: https://www.youtube.com/watch?v=9PuhbJRniZM. Accessed on: 19 May 2021.

VERRA. **Verra Standards and Programs**. Available in: https://verra.org/verra-standards-and-programs/. Accessed on: 19 May 2021.

YOUNG, Carlos Eduardo Frickmann; BAKKER, Leonardo Barcellos de. Payments for ecosystem services from watershed protection: A methodological assessment of the Oasis Project in Brazil. **Natureza & Conservação**, v. 2, n. 1, p. 71-78, 2014.