

Palacký University Olomouc
University of Clermont Auvergne
University of Pavia

Master's Thesis

Daniel Aguilar Viñas

Supervised by Lenka Dušková and Armin von Schiller
May 2023

Erasmus Mundus Master on Global Development Policy
(GLODEP)

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Community perceptions in a collective PES
on mangrove conservation: a case study
from the Gulf of Nicoya, Costa Rica

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Declaration of Authorship

I, Daniel Aguilar Viñas, hereby declare that the content presented in this master's thesis titled "Community perceptions in a collective PES on mangrove conservation: a case study from the Gulf of Nicoya, Costa Rica" is entirely my own work, unless otherwise properly referenced.

Throughout the research and writing process, I have made every effort to ensure that any external material, including but not limited to ideas, theories, data, images, and quotations, is appropriately cited and referenced following the guidelines provided by my academic institution.

I understand that any violation of academic integrity, including plagiarism or misrepresentation of sources, can result in severe consequences, such as academic penalties or the nullification of my thesis.

I take full responsibility for the originality and accuracy of the content presented in this master's thesis and assure that no part of it has been previously submitted for academic credit in any other educational institution.

15/05/2023

A handwritten signature in black ink, enclosed in a thin black rectangular border. The signature is written in a cursive style and appears to read "Daniel".

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Zásady pro vypracování

The research will examine the situation and particularities of PES schemes in Costa Rica, analyzing the impact on diverse areas, with special attention to the social perspective.

The selected central american country it's been a pioneer on the development and implementation of this instrument, being the first one in the world including it in a national program. In the present day, the country faces a process of transition, in which the nature and characteristics of the program are being revised and redefined. The research design and its scope will be elaborated in a collaborative way with the host organization and local actors, so it is locally contextualized and responds to the interest of both parties. The methodology will consist in a qualitative design, on which the different perceptions dynamics in place will be aimed to be understood through diverse qualitative data collection approaches. Primary data will be collected from different key actors involved in the program, from the ministry of environment to local communities, including international organizations and academia.

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Katedra rozvojových a environmentálních studií

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Abstract

Payments for Ecosystem Services (PES) are increasingly implemented worldwide as an instrument to provide incentives to landowners and communities for the provision of ecosystem services. Whereas most of the interventions target in-land forest conservation, mangrove ecosystems are often not considered. Similarly, evaluations tend to focus on the environmental and economic effects, while the social dimension is usually relegated to the background. The present research attempts to address these gaps through the qualitative exploration of community perceptions within a collective PES scheme on mangrove conservation, with a particular focus on the relational social effects among stakeholders. The study comprises 10 key expert interviews with institutional actors involved in PES and the examination of participants' perceptions in 2 communities in the Gulf of Nicoya, Costa Rica. The analysis indicates that the project had an impact on the social, economic and environmental spheres, with special relevance for the social dimension. Among other effects, the intervention seems to have strengthened collaboration and trust among participants and institutions, to have reinforced the local identity, to have led to the creation of a new community-managed enterprise and to have increased the environmental awareness of participants. The research also underpins the relevance of local-ecological knowledge (LEK) for the implementation of environmental conservation projects.

Keywords

Payments for Ecosystem Services

Collective schemes

Mangrove conservation

Social cohesion

Community perceptions

Local-ecological knowledge

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List of abbreviations

ACICAFOC	Central American Indigenous and Peasant Association on Community Agroforestry
CATIE	Tropical Agronomy Research and Educational Centre
CI	Conservation International [Costa Rica]
FONAFIFO	Costa Rican National Forestry Financing Fund
FUNDECOR	Foundation for Economic Development of the Central Volcanic Area
GGGI	Global Green Growth Institute
INEC	Costa Rican National Institute of Statistics and Census
IWGIA	International Work Group for Indigenous Affairs
LEK	Local-ecological knowledge
MINAE	Ministry of Environment and Energy
MIRINEM	Former Ministry of Environment, before the creation of MINAE
PES	Payments for Ecosystem Services
PSA	Pagos por Servicios Ambientales [Costa Rican PES national program]
SINAC	Costa Rican National System of Conservation Areas
UN	United Nations

Internship at Conservation International Costa Rica

Conservation Internacional Costa Rica is an institution with more than 30 years of experience in the country. The organization carries out its activities under a science-based approach, developing innovative policies and working closely with communities in order to empower local people to conserve the nature on which their wellbeing and livelihoods depend. The organization focuses particularly on marine protection activities, working on the sustainable management of fisheries and aquaculture, mangrove conservation and blue carbon projects.

During my stay at *CI* I carried out the main activity of researching about the creation, evolution and current state of the national PES model, as well as the implementation of other local PES schemes. I particularly focused on the social implications of PES interventions, especially mangrove conservation projects. For this purpose, I held meetings with numerous institutional actors related to the PES ecosystem, with whom I was able to have several informal conversations and conduct formal interviews. I also realized a field visit to a mangrove area under a PES restoration scheme together with the team of *CI*, alongside staff from other institutions such as the *Costa Rican National System of Conservation Areas (SINAC)*, the *German Development Agency (GIZ)* and the *Environmental Bank Foundation (FUNBAM)*. In the same line, I conducted another field visit to a forest under the national PES regime, in collaboration with the *Foundation for Economic Development of the Central Volcanic Area (FUNDECOR)*.

This period contributed to enrich my knowledge on community-based collaborative approaches as well as environmental conservation, two of the topics I feel more passionate about around which I want to keep expanding my horizons. My interest to learn on these dimensions played an important role in deciding to join GLODEP two years ago, and I think the activities I performed during the last months are tightly connected with the GLODEP curriculum. Furthermore, these are two of the main areas in which I am more interested for my laboral and academic future. During this time I have also gained valuable experience on how to conduct qualitative research, as well as on how to interact with people from diverse sectors of the institutional environment. In addition, I have had the possibility of discovering and getting to know first-hand the country of Costa Rica, something I wanted to do since I was 19 years old due to the particular history and development of this nation and the character of their people.

My work during these weeks have been also enrichful for the host institution, since the research I have conducted on the social implications of collective PES is in line with one of the main areas of action of the organization, especially around the dimension of mangrove conservation. The social evaluation of interventions is a niche that the organization had previously identified as relevant but never delved deeper into it. Moreover, the research can serve as a guidance for the current endeavors that the institution is developing in order to integrate mangrove conservation in a national program on which local communities play a central role. The results could thus not only be useful internally for the better understanding of the effects implied by their project, but also to show to other institutions the relevance of allocating more time and resources to these types of interventions.

Overall, I am happy and satisfied with the course of the last 3 months. I honestly think they have positively contributed to my personal and professional development.

1. Introduction

Payments for Ecosystem Services (PES) emerged as an instrument to contribute to the global venture of reforestation and forest conservation. Since its origins at the end of the 20th century, PES schemes have spread worldwide, reaching a number of 550 active programs that account for an estimated 36–42 USD billion in annual transactions (Salzman et al., 2018). PES aim to function as a market transaction, creating economic incentives that attempt to reverse the negative trends in different environmental areas, mostly deforestation and forest degradation, but also water pollution (Naime et al., 2022).

However, there is not much evidence on PES schemes that have addressed mangrove conservation, existing just few preliminary attempts developed up to the present (Rakotomahazo et al., 2021; Razzaque, 2017; Friess & Thompson, 2016; Locatelli et al., 2014). Mangrove ecosystems have experienced massive degradation and deforestation in the last decades. Between 1960 to 2010, around 20%–35% of all global mangroves disappeared due to anthropogenic activities (Goldberg et al., 2020). Although the rate of loss has greatly diminished, moving from global estimates of 2%¹ net extent loss per year between 1980-1990 to 0.04% between 2010-2020, the international mangrove cover keeps decreasing every year (Global Mangrove Alliance, 2022). Despite numerous benefits have been associated with mangrove ecosystems, projects in the area are still scarce. Furthermore, existing efforts on mangrove conservation have not been translated into coordinated public policies yet (Howard et al., 2022), with mangrove policies often being characterized by their fragmented nature, as multiple sectors, disciplines, and institutional structures interact to affect the management of mangrove conservation (Chamberland-Fontaine et al., 2022).

Concerning the type of beneficiaries, PES interventions have been traditionally implemented following top-down approaches in the form of national programs, using in-cash transfers as a payment for the environmental services provided by individual landowners (Katherine et al., 2020; Schomers & Matzdorf, 2013). Although literature has shown diverse positive outcomes derived from PES implementation, mainly in the environmental sphere, its impact has been overall limited, leading to optimistic but modest results so far (Naime et al., 2022; Katherine et al., 2020). Similarly, systematic reviews and meta-analysis have indicated that the impact of PES has been overall small, especially among national level programs (Liu & Kontoleon, 2018; Börner et al., 2017; Samii et al., 2015). Furthermore, detractors have criticized the market-based character of PES, arguing that it is associated with commodification, privatization trends and the neoliberalization of conservation (Kaiser et al., 2023; Büscher et al., 2012; Kosoy & Corbera, 2010). In this sense, PES have been accused of promoting motivational crowding-out effects (Kemigisha et al., 2023; Oniki et al., 2023; Akers & Yasué, 2019). This concept describes the decrease in pro-conservation behavior due to the undermining effect that financial incentives can have on intrinsic and altruistic motivations, especially after the end of the specific intervention (Chapman et al., 2020). Critics have also

¹ The 2% net extent loss comprises an annual average deforestation of 198,090km² for the decade of the 80s, while 0,04% implies the average annual loss of 66km² for the period 2010-2020

argued that the neoliberal market nature of PES hinders the achievement of intended outcomes, falling PES projects far short of conservation objectives while also often exacerbating socioeconomic inequality and undermining collaborative actions within local communities (Kaiser et al., 2023; Fletcher & Büscher, 2017).

Regarding this, a debate around the design, characteristics and implementation of PES schemes surged in the academic community in the last few years. Since governance structures condition the predominant values and perspectives (Vatn, 2010), different PES governance modalities affect the prioritization and interaction between economic, ecological and social objectives (Katherine et al., 2020). Diverse studies have analyzed the benefits and limitations of different PES modalities, emerging collective local approaches as an alternative to tackle the shortcomings presented by the predominant national individual-based approaches (Kaiser et al., 2023; Katherine et al., 2020; Schomers & Matzdorf, 2013; Vatn, 2010; Muradian et al., 2010). A recent literature review suggests collective PES show a lower degree of commodification due to the fact that land is often less embedded into private land markets (Kaiser et al., 2023). In the same line, crowding-out effects have been found to be smaller in collective schemes, which have shown to promote crowding-in effects by enhancing social motivations and environmental values (Nguyen et al., 2022; Moros et al., 2019; Grillos et al., 2019).

Existing literature suggest collective PES schemes also have several other benefits over individual interventions, such as the improvement of ecological benefits by planting a larger diversity of trees, the higher engagement of people with smaller incomes and properties (Katherine et al., 2020) and the reduction of transaction costs (Nguyen et al., 2022). In the same sense, a review of 130 local studies in 14 countries found that community-owned forests suffer less deforestation and fewer fires, while storing more carbon than forests of other ownership types (Stevens et al., 2014). Furthermore, collective local interventions have proved to better include vulnerable social groups, including those which do not possess land title rights and indigenous communities that see their rights systematically violated (IWGIA, 2022; Muradian et al., 2010 Corbera et al., 2007). Although collective community-based governance frameworks have shown to be effective in the management of common and public resources, they represent a minor number and evidence on their effects is still scarce (Kaiser et al., 2023; Katherine et al., 2020).

Furthermore, whereas most of the studies around collective PES have focused on the environmental and economic impact and programmatic aspects, such as selection criteria or transaction costs, few attempts have been made to understand the perceptions of beneficiary communities. In addition, the literature in this area has reported on domains such as the perceived effectiveness of the intervention (Cordero, 2008; Corbera et al., 2007), the general perception (Perevochtchikova & Rojo Negrete, 2015), the perceived future effects (Rakotomahazo et al., 2021), crowding motivation effects (Oniki et al., 2023; Vorlauffer et al., 2023) and the impact on livelihoods and forest conservation (Pham & Roongtawanreongsri, 2022; Clements & Milner-Gulland, 2015). However, little attention has been given to the dynamic interactions between participants and institutions, especially in developing countries

(Grillos et al., 2019), whereby the relational social effects of PES remain as an open question (Nguyen, 2022).

In summary, the existing PES endeavors coincide in the following points: 1) not addressing mangrove conservation, 2) prioritizing national individual-based approaches over collective community-based schemes and 3) lack of evaluation of participants' perceptions, specifically regarding the effects on the social relations among stakeholders. The present research seeks to address the gaps in these areas through the examination of community participants' perceptions in a pioneer collective PES scheme for mangrove conservation developed in the Gulf of Nicoya, Costa Rica. The study particularly focuses on the inspection of relational effects in the social sphere, contributing to the existing literature that has evaluated collective PES schemes mainly from an environmental, economic and programmatic perspective. The investigation responds to the following main research question: What are the perceptions of community members towards their participation in a collective PES project on mangrove conservation?; And to the subsequent secondary research question: What are the implications of the project for the social relations among the stakeholders involved?

In the following section, a conceptual framework around the importance of mangrove ecosystems and the role of communities on environmental conservation is developed. At the same time, an overview of the Costa Rican PES program is provided, reviewing its creation, evolution and characteristics. Special attention is drawn over 4 characteristics of the national PES: 1) the absence of mangrove ecosystems, 2) the predominant individual character of the program, 3) the lack of evaluation on social outcomes and participant perceptions and 4) the possible detrimental effects of the program on the social dimension; elements that motivate the analysis of the selected case study. In section 3, detailed information about the characteristics of the case study is provided. Subsequently, the methodological approach is exposed. In section 5, the results of the analysis are disclosed. Finally, conclusions are presented and limitations of the research pointed out, opening space for further contributions.

2. Conceptual framework

2.1. *The relevance of mangrove ecosystems*

Evidence in the literature has indicated diverse benefits of mangrove conservation. As such, mangrove ecosystems are identified as a key instrument to combat climate change (Kumari & Rathore, 2021). It is estimated that mangroves protect globally 3.5 million people from the impacts of climate change, including storm surges, flooding, sea-level rise, and erosion (Global Mangrove Alliance, 2022; Blankespoor et al., 2017). The benefits of mangroves concerning flood protection are estimated to exceed 65 USD billion per year. If they were lost, 15 million people would be flooded annually across the world (Menéndez et al., 2020). Mangrove forests are also considered crucial in the promotion of biodiversity, due to their key role as an intersection between coastal and terrestrial ecosystems, hosting a broad array of habitats and supporting a large diversity of species, including terrestrial, estuarine, and marine organisms. In this sense, mangrove ecosystems are vital for the protection of biodiversity and for all the different elements interlinked with it (Rahman et al., 2021; Carugati et al., 2018).

Furthermore, mangrove forests act as efficient carbon sinks, having the capability of storing around 3-4 times more carbon than tropical forests, as well as improving nutrient cycling and soil formation (Kumari & Rathore, 2021). Recent studies have underpinned evidence on the key role of mangroves for carbon sequestration and carbon storing. For instance, a research conducted in Brazil demonstrates the efficiency of carbon sequestration by mangrove ecosystems, indicating that Brazilian mangroves store up to 4.3 times more carbon in the top meter of soil than the Amazon forest (Rovai et al., 2022). A review in the Asia-Pacific region (Sharma et al., 2023) has estimated the carbon fluxes in 25 countries, determining large benefits on carbon sequestration and carbon storage. On a global level, Zhong et al., (2023) have exposed the trends and perspectives on carbon sequestration in coastal wetlands from 2003 to 2021, indicating the principal role of mangrove carbon sinks.

Last but not least, mangrove ecosystems develop a fundamental role for the livelihoods of neighboring communities, representing an important source of food for many tropical coastal communities, providing income generation through fishery activities and protecting them from environmental conditions such as floods and heat (Global Mangrove Alliance, 2022). People living around mangrove ecosystems are the ones that benefit the most from its conservation, but also the ones who know more about its evolution and conditions. As a consequence, the integration of local communities is essential for the implementation of effective interventions, as they can provide critical information that address data deficiencies and knowledge gaps. As the report *The State of the World Mangroves* stresses (2022, p.60):

Having a broader and more detailed understanding of the local conditions and history of a particular site can greatly improve successful protection and restoration of mangroves. For many areas, however, there are huge data gaps, including information on past conditions, local human uses, the fauna and flora, and physical and hydrological settings. To fill knowledge gaps, scientists often rely on estimates from large-scale, low-resolution datasets, but such information

rarely captures the local context. Local peoples can provide a critical route to addressing data deficiencies and knowledge gaps.

In this sense, local-ecological knowledge (*LEK*), a broad term that comprises the information that local people have on animals, plants, and the environment with which they are familiar, can provide key information on endemic organisms, interactions between humans and the environment and changes in the ecosystem through space and time. The report provides several examples of the relevance of *LEK* for mangrove conservation from all around the world. For instance, in India, local knowledge of change in mangrove areas differed from geographic information system maps, and information from both sources was used to develop interventions. Through community participatory mapping, a local community in the Philippines identified mangrove areas that were not identified in global mapping efforts. In Madagascar, *LEK* contributed to the elaboration of comprehensive bird inventories, with local people adding 18 species that were not found in formal field surveys. These examples illustrate how the participation of communities can strengthen the understanding of mangrove ecosystems and support its effective protection, restoration, and management.

2.2. The omission of mangrove conservation in Costa Rica's current PES model

Costa Rica has implemented for years a successful and internationally recognised model for conservation. In 1997, the country became the first nation to introduce a PES scheme as part of a national program. However, in line with most of the international PES initiatives, mangrove forests have not yet been considered in the program. A short historic overview illustrates the creation and evolution of the national PES model.

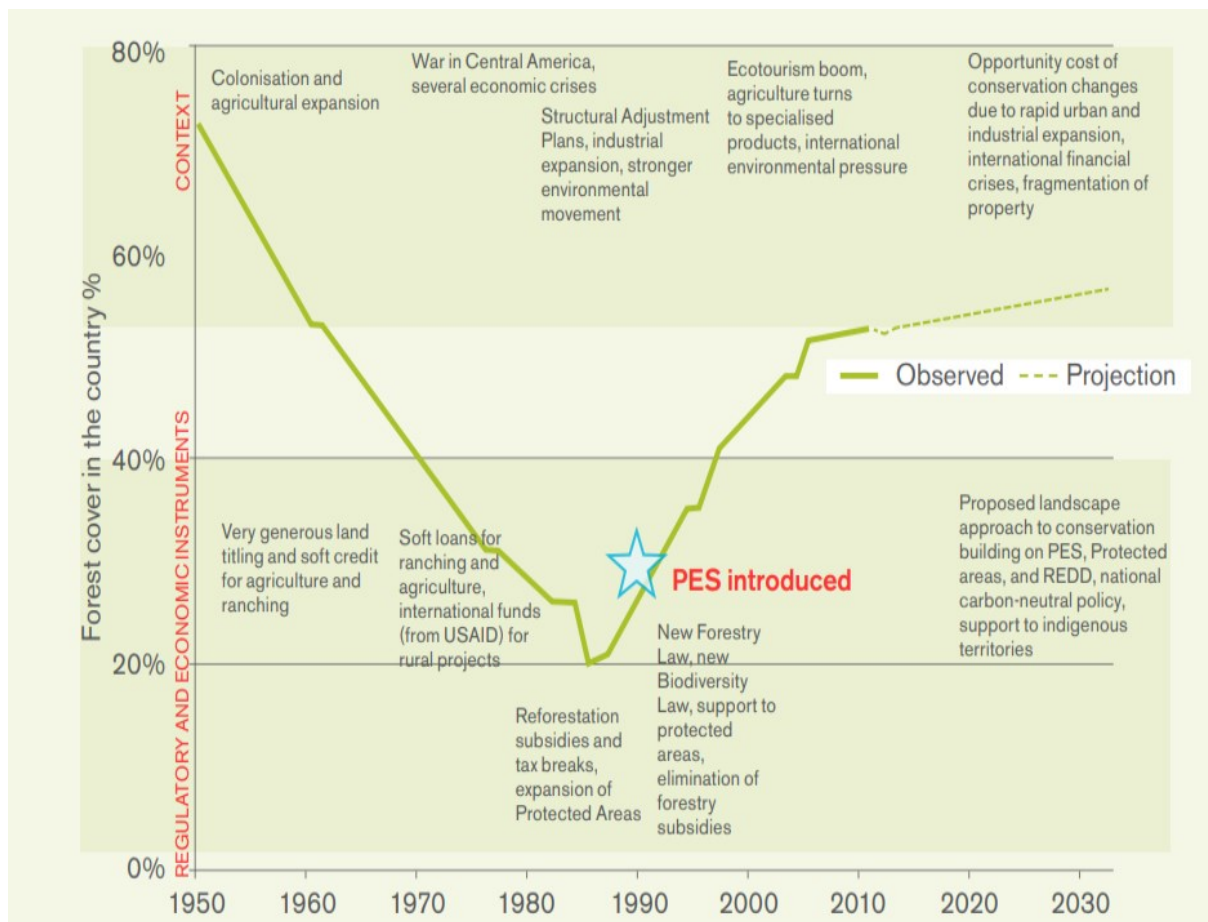
In the second half of the 20th century, Costa Rica followed a development model focused on the expansion of cattle ranching and agriculture. As observable in *Figure 1*, from 1950 to 1985 the country lost 58% of its forest cover, which represented one of the highest deforestation rates in the world at that time. This process was fueled by several drivers, both internal and external ones. Concerning the latter, the main factor was associated with high meat prices, which generated incentives for land use change. In addition, the government created a series of incentives to promote extensive cattle ranching, such as the facilitation of access to credit or the provision of formal land titles to those who cleared out the land for the development of economic activities (GGGI, 2016).

To address this situation, the Costa Rican government started to take actions towards the promotion of environmental protection. Between 1979 and 1985, a program that allowed income tax deductions for reforestation was implemented, complemented by a set of soft loans for the forestry sector. Subsequently, in 1986 the government started to hand over direct subsidies for reforestation and forest protection (GGGI, 2016). Finally, in 1996, Costa Rica included a PES scheme as part of a national program financed with public funds, the so-called *Pagos por Servicios Ambientales (PSA)*, becoming the first country in the world to do so. Introduced by the Forest Law N°7575, the PES program was placed under the mandate of the *National Forestry Financing Fund (FONAFIFO)*, institution that was embedded in the *Ministry of Environment and Energy (MINAE)* (Sanchez & Navarrete, 2017).

FONAFIFO elaborated a framework for PES to deliver cash transfers to individual landowners, in exchange of the ecosystem services provided by the latter. In the first 9 years, the program encompassed 3 types of modalities: forest protection, reforestation and sustainable management. In 2006, a fourth one was added, namely natural regeneration. In the same year, the 5 initial ecosystem services included in these 4 modalities were expanded to the current 16, among which none of them comprises mangrove conservation, despite scientific literature has evidenced the numerous benefits associated with these ecosystems.

Figure 1

Changes in forest cover in Costa Rica in relation to context, economic and regulatory instruments



Source: Porras et al., (2013)

From 1997 to 2020, the program has involved more than 524 USD millions and provided benefits to around 18,000 beneficiaries (Presidencia, 2020). The country has been able to uninterruptedly run the program over the last 26 years, transitioning from being one of the countries with the highest deforestation rates in the world to consolidating as an international reference terms of environmental conservation, increasing the total national forest cover by 37%, from 20% in 1987 to 57% in 2021² (SINAC, 2021; Porras et al., 2013). The PES program implementation has become a worldwide example of a successful instrument able to reverse deforestation and forest degradation in a stunning short period of time, studied and replicated across the globe (Robalino et al., 2021; GGGI, 2016). The contributions of the PES program, alongside other complementary endeavors on environmental conservation, has shifted the processes of deforestation and forest degradation initiated in 1950 and still undergoing at the beginning of the 90s. In recognition of its environmental contributions, Costa Rica has been awarded with several international prizes, such as the *UN Global Climate Actions Awards* (UN, 2020) and *The Earthshot Prize (2021)*, which involved the awarding of 1 million pounds.

Although the PES program achieved astonishing environmental results during its history (GGGI, 2016; Porras et al., 2013), it currently faces a slowdown trend for the expansion in forest conservation. As depicted in *Figure 1*, whereas in the first 13 years of the program the forest cover increased over 30%, in the next 13 years the program was only able to incorporate 6% more of territory to reach the current forest cover of 57%. This decline is a result of mainly 2 factors. Firstly, there is a limitation for the maximum forest cover the country can achieve, due to the use of the land for residential and economic activities. Predictions set this limit at 60%, meaning that the convertible lands that the program could encompass in the future represent currently less than 3% of the national territory. Secondly, the opportunity cost to incorporate the remaining suitable lands to the program is now much higher than 2 decades ago. In 1990, a huge drop in beef prices coincided with low productive efficiency since most of the cattle lands were managed in an extensive way, facilitating the reforestation of extensive portions of the territory. In contrast, a large part of the cattle sector nowadays is intensive-oriented. This factor renders the current opportunity cost for land conversion very high, comparing the current profitability of the sector with the financial endowment provided by the PES program (Katherine et al., 2020; GGGI, 2016).

What was considered to be a very appropriate and effective measure at the end of the 90s and the beginning of the new century, now sees its own boundaries very close regarding the limits to incorporate new beneficiary landowners and create additionality. In the present moment, the program struggles not only to expand conservation to new territories with new contracts, but also to maintain the achievements made in the last 26 years. The *State of the Nation Report* (2019) reveals that illegal logging has grown exponentially in recent years due to the expansion of monocultures such as pineapple, palm and banana. In 2017 alone, the report states that 78 conflicts were registered between pineapple plantations and Protected Wildlife

² See *Figure 2* illustrating forest cover by 2021 in the Appendices

Areas, while 90 conflicts were accounted for wetlands. The conflicts for protected wildlife areas represented 3,800 hectares, whilst for wetlands it concerned more than 16,000 hectares.

Notwithstanding, the constraints to expand forest cover due to the stagnation point that the program seems to have arrived at does not mean that the country has reached its full potential for environmental conservation. On the contrary, while in the last 3 decades the country has become a worldwide reference for forest conservation and reforestation, the reality is abruptly different regarding marine ecosystems. At the time Costa Rica reversed the deforestation process and significantly increased forest cover, mangrove ecosystems along the coasts were dramatically destroyed. 25,000 hectares of mangroves were deforested in 30 years. Their number fell from 64,452 hectares in 1979 to 39,034 in 2011, representing the loss of 40% of total mangrove cover and becoming thus a major environmental issue (López-Angarita, 2016).

Nonetheless, the efforts on mangrove conservation are still sparse, especially if compared with the ones developed around in-land forest. Although some steps have been recently taken to keep at bay the rapid mangrove deforestation and reverse the process, the advances made up to now are small. The current mangrove cover level is still far from the existing one before the deforestation process started in the 60s, and moreover, whilst controlled and slightly decreased in the last years, Costa Rica annual mangrove loss rate of 1.23% has shown to be significantly high compared to the global average of 0.04% (Global Mangrove Alliance, 2022; López-Angarita et al., 2016). The backlog situation of mangrove conservation in Costa Rica, together with the international evidence on its enormous importance for multiple areas, proves the importance of increasing endeavors in this dimension and evaluating their functioning and effects.

2.3. The importance of including communities in environmental conservation

Since Costa Rican mangrove ecosystems have the character of public good and the PES case study analyzed in this research is collective, it is convenient to have a look at the works developed by Elinor Ostrom to better understand the common management of public and communal resources.

The collective management of goods was systematically analyzed by Ostrom, who addressed the debate around the “tragedy of the commons” presented by Hardin in 1968³, for whose contributions became the first woman to win the Nobel Prize in Economics in 2009. According to Hardin’s theory, people do not coordinate to manage common goods as they focus on the maximization of self-interest, which leads thereby to the depletion of resources when the demand exceeds the natural capacity. Following this idea, for years economists developed their theories pigeonholing the necessity of giving preponderance either to the public governance of goods or the private one. Ostrom and her collaborators broke with this private-public dichotomy, showing that in many parts of the world groups of people were capable of successfully self-organizing to use diverse goods. Her theories indicate that the

³ For further information, revise Hardin (1968)

management of exhaustible resources by collective groups of people can prevent environmental degradation either without public administration or private market-based interventions.

From Ostrom's theories it can be implied that "*there is a significant class of environmental problems, including the management of forests, watersheds, inshore fisheries and many local collective or public goods where it would be better to rely on more decentralized forms of management*" (Aligica & Sterpa, 2017, p. 98). Ostrom provided examples of satisfactory collective management of resources from all around the globe. Successful cases exposed by the author include pasture fields and forests in Japan, high mountain forests in Switzerland, irrigation systems in Spain and the Philippines and fisheries in the United States (Ostrom, 1990; Ostrom 1997). Some of these examples, such as the fisheries, coincide with the public good nature of mangrove forests in Costa Rica, suggesting community-management could be also efficient for these mangrove ecosystems. Nonetheless, Ostrom's theories advocate the necessity of local contextualization, taking into consideration the particularities and conditions of each case. In her narratives, there is no one-size-fits-all solution to address different conditions and characteristics in every instance (Ostrom, 2010).

The works of Ostrom exemplify not only the possibility of successfully administering resources in a collective way, but also the rationality and superiority of this modality over private and public approaches. In this sense, their theories illustrate that the development of collective PES can be an efficient instrument in the promotion of environmental conservation in different domains, such as fisheries, forests, watersheds and other collective and public goods (Aligica & Sterpa, 2017).

However, the Costa Rican national PES program has been predominantly individual-oriented since its creation in 1997, excepting the case of indigenous communities, whose participation was incorporated to the program in a collective way. The absence of a collective approach in the PES model has hence entailed the omission of the potential benefits rendered by community-based governance structures, and may have led to detrimental effects on the social dimension. While there has been a detailed monitoring of the results accomplished on environmental indicators, principally land-use and forest cover, the social outcomes have been largely overlooked during the program's evolution. No evaluation on community perceptions has been conducted up to date, and there is no robust evidence of the effects of the program in the social area.

In a review of the national model, Porras et al., (2013, p. 51) expressed that "*there has still not been a rigorous evaluation of intangible benefits such as perceptions of the scheme, community and group relations, or perceptions of justice*". Although 10 years have passed since the statement was made, an exhaustive literature review and key expert interviews⁴ with Costa Rican institutional actors show that the void in this matter still persists.

⁴ The interviews underpinned the absence of evaluations on social outcomes and community perceptions that was identified in the literature review, as illustrated in section 5.1

Notwithstanding, despite the absence of systematic evaluation on the social dimension, the individual nature and characteristics of the program provide some hints on potential negative dynamics around the social sphere derived from its implementation.

For instance, the possession of legal property rights is considered as a strict criteria for selection, which excludes mainly the poorest segments of population who do not have formal property rights, the absence of which is correlated with poverty and economic development (UN-Habitat, 2018). In the same line, not having any type of debt towards the State or the private banking sector represents another requirement for selection, which excludes poorer households from the program as these are the ones with a more vulnerable economic situation, thus more likely to incur in debt (Hood et al., 2018).

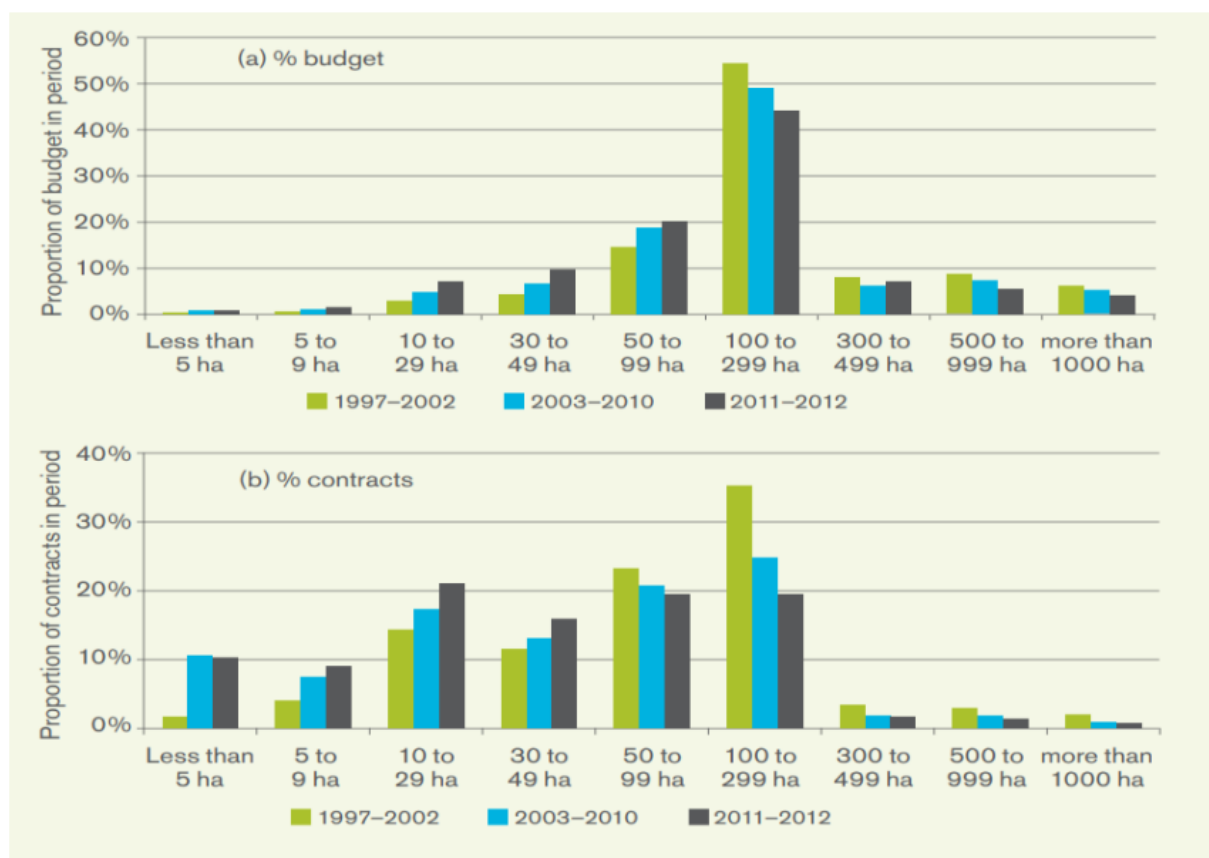
In consequence, the program has been accused of channeling most of its resources to big landowners and thereby enlarging the gap between the accommodated and most vulnerable social classes (Zbinden & Lee, 2005). Testimonies from the rural world emerged denouncing resource hoarding from wealthy landlords from the dawn of the program. (Campos, 2005). As a result, attempts to promote the inclusion of smallholders were progressively developed. In 2004, *FONAFIFO* included the *Social Development Index (SDI)* as a criteria for the selection of participants, in order to promote the inclusion of vulnerable farmers in low-income areas. However, the use of this mechanism has been found not to be effective to prioritize access to poorer farmers in these areas. In fact, it has given indiscriminate priority to relatively well-off landowners (Porrás et al, 2013).

In line with this, official records (*see Figure 3*) show that resources have been unequally distributed. The budget allocation for properties smaller than 30 hectares raised from 3% in the period 1997-2003 to 7% between 2003-2010, to then escalate to 9% by 2012. In the meantime, resources towards plots bigger than 100 hectares accounted for 77%, 68% and 61% respectively for each period. Although an increasing trend on the relevance of smallholder contracts is observed, its weight is still marginal compared to the percentage of budget allocated to large landowners. The most recent data for the period 2012-2021 shows that *FONAFIFO* (2023a) realized over 6,500 contracts covering a total area of more than 485,000 hectares, which results into an average tenancy of 74 hectares⁵ per landowner, a considerably large extension.

⁵ Author's own calculation taking into account the official data from *FONAFIFO* (2023a)

Figure 3

Share of budget and number of contracts by farm size and main period



Note. The data does not include contracts with indigenous groups, applying the figures just to individual contracts. Extracted from Porras et al., (2013)

Regarding these figures, it is possible to infer that the main profile of individual beneficiaries are tenants with large plots of land. As a consequence, the groups excluded from the program are those that tend to be in a more vulnerable economic situation, such as the ones who do not have any land in property, those who own a piece of land but do not have it legally recognized, or those who have incurred into debt towards the State or the banking system.

In addition, the program has seen how legal entities have progressively taken over more resources. Whereas in 1997 these organizations received 26% of the annual budget, in 2012 that amount had been raised to 48%. Overall, in these first 15 years the legal entities received 49% of the total budget⁶. Most of these entities respond to the legal form of ‘Anonymous Societies’⁷, which have the principal characteristic of anonymity concerning the people in charge. This obscurity hampers social assessments due to the ignorance of who are the final owners on the land, having these likely a corporativist character. Ultimately, the majority of

⁶ See *Figure 4* in Appendices

⁷ ‘Sociedades Anónimas’ by its legal definition in Spanish

resources have been channeled to individuals and legal entities, which jointly hoarded 80%⁸ of the total budget, which represents a sign of the possible detrimental social impact of the program. In this sense, it is probable that the implementation of the national PES has acted in some ways as a booster of social inequalities, whilst its effect on improving the living conditions of the poorest appears to have been overall limited (Porrás et al., 2013). Analysis of other PES programs have already shown the existence of barriers that exclude the most vulnerable groups for entering the program (Bremer et al., 2014), and the canalization of resources towards the wealthiest landowners (Grieg-Gran et al., 2005). The risk of exacerbating pre-existing inequalities has been also previously pointed out (García-Amado et al., 2011).

Taking into account the degradation process of social conditions that the country is currently undergoing, the development of interventions aiming to improve the situation of the most disadvantaged social groups becomes highly relevant. The *National Household Survey 2021* elaborated by the *Costa Rican Institute of Statistics and Census* (INEC, 2021) shows that the Gini coefficient per cápita reached 0,524 points in 2021, the highest level since 2010. Concerning poverty, the latest data published in May 2023 by the *Research Institute in Economic Sciences of the University of Costa Rica* (IICE, 2023) indicates that by December 2022 1 out of 4 nationals (24,9%) was below the poverty line, which implies an increase of almost 3% compared to the first quarter of 2020 pre-pandemic. As for extreme poverty, the situation is even more alarming. The same report indicates that by December 2022, 8 out of every 100 people were unable to meet their basic needs, representing an increase of 2% in comparison to data from April 2022 data. The situation is especially harsh in rural areas, where the percentage of people under the poverty line rises to 30,1%, increasing the extreme poverty rate to 10,1%.⁹ In this line, a report by the World Bank (Maloney et al., 2023) issued in April 2023 stipulates that Costa Rica has been the country in Latin America with a higher increase of inequality and poverty for the period 2017-2022. Furthermore, the country is experiencing a surge in violence and increased presence of drug cartels. Data from the *National Observatory on Violence* (2023) reveals that the number of homicides has risen 66% in the last decade, from 407 in 2012 to 645 in 2022¹⁰. And the trend appears to be skyrocketing. By May 2023, homicides reached the number of 302, 93 more than for the same period last year.

This situation responds to a compendium of different factors, and accordingly requires a set of actions structurally coordinated. While collective PES programs do not have the capability of changing the overall social picture of a country, its implementation has the potential to improve the living conditions of certain sectors of the population, specially the most vulnerable ones living in rural areas. In complementation to larger social policy plans, collective PES projects could contribute to the improvement of the social situation of the country, whilst promoting environmental conservation at the same time. However, as

⁸ Corresponding 49% to legal entities and 31% to individuals, based on Porrás et al., (2013)

⁹ The poverty rate and the extreme poverty rate for the urban population stand at 22.9% and 7.1%, respectively.

See graphic comparison in *Figure 5* and *Figure 6* in Appendices

¹⁰ See *Figure 7* in Appendices for the disclosed data by year

previously exposed, the current PES model does not look to be rowing in this direction but rather the opposite. For this reason, it seems appropriate to explore new approaches that differ from the national PES program, as the collective case study selected.

Moreover, the adequateness of introducing collective governance frameworks connects with suitability of including mangrove conservation in a PES program. Mangrove areas in Costa Rica have a public legal status, reason for which the current individual-based model does not seem appropriate when it comes to promoting mangrove conservation. Since mangrove lands are property of the State, the PES system currently in place that pays individual owners of forest for the provision of ecosystem services could not be applied in this dimension. As a result, 2 different possibilities emerge. On the one hand, the government could develop conservation activities involving just public institutions and international organizations. On the other hand, marine conservation interventions could be carried out in tight collaboration with the neighboring communities. Similarly to what the national PES mode currently does, the first scenario would leave aside the potential benefits that projects could render for rural communities, who tend to have a weaker economic background. In this sense, not only could the potential improvements in living conditions be missed out, but the very environmental benefits that the PES projects pursue would be jeopardized as well. The inappropriate and illegal use of natural resources increases in deteriorated economic contexts characterized by limited access to resources and poverty (Burki et al, 2021; Masron & Subramaniam, 2018), while the omission of social equity considerations can undermine environmental protection in the long-run (Pascual et al., 2014).

In contrast, a predominant role of communities in mangrove conservation would imply the redistribution of resources towards the most vulnerable sectors living in rural areas, including those without land in possession, without formal property rights or with public and private debts, which are excluded from the current national PES model. Ostrom's studies from all around the world demonstrated the effectiveness and superiority of community-management in the administration of common and public resources, being mangrove ecosystems in Costa Rica an example of the latter. Additionally, community participation in mangrove conservation has been shown to be crucial for the effectiveness of interventions, due to the profound context-specific knowledge local peoples have (Global Mangrove Alliance, 2022).

In summary, the implementation of collective schemes could potentially foster social outcomes such as the decline on inequality, the reduction of poverty and the improvement of local well-being, as shown by previous literature (Pham & Roongtawanreongsri, 2022; Jing & Du, 2022; Fletcher & Büscher, 2017; Clements & Milner-Gulland, 2015), whilst allowing to harness the large potential existing on mangrove conservation in the country. The analysis of the case study selected seeks to add on to these elements through the exploration of the effects that collective PES interventions could generate in the social relations among participants.

3. Contextualization of the case study

In the last years, *Conservation International (CI) Costa Rica*¹¹ has been advocating for a shift in the PES national model, exploring new ways to complement and expand the limited and restricted current framework. Differing from the individual approach currently taken by the government with PES, the organization aims to promote collective community-based interventions. Most of their efforts have been set in the direction of blue carbon projects and marine conservation, especially mangrove ecosystems. The main project undertaken in this direction was implemented in *The Estuary Puntarenas Wetland National Wildlife Refuge*, a region that represents one of the longest estuaries in Central America with a surface of 1530 km². The area experienced a mangrove coverage decrease of 766 hectares between 1945 and 2005. The intervention was carried out in collaboration with the *Tropical Agronomy Research and Educational Centre (CATIE)* and the *Costa Rican National System of Conservation Areas (SINAC)*. (CI, 2022). Costa Rica was selected as a case study country due to its long and extensive experience with PES, as well as for the commitments of the nation with environmental conservation and sustainable development. The case study was selected due to its singularity, since it is the first project of its type implemented in the country and the largest coastal engineering initiative in Central America (Global Mangrove Alliance, 2022), as well as for the relevance of mangrove ecosystems and the importance of community participation on their conservation, as illustrated in the Conceptual Framework.

For decades, large parts of mangrove areas in this region were lost due to anthropogenic factors, mainly because of the expansion of salt extraction, shrimp production and sugarcane cultivation. For the development of the latter, the course of the river was modified through the artificial straightening of its natural meandering shape. In result, wide mangrove extensions were isolated and deprived of the mixture of fresh and saltwater that they require for their survival. As the mangrove forest died, people began to uproot trees to use them as wood for domestic purposes and started to cultivate sugarcane in the bare ground. These individuals, called in Spanish “parceleros” (meaning plot holders in English), usually came from outside locations and appropriated extensions of land they thought belonged to nobody. During years, these plot holders performed economic activities in the land that they grabbed, constructing buildings and even realizing purchase and sale contracts. All these actions were illegally conducted, since all mangrove extensions in the country have a public character. In addition, some of this land-grabbing was performed in the perimeter of currently protected areas. Public institutions dismissed the phenomena for a long period of time, in part for their lack of capacities and concrete understanding of the problematic situation. Growing scientific evidence led nonetheless to a rise in awareness about the importance of preserving mangrove ecosystems. This consciousness-taking has been followed by conservation efforts such as the

¹¹ Conservation International Costa Rica is an institution with more than 30 years of work in the country. The organization carries out its activities under a science-based approach, developing innovative policies and working with communities, with the aim of empowering people to conserve the nature on which their wellbeing and livelihoods depend.

project implemented by *CI* in *The Estuary Puntarenas Wetland National Wildlife Refuge* illustrates. (CI, personal communication, 2023)

CI's intervention was carried out between September 2021 and January 2022, aiming to recover 210 hectares of the mangrove extension previously deforested in 2 specific points of the estuary, namely the mouths of Seco and Aranjuez rivers. The intervention was carried out in collaboration with members of 2 communities adjacent to the estuary, El Establo and Pitahaya (see *Figure 8*). A social diagnosis was elaborated by an external consultant (Borges, 2020) in order to evaluate the social context of the influence area of the project, with the objective of calibrating the feasibility and selecting the social groups with whom the project would be implemented at the local level. The activities consisted in the rehabilitation of the natural course of the river, which was altered in the past for the cultivation of sugarcane. The project was financed by grants of international donors and philanthropic sources (CI, 2021; CATIE, 2020).

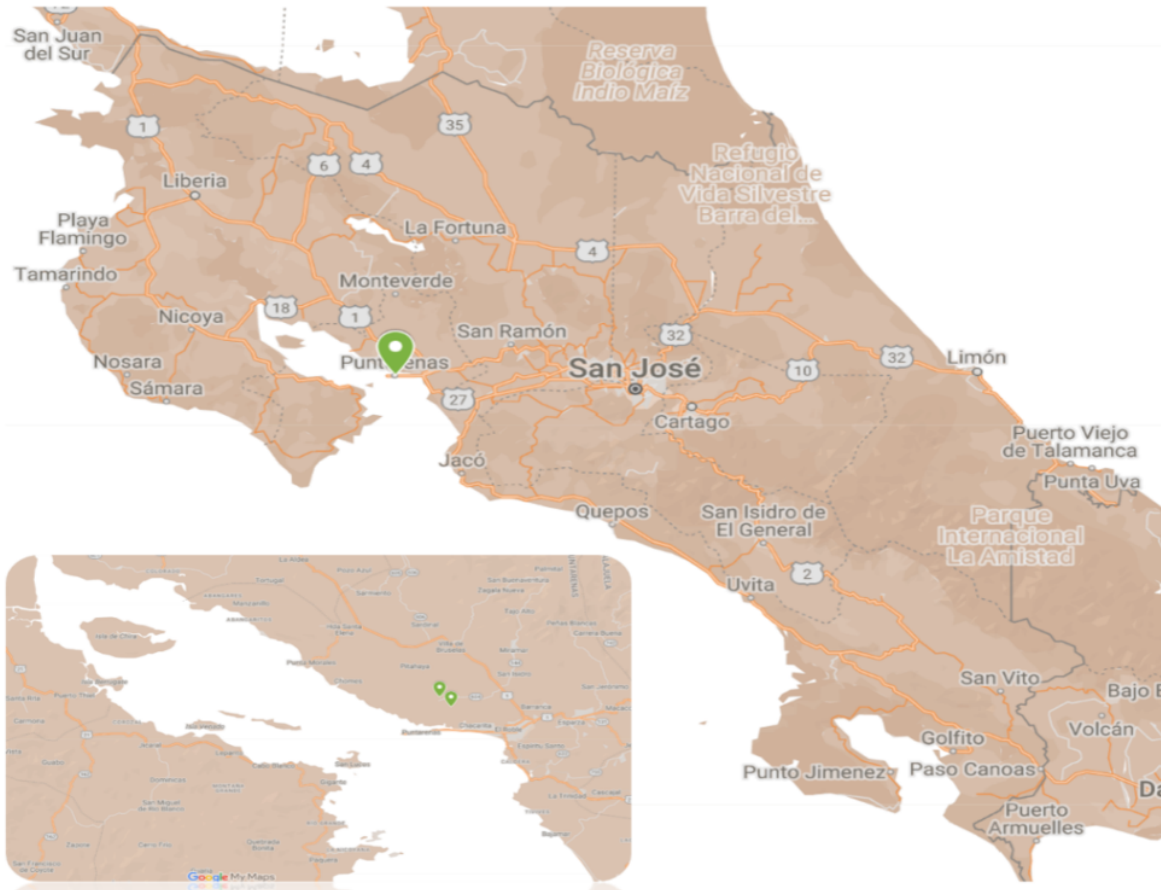
10 members from the community of *El Establo* and another 10 from *Pitahaya* participated in the project. The selection process was attributed to the communities through their local development associations. The presidents of both associations contacted diverse members of the communities and proposed them to participate. The selection criteria responded mainly to 2 variables, the gender and the laboral status. Due to the physically demanding nature of the activities it was decided that only men would be included. Regarding the second element, only unemployed individuals were offered to join the project for a matter of availability and necessity (CI, personal communication, 2023).

In the first phase of the project, participants received capacitation on environmental practices for mangrove conservation. Community members developed a key role as knowledge holders of the past and present conditions of the territory. They actively participated in the delimitation of the areas that the project would target, based on their knowledge of the zones that were previously covered by mangroves. Once the intervention framework was elaborated, community participants became the central axis in the construction of the channels that aimed to restore the natural course of the river. The 20 participants manually excavated a total of 2.5 km of secondary and tertiary channels in the low zones of the mangroves. Complementary, 16.5 km were constructed using industrial machinery in higher zones that were suitable for it. (CI, 2022; CI, 2021). During the 5 months of the project, community participants eagerly took part in the decision process, suggesting options and providing their knowledge. After the completion of constructions in January 2022, they have taken part in the maintenance and cleaning of the channels.¹²

¹² The channels can get obstructed due to sediments and fallen branches, impeding the flow of the water the mangroves require. In the rainy season, torrential rains can partially destroy them, which makes its reconstruction and periodic maintenance necessary.

Figure 8

Map of Costa Rica showing the location of the communities of Pitahaya and El Establo within The Estuary Puntarenas Wetland National Wildlife Refuge, located in the Gulf of Nicoya



Source. Author's own elaboration

The communities are characterized by a strongly segmented and seasonalized laboral environment and vulnerable economic situation. Almost all the male members work in the sugarcane industry, which is monopolized by one single company that gives employment to over 500 people from the 2 communities of the case study and other neighboring municipalities. Despite the few permanent jobs that are kept throughout the year, the sugarcane company provides laboral opportunities for a limited time of around 3-4 months, depending on the production of each year. After the end of the harvest, most community members remain thus unemployed, subsisting with the income generated during the sugarcane season, complemented by some small home-based cattle and poultry activities and few other informal side hustles. The 2 communities are located in the poorest province of Costa Rica, which has become one of the areas with more homicidal violence due to the increasing influence of drug trafficking groups, tripling the national average homicide rate (Teletica, 2023). The Social Development Index elaborated by the *Ministry of National Planning and Economic Policy* (MIDEPLAN, 2017) further shows that the communities present a low development rate of 52.8, being this value located within the second lowest quintile out of the 5 the report's methodological framework considers.

4. Methodology

As previously mentioned in the Introduction, the present research aims to explore the perceptions of community participants within a collective PES, with particular attention to social relations. In this sense, the following main research question is posed: What are the perceptions of community members towards their participation in a collective PES project on mangrove conservation?, complemented by a secondary one: What are the implications of the project for the social relations among the stakeholders involved?

The fact that collective PES implies collaboration towards a common goal opens the door for discussing how the interactions and the cooperation embedded in the interventions could shape and influence social dynamics among participants. This has significance not only to acquire a better understanding of the outcomes of PES interventions. But also for the acknowledgment of how projects can impact areas out of their intended objectives, and how the effects could endure after the project lifecycle and affect future policy endeavors.

4.1. Data collection

The research intervention was articulated over 2 main phases, comprising 12 weeks of fieldwork in Costa Rica from March to May 2023. In total, 25 people were interviewed, 10 actors from PES-related institutions and 15 community members, when data saturation seemed to have been reached.

In the first stage, 10 key expert interviews with diverse institutional actors were conducted in order to obtain a deeper understanding of the Costa Rican PES context and evaluate the elements identified in the Conceptual Framework¹³. Both employees from central headquarters and local offices were included to capture different perspectives. The institutions were selected regarding their roles for PES environmental conservation activities in the country. A set of between 6-10 questions was formulated, seeking to grasp a general understanding on the functioning of the current PES model and the relevance of the community case study selected.

Secondly, a qualitative data collection strategy was conducted in the communities of el Establo and Pitahaya, located in the Gulf of Nicoya, seeking to obtain first-hand information on the perceptions and dynamics generated by the previously described collective PES intervention on mangrove conservation. 2 focus groups and 4 subsequent in depth-interviews were conducted, as well as various informal conversations. Focus groups were selected as a research tool due to the richness and different narratives that group discussions can render, particularly when aiming to grasp perceptions and social dynamics among participants. Individual interviews were conducted with certain participants to obtain further specific insights. Of the total 20 people that were involved in the project, 15 participated in the interviews and/or focus groups - 14 took part in the focus groups, 1 was just interviewed and

¹³ See *Table 1* in Appendices for further information about the institutions

3 assisted both in the focus groups and the individual interviews. The remaining 5 project participants could not take part in the research due to time and accessibility constraints.

The identities of both key informants and community participants were concealed to safeguard the anonymity of respondents. Identification numbers were assigned to each interviewee, ranging from 1 to 10 for key informants, i.e. KI1-KI10, and from 1 to 15 for community participants, i.e. R1-R15.

The research presents the risk of interviewer bias stemming from my personal characteristics and the way questions were inquired. I tried to mitigate this by realizing a self-introspection exercise before data collection was carried out. Through this, I reflected on my preconceived ideas and visions on the topic in order to be aware of the particular lenses through which I looked at the case study and minimize its influence on the research. Subsequently, during data collection, questions were aimed to be formulated in a non-leading and open way, using expressions such as “What are your perceptions on the project?”, “What motivated you to join?”, “How did you experience it?” “What did it mean for you?”. Similarly, there was the possibility that respondents would tend to condition their answers thinking that positive messages would lead to the development of more projects and higher transfer of resources towards the community. To address this, I explicitly detach myself from *CI* and the other institutions involved in the project, indicating that the information they provided me would not have any type of consequences.

4.2. Data analysis

The data collected was analyzed following a thematic hybrid inductive/deductive coding. Firstly, an inductive coding strategy was developed in order to systematically identify patterns and themes emerging from the participants’ narratives. Secondly, the information gathered was analyzed taking into consideration the social cohesion conceptualization elaborated by the *German Institute of Development and Sustainability*¹⁴. This framework disaggregates the social cohesion level of a given social group into 3 dimensions: collaboration for the common good, trust and identity, both in the vertical and horizontal axis. The elements derived from the coding process were illustrated into a conceptual mind-map (*see Figure 10*) and further classified into a typology (*see Figure 11*).

The intervention presents a set of particular characteristics which may have had an impact in the outcomes of the analysis. The project evaluated encompassed a small number of participants. The composition was quite homogeneous in terms of gender and economic background, being all participants unemployed men with a fragile economic condition. Some participants expressed that collaboration among members was a distinctive trait of the communities. All participants knew each other before the intervention, having most of them work together in the sugarcane industry or other informal activities. The selection process was transferred to the development associations of the communities, which were actively included in the decision-making. Mechanisms of sanction and accountability were not introduced. The

¹⁴ For a more exhaustive explanation of the attributes of the concept, see Leninger et al., (2021)

participation was strictly voluntary and the incentives depended on the meters of channel constructed by each participant.

Although it is not the purpose of this study to assess how these factors influenced the results delivered by the analysis, these considerations should be taken into account at the time of evaluating the outcomes of the case study. Previous literature has indicated the effects of PES interventions depend on project's features, such as the type of incentives and its amount, the flows of communication, the degree of voluntariness, the inclusion and participation in the decision-making, the kind of monitoring and sanctioning procedures and the word framing employed (Ezzine-de-Blas et al., 2019; Liu & Kontoleon, 2018; Clot et al., 2017). Furthermore, collective PES schemes have been connected with the risk of exacerbating underlying problems or even creating new conflicts, as indicated by a recent case study in Vietnam (Nguyen et al., 2022). Likewise, focusing on mangrove conservation programs, Chamberland et al., (2022) found that even when communities take on the interventions, the benefits can often accrue to the dominant and most powerful segments of the community, hampering in this way the strengths of collective schemes and increasing the risk of generating negative dynamics within the communities. There is therefore no one-size-fits-all approach regarding the collective management of natural resources (Ostrom, 2010). PES projects should always be context-specific and should be set accordingly to different conditions (Jing & Du, 2022). Notwithstanding, the analysis conducted offers context-specific insights that can be illustrative for interventions in similar settings and serve as a beacon to orient future policy efforts.

5. Analysis and results

5.1. Individual key expert interviews

To obtain deeper insights on the characteristics, evolution and current situation of the national PES model in order to corroborate the elements identified in the Conceptual Framework and their relevance at the present time, 10 key expert interviews with strategic institutional actors were conducted¹⁵.

3 members of *FONAFIFO* were interviewed, as well as an ex-member who was part of the organization in the 90s when the PES program was elaborated and launched. All of them indicated that considerations around the social dimension were not taken into account in the formulation of the program, and that its impact on the social area has been overlooked over the years. According to the former member, “*the creation of PES responded to a public policy emergency, it came to preserve the around 25% of forest cover remaining [...] as such at the beginning the program did not consider socio-economic objectives, but more environmental ones*” (KI4).

When exposed to a brief presentation of the research project and its social character, a *FONAFIFO*'s employee expressed his doubts about the mere suitability of the interview, in view of the lacking social dimension within the national PES. In his words:

Perhaps as a frame of reference, the national scheme of PES does not have a social character but an environmental focus. In its evolution it has incorporated some nuances of the social part, but they do not generate a baseline for the program participants. So you have to take into account this consideration (KI1).

Likewise, a member of the *Central American Indigenous and Peasant Association on Community Agroforestry (ACICAFOC)* expressed the following:

There is an evaluation made by the General Comptroller of the Republic on the national PES program. This report is very hard with *FONAFIFO* and *SINAC*. It indicates that there is no information of social nature. *FONAFIFO* pays the money to the people and it is not known where the money ends up. And this is really the case, *FONAFIFO* does not have the capacity to know if the PES resources are invested in social matters, if they are improving the quality life of the families or if they are spent in the consumption of alcohol and drugs. There is no information about that, that is the situation (KI10).

This illustrates that little attention has been drawn over the social effects the program may have had. Moreover, a significant change in the individual focus and the exclusive criteria selection has not been considered up to now, fact that is contributing to the transfer of resources to wealthy landowners as exposed in the Conceptual Framework.

¹⁵ Access to the recordings and transcripts can be provided at request

Regarding the situation of marine conservation, actors both from public and non-public institutions underpinned the fragile situation of mangrove ecosystems. A member of *SINAC* stated that:

Mangrove ecosystems are currently under enormous pressure because the coasts of our country are one of the most sought-after places for tourism. They are under pressure for urban development and agricultural development, also for cattle ranching, they are good lands in every sense [...] There are sites where mangrove coverage gains have been seen, but also sites where coverage losses have occurred (KI8).

In the same line, an interviewee from *CI* expressed the following:

We have lost many hectares of mangrove forest. Among the main causes were shrimp farming and salt production [...] The expansion of the agricultural frontier was also a determining factor. The mangroves were affected by the production of sugarcane in the Gulf of Nicoya, one of the most affected areas in the country on which we are working. If you go south, the African palm occupies kilometers and kilometers of the coast. And it is not only the expansion of the agricultural frontier, but also the use of agrochemicals that are dumped into the mangroves (KI5).

For these reasons, both actors emphasized the importance of addressing mangrove conservation. Although it was mentioned that some steps have been taken to promote mangrove protection, they agree that what has been done so far is not enough. The employee of *SINAC* categorically stated that *“what has been done so far is not enough, not at all. It is necessary to recover many areas that since 1945 have suffered mangrove deforestation and where agricultural and residential areas have been established”* (KI8).

In the same line, the interviewee from *CI* evaluated the endeavors on mangrove protection the country has taken so far. In February 2023, 2 projects of law attempting to create financing mechanisms for coastal conservation entered the Parliament, 1 proposing the creation of a new tax and the other one seeking to redirect an existing subsidy that supports fishermen during the closed fishing season. According to this member of *CI*, the 2 proposals have not been able to encompass the critical elements needed to set a robust basis. While the tax has very little chances of even being approved due to the reticence of both population and political parties to introduce new taxes, the conversion of the existing subsidy seems to fall short in the purpose of building a structural PES program of marine conservation analogous to the forestal one set in 1997. For this actor, this project *“falls into the same sin of the current subsidy not specifying what the monitoring framework will be, if you do not have monitoring, review and verification, you fall into the same trap of what we already have”* (KI5).

Furthermore, a novel Blue Carbon National Strategy was launched in February 2023. Although considered as a positive initiative, this interviewee indicates that vital points which are crucial to elaborate a structural program and conduct effective interventions are still undeveloped, *“such as the channels to finance the program, which criteria establish to select the beneficiaries or the indicators for the evaluation and monitoring process”* (KI5).

Since mangrove conservation projects are financed by donor money nowadays, the possibilities to expand these endeavors and the pace at which it can be done are limited. For this reason, the integration of mangrove conservation into a national program complementary to the existing forestal PES is regarded as crucial to reverse the impact that mangrove deforestation caused in the last decades. An interviewee from *FONAFIFO* commented:

We have had a projection exercise to see how the organization sees itself in a few years, and we proposed to the authorities a project that implied an institutional transformation, so we could introduce in the PES model other types of ecosystem services such as mangroves and others that now have no recognition now (KI3).

A member of *SINAC* underlined in the same direction:

Getting resources to invest in coastal or estuarine type wetlands would be great. I would see very positively the introduction of a PES to maintain the mangrove ecosystems that produce and store blue carbon. But just as long as it is linked to the coastal communities. The communities that live on the edges of wetlands do not have title to them, but they benefit from the mangrove ecosystems [...] If we could get these communities to benefit directly from the mangrove themselves, they would be able to do a better job because they are the ones who live there, they are the inhabitants. This is what I consider the best option (KI8).

These words highlight not only the suitability of including mangrove conservation into a national PES program, but also the necessity that neighboring communities are actively incorporated in the activities. The relevance of including communities in the conservation activities was also highlighted by the interviewee from *CI*:

The communities who live around the mangrove, who have been living there for years, told us what the course of the river was like originally [...] The communities not only participated actively in the mangrove restoration, but today they are the first ones to say when something is wrong, they are the ones who are watching over the area, and they show a lot of willingness to continue working on this [...] We are trying to see how to put all the pieces of the puzzle together in a systematic and coordinated way, to think about how to establish a mangrove conservation pilot as a blue carbon community development model, where people can be recognized their collaboration in mangrove restoration, be it monitoring, sampling or restoration actions (KI5).

In order to foster the transition towards a PES model that includes mangrove conservation more financial resources would be needed. However, all the institutional actors interviewed pointed to the financial question as the principal defying challenge, not only to expand conservation towards mangroves but also to even maintain the current forest protection activities. Annual budgets plans (*FONAFIFO*, 2023b)¹⁶ show the hassles faced by *FONAFIFO* at the time of disposing enough resources to meet the objectives established

¹⁶Annual budgets are available from 2017-2023. The reports indicate the PES the struggles to acquire the funds required for the objectives foreseen each year

every year. Aggregated data discloses that from 1998 to 2014 PES purchasing power has fallen by more than 50 per cent per hectare, meaning the transfer received by beneficiaries has lost half of its value in 16 years (GGGI, 2016). This has provoked some beneficiaries do not consider convenient to be part of the program due to the higher opportunity cost of keeping the land within a PES contract in comparison with other economic activities such as cattle or agriculture, especially smallholders for whom the land is more relevant to cover basic needs. According to a professor at *University of Georgia*, who was involved in a local-based PES program implemented by this university in the country:

The government's current financial situation is so bad, there is no more funding for PES, the program has basically collapsed. Many of the farmers that participated in it, when they stopped receiving the PES payments, they just changed land use. And in Costa Rica, by law, you technically cannot cut down forest once it is established, so we saw that people who had large reforested or regenerated pasture areas, went in and burned it as a way to get out of their contracts. And said, oh well, you know, it burned. And it was gone like that (KI6).

In a similar way, a member of *FUNDECOR* indicated that the main problem of the current PES program is the fact that it does not provide sufficient resources to landowners to cover basic needs:

I have been told by beneficiaries that owning land in these areas is a disgrace. The State does not let you do anything with this land. They do not let you change the use of the land, the use of the land is not free because you have to make an initial investment to make the agroforestry reGENCY and pay the engineer [...] The main enemy of the PES right now is the very incentive it gives (KI9).

The member of *ACICAFOC* further mentioned that “*the PES programme is losing its attractiveness, and FONAFIFO is already being asked to start looking for more innovative approaches, where the ecosystem services included are diversified and where the social dimension is addressed*” (KI10).

The implementation of new collective approaches on mangrove conservation could thus contribute to addressing the gaps and challenges faced by the program. These narratives reveal the suitability of not only modifying the national model regarding the type of beneficiaries and the ecosystem services included, but also in how the model is financed. Nowadays, the bulk of resources comes from a fossil fuel tax¹⁷introduced by the Law N°7575 when the program was implemented in 1997. This instrument has channeled more than 60%¹⁸ of the whole resources utilized by the program up to 2015, and represents over 90%¹⁹ of the annual budget in the present day (FONAFIFO, 2023b). Due to the international agreements on carbon emissions to which Costa Rica has committed, the country is currently undertaking a process of decarbonization. As a consequence, the financing body of the program is expected to significantly decrease in the upcoming years and to eventually completely disappear.

¹⁷ From the total amount collected by the tax 3,5% is transferred to the PES program

¹⁸ See *Figure 9* in Appendices

¹⁹ Based on budget plans for the years 2021 and 2022

The inclusion of mangrove ecosystems in the national PES model would require more funds and new financing mechanisms. The financial framework that can support this transition is still unclear. The suitability and potential of new financing mechanisms remains open for further research. The elaboration of a new PES framework that comprises mangrove ecosystems and includes communities as beneficiaries could be seen as an opportunity to delve into the process of seeking new sources of financing at the same time.

In summary, the information gathered through the key interviews bolsters the elements identified in the Conceptual Framework, both regarding the absence of collective approaches and mangrove conservation in the current PES program and the lack of evaluations on the social dimension. Actors also highlighted the fragile situation of mangrove ecosystems in the country and the importance of expanding conservation activities in this area. This underpins therefore the relevance and appropriateness of the selected case study.

5.2. Collective PES case study

Diverse elements and themes emerged from the analysis of participants' perceptions²⁰, which were coded and illustrated in a concept mind map (see Figure 10), and further grouped into a typology (see Figure 11).

Figure 10

Concept mind map of narratives emerging from participants' perceptions



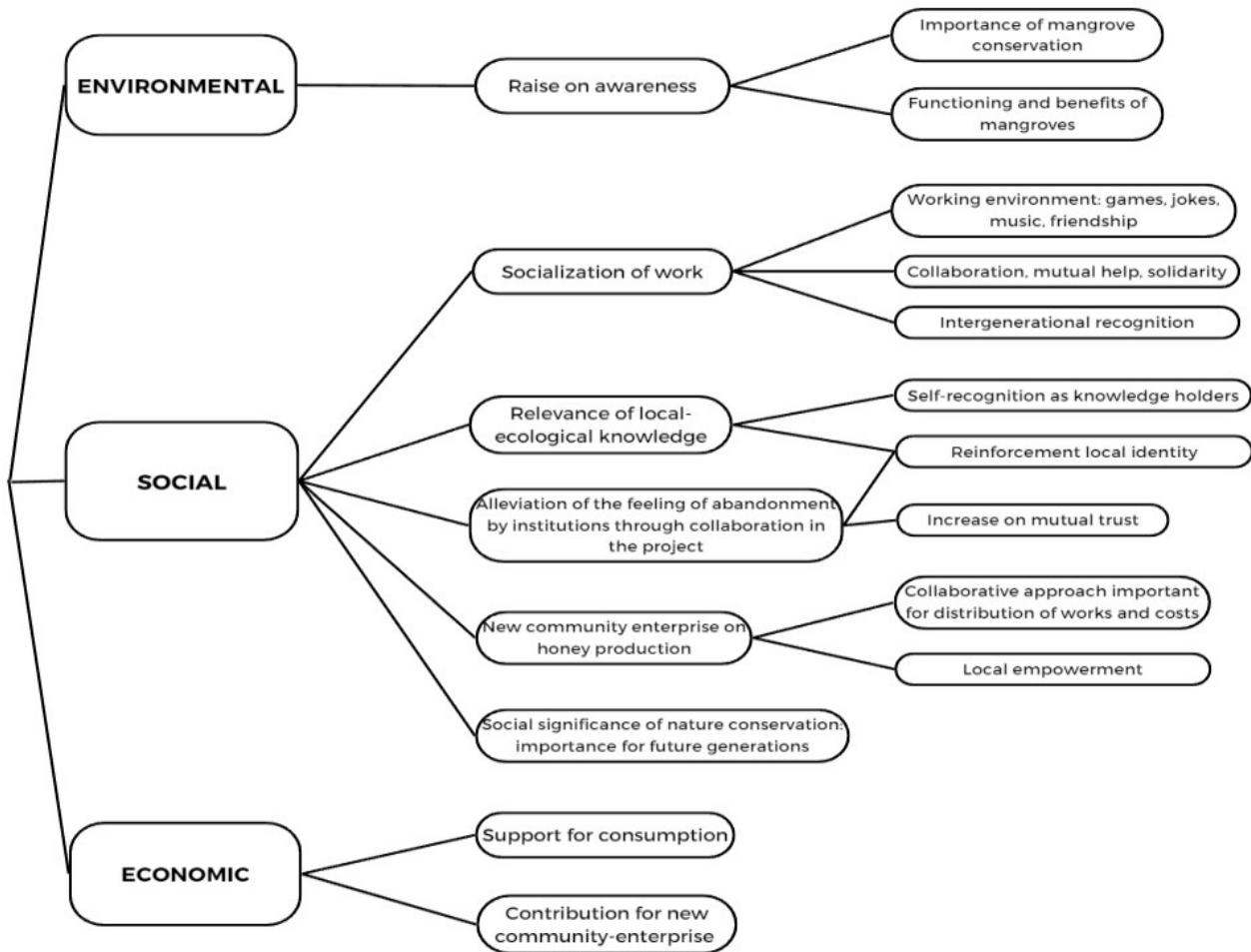
Note. The dashed lines indicate possible interconnections between the elements connected.

Source. Author's own elaboration

²⁰ Access to the recordings and transcripts can be provided at request

Figure 11

Participants' perceptions grouped by categories (environmental, social and economic) and themes



Source. Author's own elaboration

5.2.1. Social implications: collaboration and LEK reinforces relational dynamics and local identity

The expressed narratives present a marked social character, with numerous aspects revolving around this dimension. The project entailed the collective work of the 20 participants that collaborated in the process of constructing the channels and weeding the surrounding area. The socialization aspect seems to have played a key role in their experience. Participants referred to the project with terms such as ‘excellent’, ‘beautiful’ and ‘beneficial’. Several individuals brought in the dynamics present during the works, mentioning that games, jokes and music were involved during the process, helping to make it less tough and more enjoyable. When asked to provide a general overview of the timeline and the activities carried out, a participant mentioned that *“we played, and then we connected with music and we shouted, and that's how the work was being done. It was quite nice and it was quite fun”* (R2). In the same line, queried about if it was the first time they developed these types of projects, another participant expressed that *“yes, it was the first time, it was very beautiful to work*

collectively, one can build friendships, and can work and talk at the same time” (R15). Another interviewee further mentioned:

When we were working together, we did not feel the work was so hard because we were kidding with ourselves, we talked to each other, we shouted. So the work went quickly and the truth is that you did not feel it was so hard, so it was very nice. It was really nice (R12).

Values such as solidarity and mutual help were perceived as central elements. Taking into consideration that the age of participants ranged between 15 and 70 years and the physical nature of the tasks, the contributions and the pace of work that each of the individuals could provide was very different. In consequence, there was a risk that some people were left behind while others advanced faster in the channels. To address this, participants were divided into groups of 2. In addition, when someone fell a few meters behind, other members came to their assistance to keep the team together at the same level of the channels. According to one of the participants, *“there was a lot of companionship, we helped each other. When we went out of the mangrove, we all went out together”* (R2).

The perception of intergenerational recognition is also present in the narratives. In one sense, the elder participants recognized the effort and commitment of the younger ones. As mentioned by one of the elder :

In the project there were quite a few good day laborers, like this guy and that guy. They are people that I didn't think were going to do it, but they made it. That little boy I didn't think was going to make it and he made it too. They are very young guys and they made it (R2).

Correspondingly, there was a sense of respect and recognition from the young towards the older participants. As mentioned before, the group stuck together, helping out those that at some point could be backlogged, which were usually the oldest because of the physically demanding character of the activity. The eldest participant indicated that during the work the importance of always staying close to him was highlighted, due to the fact that he is in an advanced age and some health issues could occur. Thereby, if everyone would go ahead of him and something would happen, no one would be able to notice and help him, the reason for which the rest of participants tried to remain close to him and to each other at every moment.

This fact becomes even more relevant if taken into account that participants were paid per meter of excavated canal and that the economic situation of all of them was quite fragile. The more someone advanced, the more money he would receive at the end of the day. Therefore, there was an incentive for the physically stronger, in this case the younger ones, to advance on their own. However, participants mentioned that the group remained cohesive and that support and camaraderie were pillars. As mentioned above, everyone left the mangroves at the same time, and there were hardly any differences in the salary that each participant earned (R2), which exemplifies that values of solidarity and mutual help prevailed over individual economic benefit.

The *LEK* of participants seems to have played a major role in the implementation of the project. Participants were an active part in the design of the intervention. They informed the staff from the institutions which parts used to be mangrove forest before deforestation happened, when this deforestation occurred, and which of these areas were the most suitable for reforestation. This information was then combined with scientific evidence and satellite data to decide where and how to construct the channels. Participants were not only involved in the design phase but in the whole process. When obstacles or doubts appeared in the implementation, they would be consulted about how to proceed. Participants expressed that they felt their opinion was actively taken into consideration during the process. The narratives emerging from the data suggest that the fact that for the first time someone external came to ask for their vision and collaboration may have resulted in a greater self-recognition as knowledge holders and local empowerment. The statement of a participants illustrates this aspect:

Before, I was ashamed, I was afraid, I was afraid of everything. Nowadays, I feel a little freer, one speaks from what one really is. And that is what one has to do, leave the bush, do not let the bush remain with us. The bush is the shame, we have to leave the shame aside and speak as the peasants we are, nobody will criticize us (R2).

In the same way, another participant mentioned that *“the people from the communities are the ones that speak the truth”*(R5). One interviewee also stated that *“there are skilled people here, quite skilled and adequate to carry out these projects. The human material is here”* (R4).

Overall, participants had a holistic vision of the project and highlighted its social character. Across the conversations it was emphasized that the project was good both for them and the community in different senses, as well as for the institutions. In this sense, one participant emphasized that not only them but the whole community would be interested to carry out this type of intervention. In his words:

The community is known for being supportive. If someone comes and needs a hand, the people here will always give them that support, no matter who they are. The people here are always willing to give that support and contribute in whatever way they can. So the efforts that institutions can develop here are very high (R4).

5.2.2. The creation of a community-managed enterprise, an outcome derived from the collective PES project

The empowerment effect was not only limited to the self-perception and identity sphere, but it was also translated into action by the creation of new self-driven initiatives. In September 2022, some members of the community El Establo launched an enterprise to produce mangrove honey. Since then, the members have installed 30 panels of bees, collecting around 60 kilograms of honey. A sample of the product has been already sent to a laboratory to do the pertinent nutrition analysis, and branding has been created in order to commercialize the product. Their intention is to progressively incorporate more panels to the beehive and

eventually sell it across the country. By the moment the data collection was concluded, the cooperative was preparing the arrangements needed to sell the honey in local supermarkets.

The influence of the mangrove restoration project in the creation of this new initiative can be considered direct. One of the members of the enterprise illustrated the story on how the idea of venturing on this initiative came up. Some staff from the institutional setting and himself were taking a walk around one of the mangrove areas included in the restoration project. All of a sudden, they stumbled upon a beehive, whose members started to attack them forcing them to run away from the site. After the incident, a member of one of the institutions commented on the health benefits of mangrove honey and its market potential. The community member, interested by these words, kept inquiring to get more information about it and asked if it would be possible to produce honey right there in the mangrove areas surrounding the community. Confronted with a positive response from the institutional staff, the participant expressed immediate and strong interest by stating “*alright, let’s do something then, but so be it. Because one can talk and talk and then do nothing*” (R2).

In a span of 6 months, what initially was an unpleasant incident became an initiative with potential for the development of the community. During this period, the participant present in the bees’ event maintained close contact with the individual from the organization in order to coordinate the new project. First of all, the community member asked the people in the community if they would be interested in participating. In total, 18 members expressed interest, and a series of meetings were held in the building of the Local Association of Development. From the initial 18 people, 9 showed final predisposition to being involved in the project and kept participating in the recurrent meetings. After some discussion among the interested inhabitants and the institutional linking on how to proceed, the initial steps were taken. The institutional worker put the community members into contact with the *Corcovado Foundation*, an entity working in the south of the country that had some experience in honey production. In the next weeks, some training and capacitation was given to the members, who knew almost nothing about the care and needs of a beehive. Finally, 6 months after the bee incident, the first bee panels were installed in a mangrove forest nearby the community.

Among the 9 people who participated in the honey scheme, 6 of them are individuals who were not involved in the mangrove regeneration project, suggesting the impact of the mangrove restoration intervention went beyond the participants. The members currently self-organize themselves to carry out the tasks, with groups of 4-5 people going every week to monitor and feed the beehives following an informal periodic alternation. Altogether, the workload is equally divided, and no conflicts seem to have emerged. Participants of this new initiative indicated the social component as essential for its existence because the beehives require permanent time and attention. As expressed by one of them:

We have to be attentive to the hives every 4 to 5 days, going around them, monitoring them to check that the queen is well, and that there are no invaders. Many times there are invaders like ants and we have to clean them, we have to be in that expectation. You have to do the maintenance of the apiary, you have to be there. And if there are many drones, we have to

remove them and clean all the boxes so that they do not remain in the hives as long as the honey is produced (R6).

Being several people involved makes it thus less demanding and time consuming to manage it in a proper way. Similarly, it was conveyed that putting efforts together through a collective project was crucial to be able to launch the enterprise, since it would not have been possible for a single person to meet the financial outlay necessary for it (R6).

Regarding those who participated in the case study project and not in the bee initiatives, they were asked about the motives for their non-participation. One of them indicated that he was not living in the community by the time the conversations and preparation was undergoing. Another expressed that he did not know about it, while the rest did not state clear reasons. From the analysis of the dynamics in the focus groups and the informal conversations held during the fieldwork, a plausible option is that some community members did not join due to unfamiliarity and uncertainty over the initiative. With honey production being external to the historical livelihoods of the community, some people could either not see the potential of the project, or think they did not have the capabilities to develop such an activity. The time needed to get acquainted with the production process and the necessity of traveling out of the community for the capacitation could also play a role as disincentives.

Nonetheless, the fact that they did not take part in the bee initiative does not imply they systematically do not want to join other collective projects. Queried about the willingness of being part of new potential future projects of a similar kind, all the individuals that did not take part of the honey enterprise expressed a high interest in joining these schemes in collaboration with other members of the community. This underpins the possibility that they did not participate more for a lack of determination due to the novelty of the initiative than for the existence of underlying conflicts among participants. In addition, the preliminary success in the honey production enterprise may have explicitly turned visible the possibility of collectively running such an enterprise both for those who engaged and did not engage in the initiative, increasing therefore the interest in future participations of the latter.

The empowerment in self-perception together with the practical confirmation that community projects can thrive made the 15 participants of the restoration to be highly interested in taking part in new collective initiatives. All of them showed enthusiasm to collaborate in new projects coming from institutions, and also emphasized the opportunities for new self-driven initiatives. In addition, since the project was over, community members have kept protecting and monitoring the evolution of mangrove restoration on their own. This suggests the intervention did not generate motivational crowding-out and promoted crowding-in.

Regarding the interest of participating in future collective projects, ecotourism emerged as a possibility perceived with a high potential. The 2 communities are located relatively close to the touristic coastal city of Puntarenas, which is a hotspot for maritime cruises and for tourists

coming from San Jose, since Puntarenas the closest coastal point from the capital²¹. In view of the large number of visitors that arrive to the coast every week, participants see potential to develop mangrove tours, on which tourists would receive information about how this ecosystem works, the benefits that mangroves bring and the process of regeneration that some areas are currently undergoing. Additionally, travelers would be able to contemplate the vast biodiversity living in these ecosystems, which is one of the main motives for tourists to come to the country. One of the participants mentioned in his way:

Living in an area like this, it is known that the potential for tourism is quite large due to the type of area, the access to the mangroves, etc [...] I have always thought that the area should be exploited a little more in the sense of being able to take advantage of the resources it offers us [...] There is a road that leads directly to the mangrove channels, so with a boat you could take a tour inside the mangroves (R4).

Whether collaborating in projects coordinated by institutions or developing their own initiatives, participants agreed that support from external actors would be necessary. The same participant of the last quote, expressed that *“a lot of economic support is needed to develop these types of projects because we are an area of people with low resources”* (R4).

In this sense, the economic implications of the mangrove restoration project were also present in the narratives. Overall, the economic benefits of the project emerged as a recurrent topic among both the focus groups and the individual interviews. Participants exposed the challenges in the laboral environment of the region, characterized by temporality, with most of the inhabitants being able to have employment during 3-4 months per year in the almost unique laboral sector, the sugarcane industry. The activities of the project were developed between September and January, a period out of the sugarcane season where most of the people are unemployed. Due to the precarious financial situation, participants expressed that the money they earned with the project was used mainly for consumption, as a help for common expenses they struggle to cope with during the sugarcane off-season. One interviewee mentioned in this respect that *“it was a job that was useful to all of us, because here we work in the sugarcane harvest and then we are left stranded without work, so it was a blessing that this little job had fallen to us”* (R10).

Moreover, the financial flow of the project seems to have contributed also to the launch of the honey initiative among the participants that integrate it, being an extra assistance for the investments they have had to incur in. Yet, it was emphasized that the support from external actors was crucial for the development of the initiative. One participant indicated that the *Corcovado Foundation* donated some of the instruments needed for the honey production, such as a steel table where the product is packaged (R2). Complementing this, another member expressed that:

²¹ From 2006 to 2020 before the pandemic stroke, the Pacific Coast, where Puntarenas represents the major port, received an average of 125,000 cruisers annually. From September 2021 to August 2022 the number stayed at 43,000, being expected to recover the pre-pandemic levels this season. *Source* (ICT, 2022).

There are many things that we did not buy ourselves, it was too much to invest. We have been very lucky with the institutions of Corcovado and Mar Viva, they have stood shoulder to shoulder with us and we are very grateful to them, because if it were not for them, we would have none of these things (R6).

As for the bee enterprise, the necessity of external support was emphasized for the development of future initiatives, due to the low economic power of the community. In accordance, it was stated that:

The economic incentive that could be given to us for future projects would be good. Here we need a lot of economic support to be able to take advantage of the local conditions and to know how to realize the management. There are quite qualified and adequate people to be able to carry this out, but simply economic support is needed, because we are an area where people do not have a lot of money, we live at the edge of the canyon as it is said here (R4).

5.2.3. Environmental perceptions: raise in awareness with particular social and symbolic significance

Regarding the perceptions on the environment, participants emphasized the relevance of the project in different ways. Broadly, 2 groups of people could be identified, those with a previous environmental awareness and those who did not pay much attention to this matter before.

From the second group, participants indicated that the project had helped them to be more aware about the importance of mangrove and nature conservation. The fact of working in nature to help it grow again instead of cutting it as they usually do in the sugarcane sector, contributed to the attachment of the people towards the ecosystem. Participants had also acquired knowledge on the functioning and the benefits that these ecosystems can bring, increasing their concerns about its potential disappearance. One of the participants mentioned that *“we learned a lot about valuing and caring for nature, there were a lot of lessons coming from the project”* (R15). In this line, another member exposed that *“there were a lot of things that one did not know about the mangroves and had the joy of learning about them, it was very beautiful”* (R12). This has contributed to a growth in their interest to participate in future environmental projects, as they feel they are doing something good for the place in which they have been born and lived all their life.

On a different note, there were participants previously concerned about the deforestation dynamics going on that had a sense of responsibility towards the environment. For these people, the project had a particular social-symbolic relevance that was beyond the environmental benefits delivered by the intervention. As expressed by one of the elder participants:

I always thought in my life, will they [public administration, external institutions] think of leaving this place abandoned all the time? Will they do nothing? I saw people taking space from the environment, and those who were doing it were just cultivating and grabbing the land. I do not see any sense in that and they are going to destroy nature here [...] Imagine all

the nature being destroyed, that is not right, so I think what this project did was very excellent. I would say to do it with all the land [...] Maybe I do not see everything reforested, but at least my grandchildren will, maybe my grandchildren will be of my blood and they will be happy there (R1).

This statement illustrates in one sense the feeling of helplessness of seeing how year by year nature was losing ground without being able to do much about it. And in another, the sensation of abandonment by the institutional framework of the country, who did not dedicate a lot of effort to stop and reverse the situation. Furthermore, it reveals the extratemporal significance of the project, whose environmental benefits are not perceived just on an individual basis. Nature thus acquires a relevance that goes beyond the positive effects that one can perceive from its conservation, making the actions developed meaningful both for present and future generations.

In the same sense, the project was considered by another participant as a recognition of the previous work he had done to protect the environment. From 1978 to the end of the 80s, this villager had collaborated with the *MIRINEM*, the former Ministry of Environment before the creation of the current *MINAE*, to prevent mangrove deforestation in the areas surrounding the community. On a voluntary basis, he was in charge of monitoring these areas to dissuade the attempts of anybody of cutting down the mangroves. The participant tells this story with pride and satisfaction, assuring that since 1978 all the mangrove forest around the community has remained untouched, being further areas the deforested ones that the project aimed to recover. The support of the Ministry was merely symbolic, restricted to the provision of a uniform and a plaque with his name and the acronym 'forestal guard'. Nevertheless, this was enough for him to feel that his concerns about nature were understood and backed up by the public framework. However, the collaboration abruptly ended at the end of the 80s. As he expressed:

I told *MIRINEM*, so we are not working together anymore? They told me *MIRINEM* has disappeared and now another institution comes, *MINAE*. Afterwards all the contact stopped, so then I wondered, what am I gonna do now? With whom am I gonna contact if there is nobody? There was an empty, and that is all there was for a long time. Until now, they have entered again with more strength (R2).

Although the participant kept taking care on his own that none of the surrounding mangrove areas were degraded, the loss of touch with institutions increased his feeling of abandonment. Moreover, although over the years he was able to keep at bay the degradation of the areas around the community, the deforestation was visible in further but still neighboring lands. Therefore, the implementation of the project launched in 2021 had a special meaning for this participant, which for the first time saw concrete actions coming from external actors to reverse the degradation of the environment. In addition, it was also the first time in 45 years that he received an economic transfer for his involvement in conservation activities, giving the initiative a double sense of recognition, both in the symbolic and material spheres.

For the other elder referenced at the beginning of this section, the intervention had also a marked identital significance. It implied the appreciation that the concerns they had about the environmental situation for many years were right, and that contributing to it was worth it. The words of the first elder illustrate this:

I am happy to walk in nature. I know all the mangrove forests here, I can enter from one side and get out from the opposite. You see, I am a native of here, this is my community, all my life it has been my community and I am going to die here too. I told my little grandchildren, look, look at the games [the reforestation project] I played, and with this they know who I am. And they are like... how amazing daddy. They know who I am. I am happy (R1).

The symbolic character in the perceptions of this individual are furthermore emphasized by the following declarations:

I was happy to work. One of the jobs remembered in my mind, there I have pictures at home, I have pictures with my colleagues [...] It is good to see that the canals we built are doing well, to throw out the bare soil so that nature can come in. I thought it was super excellent, something good in life, that if it had not been done this way, how will we see ourselves in a while? I ask myself, what will it be of us if this would not have been done? Then I look at what was done and I think what a beautiful excellence, it is something that is engraved in my mind and in my heart, here I still have it penetrated and I will never forget it (R1).

5.2.4. *Social cohesion effects*

The dynamics emerging from the narratives indicate the project may have had an impact on the 3 different dimensions of social cohesion as conceptualized by the *German Institute of Development and Sustainability*.

Concerning the collaboration for the common good, the project entailed the horizontal cooperation among community members in a way they had never experienced before. The effect on this dimension went beyond the intervention, leading to further collaboration in the framework of a new collectively-managed initiative and increasing the willingness of participants to take part in future collective projects. Furthermore, the intervention comprised close and constant contact between the institutions involved and participants, whose connections have endured even after the finalization of the project. Given the satisfaction with the PES project developed, community members and institutions show predisposition to expand the collaboration in further projects.

Considering the aspect of trust, the intervention seems to have led to a higher intergenerational recognition of participants, runned by the positive satisfaction of the elder towards the works of the younger and the respect of the younger towards the elder. Apart from the effect in this horizontal sense, the project looks to have caused the increase of vertical trust among participants and the institutional framework. In one sense, the organizations have realized they can count on the communities for the implementation of conservation projects, proving the relevance and value added of its inclusion. In another, the opinion of the community members was seeked, appreciated and actively taken into consideration in the

decision process. Participants expressed that there was good communication among both parties, and they helped each other with the knowledge each one had. This has likely impacted the perception of participants towards the institutions, increasing their trust and thus their interest for hereafter collaborations.

With respect to the identity, the project seems to have had an effect on the self-perception of community participants, who feel to have faced a complicated and novel challenge and have overcome it satisfactorily. This has strengthened their local identity, increasing their confidence, their empowerment and their willingness to take part in future projects, as they have realized that their knowledge and contributions can be helpful for the national endeavor of environmental conservation. In the same line, their national identity looks to have been also impacted by the fact that for the first time external actors have sought for their collaboration in an active way, which has alleviated their feeling of abandonment by the institutional environment.

In sum, the project seems to have had a positive impact on the different elements of social cohesion. Tentatively, the effects are particularly relevant around the horizontal dimensions of collaboration and trust, as well as the reinforcement of the local identity. Nonetheless, the vertical relationships of collaboration the project entailed between the institutional framework and participants seem to have increased mutual trust and impelled the feeling of recognition of the community from the institutional setting. This indicates the potential to strengthen the national identity and promote institutional legitimation by the development of future joint interventions on which public institutions take a more predominant role.

6. Conclusions and limitations

The analysis of the case study contributes to the still scarce literature on perceptions within collective PES, being one of the firsts examinations addressing the matter from a relational social perspective. The research enriches the existing literature in the area, which previously comprised mainly the effects on environmental conservation and the economic impact on local livelihoods. The study also addresses the critics that have associated PES with commodification, neoliberalization and motivational crowding-out, which have linked interventions with negative outcomes concerning collaboration and social dynamics within local communities.

In this sense, the present research provides preliminary insights around the influence of collective PES on the relations among stakeholders, indicating the positive perception of the collective actions embedded in the project and its impact on different areas. Dynamics of collaboration and mutual help were found to be pillars of the projects, with no apparent conflict emerging neither during nor after the project conclusion. The results suggest the project fostered horizontal collaboration and trust among participants, strengthened their local identity, increased their environmental awareness, promoted the creation of a new community-managed initiative and expanded their willingness to take part in future collaborative projects. The intervention seems to have also buttressed the relationships and trust among participants and the institutions involved. Overall, the narratives gathered in the community suggest the beneficiaries have a high level of satisfaction and are strongly interested in participating in future projects of the same nature. Although explorative and preliminary, these findings suggest the prospect effects that collective PES interventions may have on the social cohesion level. More exhaustive evaluations of the interlinkages between both aspects would be needed in order to clarify the ways and circumstances on which collective PES schemes can impact the diverse dimensions of social cohesion.

The inspection of the collective PES scheme in the Gulf of Nicoya allows also to better understand the functioning of community-based mangrove conservation projects, being the first investigation of this nature in Costa Rica. The study provides insights on the effects that these interventions may have, which can be useful for the implementation of future projects of the same kind. In one sense, the case study indicates the relevance to expand PES efforts to mangrove ecosystems, which have been overlooked from the national PES program throughout time. The straggling situation of mangrove conservation in the country compared to the conservancy of forest provides the opportunity of focusing time and resources towards a sector whose possibilities for improvement are wide-ranging. In another, the mobilization of resources towards wealthy landowners in the forestal PES national program underpins the suitability of exploring collective approaches for new mangrove conservation schemes, more capable of including the most vulnerable social groups and delivering beneficial social effects as the ones described in the analysis. In a context of growing inequality, poverty and citizen unrest, actions in this direction seem especially relevant.

The support of external actors is regarded as crucial in order to provide the required economic resources for the development of long-term community projects for environmental conservation. The integration of mangrove conservation endeavors in a public program analogous to the pioneer forestal PES is considered especially relevant to promote the implementation of projects such as the collective case study analyzed. These interventions could improve the living conditions of impoverished rural communities, leading to the empowerment of communities and the generation of own resources outside the project framework as illustrated by the honey production initiative. Positive environmental outcomes could be also boosted since a larger budget would be translated into a greater number of projects. Furthermore, the involvement of public institutions could enhance the trust and relationships between rural communities and the State, increasing the feeling of inclusion of the former and the legitimation of the latter. However, the financial framework that can support the inclusion of collective mangrove conservation projects in a national program remains unclear and poses the main obstacle for this transition. Considering that the actual funding sources are not sufficient, further research would need to be done to identify the most adequate financing instruments.

The case study analyzed presents certain particular characteristics that may have influence on the results obtained. In accordance, special attention to context-specific traits would have to be taken in order to maximize the positive outcomes of further interventions and minimize detrimental shortcomings, taking into consideration that literature has indicated that the effects of PES projects are influenced by its particular features. Future interventions should carefully consider the dynamics that could emerge from a larger and more diverse sample than the one analyzed here, since communities can differ so much in the characteristics they present. It is thus crucial to reflect on the interactions of the program with the local context and existing policies. Collective interventions have the capability of fueling or disincentivizing existing dynamics, as well as creating new ones. Therefore, the comprehension of the context and a thoughtful design becomes crucial in every case. Notwithstanding, the results delivered by the study can serve as a guideline for the implementation of future interventions, especially in similar contexts.

The research provides indications on how collective PES interventions can affect the social relations of the participants involved, leaving the door open for further contributions in the area. Complementary to qualitative approaches as the one developed in this investigation, the implementation of quantitative designs could contribute to the deeper measurement of the social impact of collective PES. Concerning this, it seems particularly interesting to quantitatively analyze the impact of collective PES on the degree of social cohesion of beneficiaries. In this sense, a difference-in-differences strategy could attempt to isolate the effects of PES in the level of social cohesion, assessing pre and post-intervention situations in 2 communities with very similar characteristics, from which only 1 receives the PES intervention. Future evaluations in the area seem key to shed light on the different ways in which PES can promote beneficial social dynamics.

Appendices

Table 1

Institutions of key experts interviews, identification number of interviewees and Institution's role

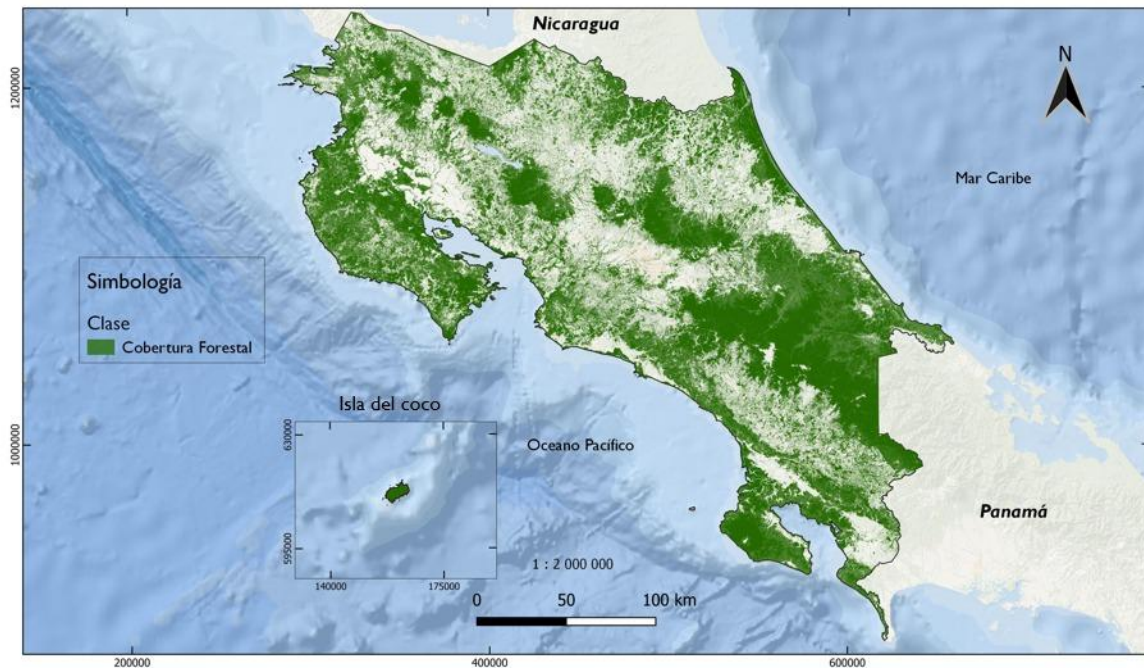
<i>Institution</i>	<i>Identification number</i>	<i>Institution's role</i>
FONAFIFO	KI1	Organism embedded in the Ministry of Energy and Environment, with the specific mandate of implement the national Costa Rican PES
FONAFIFO	KI2	
FONAFIFO	KI3	
FONAFIFO (former employee)	KI4	
Conservation International Costa Rica	KI5	Environmental scientific-based NGO focused on marine conservation. Developer of the biggest mangrove conservation PES in Costa Rica
University of Georgia (US), Odum School of Ecology	KI6	The university opened a campus in the rural region of Monteverde so their students could come and learn about the environmental conservation practices of Costa Rica. They have developed a local PES in reforestation that provides seeds to local people

SINAC	KI7	Unit of the Ministry of Energy and Environment. Exercises its functions as a system of institutional management and coordination, deconcentrated and participatory, which integrates competencies in forestry, wildlife, protected areas and the protection and conservation of the use of watersheds and water systems in order to dictate policies, plan and execute processes aimed at achieving sustainability in the management of the country's natural resources.
SINAC	KI8	
FUNDECOR	KI9	Environmental NGO who took a leading role in the design of Costa Rican PES program in the 90s. Currently acts as a mediator between FONAFIFO and landowners in the implementation of the program. It also executes own projects aiming to foster conservation and economic development
ACICAFOC	KI10	Organization that facilitates processes to allow the access, use and responsible management of natural resources in order to contribute to the socio-productive development of indigenous peoples, local peasant communities and Afro-descendants in Central America. It carries out projects in 8 Central American countries, including Costa Rica, through different modalities of local PES.

Source. Author's own elaboration

Figure 2

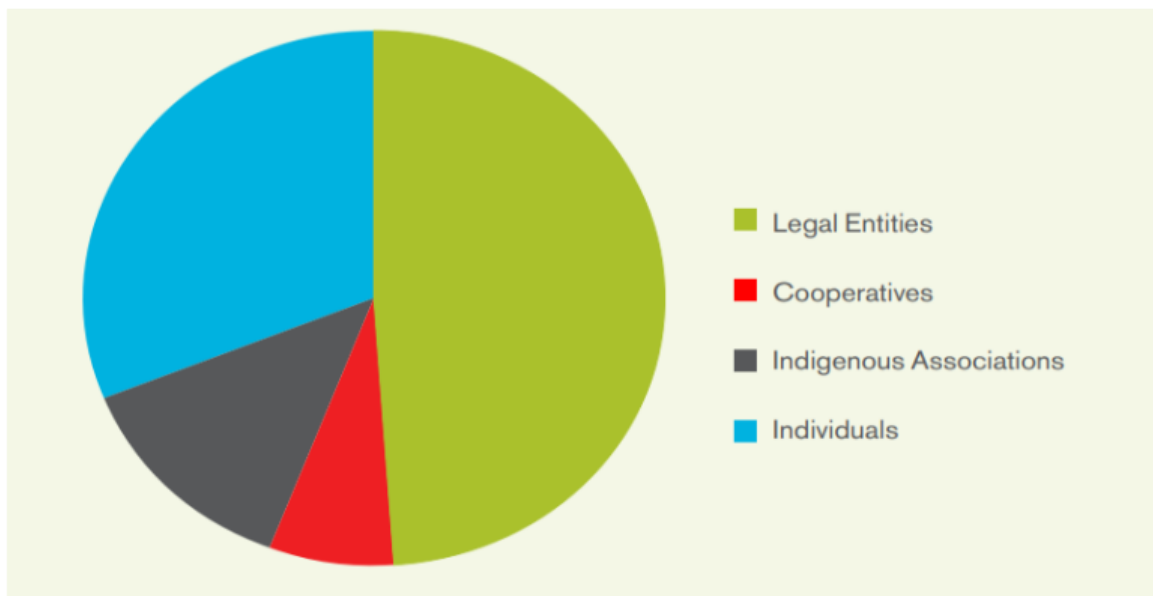
Forest cover in Costa Rica by 2021



Note. The level of forest cover depicted represents 57,1% of the national territory. *Source.* SINAC (2021)

Figure 4

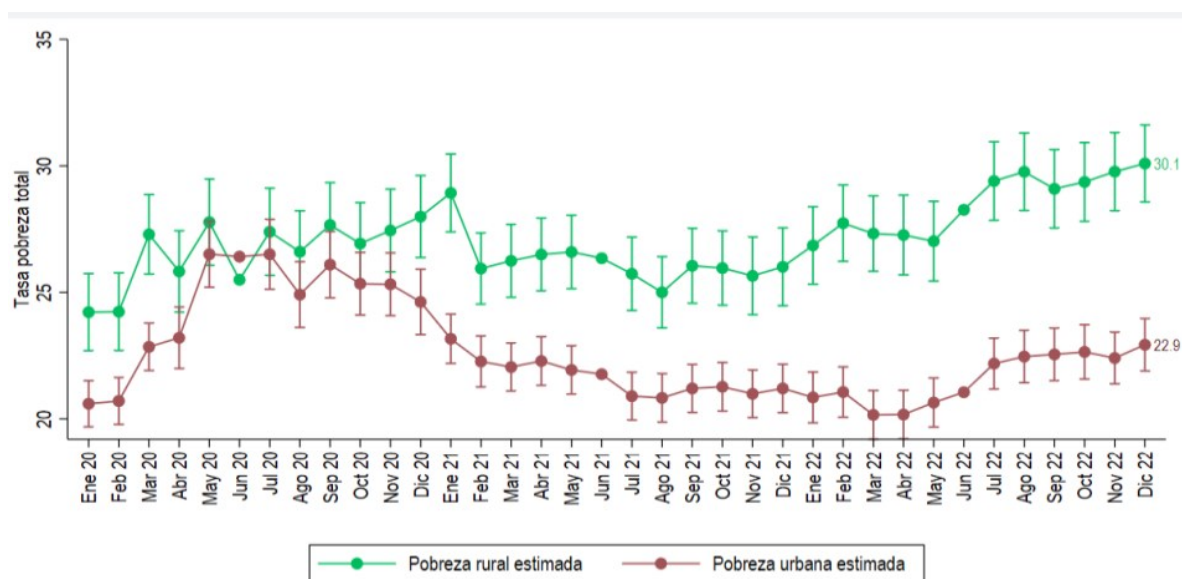
Total funds distributed by type of participant (1997-2012)



Note. Legal entities account for 49%, followed by individuals (31%), indigenous groups (13%) and cooperatives (7%). *Source.* Porras et al., (2013)

Figure 5

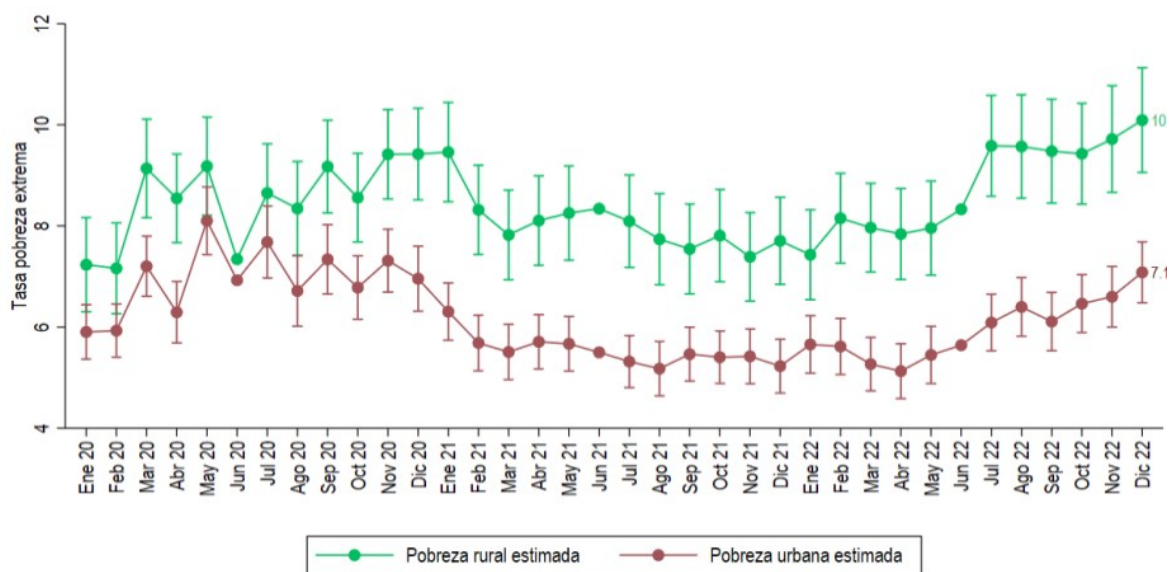
Estimated poverty rate in rural and urban areas from 2020 to 2023



Note. The red line applies to urban areas while the green to rural ones. Calculated on 95% confidence intervals.
Source. IICE (2023)

Figure 6

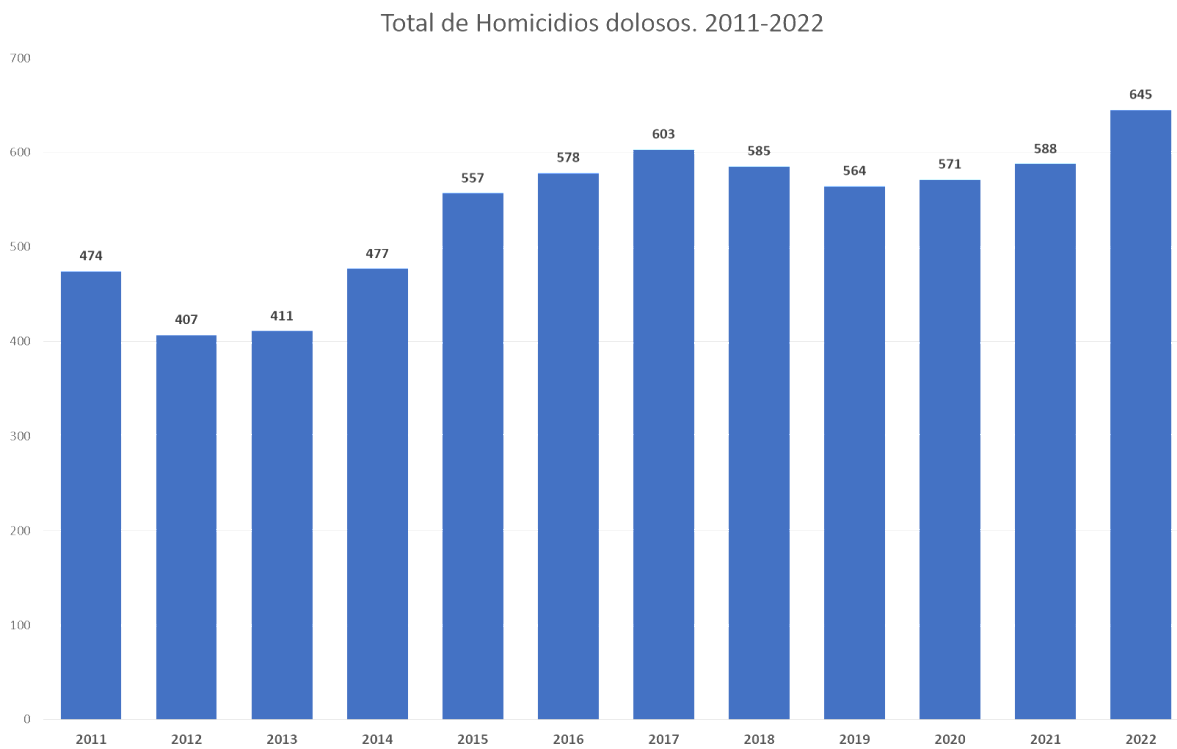
Estimated extreme poverty rate in urban and rural areas from 2020 to 2023



Note. The red line applies to urban areas while the green to rural ones. Calculated on 95% confidence intervals.
Source. IICE (2023)

Figure 7

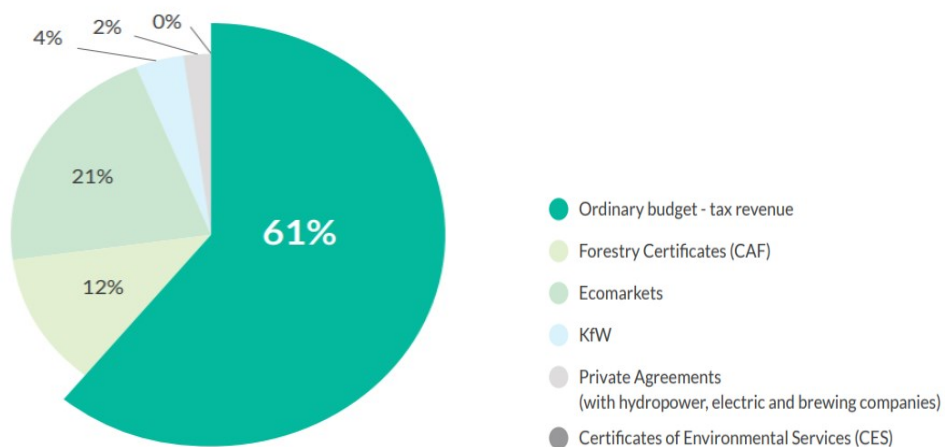
Intentional homicide rate 2011-2022



Source. National Observatory on Violence (2023)

Figure 9

PES funding source 1998-2015



Source. GGGI (2016)

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