Human Ecology (2020) 48:609–617
https://doi.org/10.1007/s10745-020-00178-w

Social Participation in Forest Restoration Projects: Insights from a National Assessment in Mexico

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Accepted: 7 September 2020 / Published online: 24 September 2020

Abstract
Ecosystem restoration is gaining momentum worldwide, but restoration projects frequently fall short of addressing the human dimension, notably through the involvement of local people. While social participation has been recognized to have a fundamental role in the success and sustainability of forest management projects, it is frequently not incorporated into restoration project planning. We gathered responses from a national assessment program regarding the status of terrestrial restoration projects in Mexico. We found that most of these projects were limited to the use of a local short-term work force in tree planting activities and were designed to alleviate short term local socioeconomic tensions, indicating that effective social participation is not well understood by managers.

Keywords Social capital · Collective learning · Dialogue of knowledge · Human dimension · Collaborative adaptive management · Ecosystem restoration · Mexico

Introduction

Ecosystems restoration is defined by the Society of Ecological Restoration (SER) as "an intentional activity that initiates or accelerates the recovery of an ecosystem with regard to its health, integrity and sustainability" (SER 2004). However, we argue that it is more complex since restoration can also promote new relationships and policies regarding the natural environment, incorporating socioecological elements necessary for social as well as ecological sustainability (Baker *et al.* 2014).

In light of increasing awareness of the threats posed by both social injustice and the impacts of global warming, many countries are demonstrating the political will to undertake ambitious restoration objectives (Chazdon *et al.* 2017; Schweizer *et al.* 2019). The most recent, the Bonn Challenge, which is designed to restore a total of 350 million hectares by 2030, will also generate around 170 billion USD per year in net benefits from watershed protection, improved crop yields, and forest products, and could sequester up to the equivalent of 1.7 gigatons of carbon dioxide annually (NYDF-New York Declaration on Forests 2015; Bonn Challenge 2020). Also, in March 2019 the General Assembly of the United Nations (UN) declared that 2021–2030 would be the "U.N. decade on ecosystem restoration" with the objective of restoring a further 350 million hectares (UN 2020). However, some scientists are concerned that these objectives are exclusively linked to productivity-based initiatives with no consideration of conservation of biodiversity and human values (Cross *et al.* 2019; Ceccon *et al.* 2020; Garzón *et al.* 2020).

A number of scholars have recognized the ethical necessity of including consideration of the human dimension in the design of restoration projects, including the perceptions, beliefs, knowledge, and cultural practices of diverse stakeholders (Jordan III 2000; Higgs 2005; Gross 2006; Egan *et al.* 2011; Higgs 2011; Ceccon and Pérez 2017). However, the most recent codes of good practices as well as international guidelines still fall short in their recommendations for inclusion of a human dimension in project planning, implementation, and monitoring (e.g., the Forest Landscape Restoration Principles, GPFLR (The Global Partnership on Forest and Landscape Restoration) 2018, and the Society of Ecological Restoration Standards; Gann *et al.* 2019).

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Some scholars have also highlighted the lack of connection between restoration objectives and human aspirations in review publications. For example, Aronson *et al.*'s (2010) analysis of 1582 scientific articles related to ecological restoration in 13 of the most important scientific journals over eight years (2000–2008), using the keywords "restoration" and "rehabilitation," revealed that only a small percentage made any connection at all between restoration and socioeconomic development, such as payments for environmental services (2.7%) or increase in agricultural productivity, for example, reduction of soil erosion and increased water availability (34%). Similarly, Wortley *et al.* (2013) reported that up to 94% of 301 articles on ecological restoration focused solely on biophysical results while ignoring human outcomes, i.e., they did not report how the well-being of local communities was affected. Although some have evaluated the ecological effectiveness of restoration (e.g., Rey-Benayas *et al.* 2009; Wortley *et al.* 2013; Crouzeilles *et al.* 2016), the extent of human benefits in restoration projects remains under-reported.

One of the most important steps toward the inclusion of human dimension in restoration projects is the inclusion of local people in these projects. Social participation can be conceived as the search for individual and community well-being according to a belief based on democratic and horizontal relationships (López-Sánchez 2018). As opposed to ecology, the practice of restoration allows participation of various social actors and incorporates various environmental perspectives and interests, which allows for the reinforcement of cultural cohesion through shared activities (Gross 2006). The dissemination of awareness about degradation and the necessity of restoring wellbeing must come through a dialogue of knowledge with stakeholders to be able to negotiate and agree on effective restoration strategies.

However, according to Higgs (2005), since most of the knowledge used by those who design and plan restoration projects is based on biological science or ecology, the real benefits of social participation are frequently not well understood and often overlooked. To confirm our hypothesis that social participation is not incorporated in restoration projects, we analyzed the responses to three questions from a national assessment about the current status of terrestrial restoration projects and initiatives in Mexico that we believe is representative of restoration projects worldwide (Méndez-Toribio *et al.* 2018): i) Did the restoration projects involve local communities? ii) Who participates and how do they participate? And, iii) What are the socioecological goals of the restoration project?

It is important to note that Mexico is a country where around 50% of land ownership is collective and cultural practices have developed over thousands of years (Alcorn and Toledo 1998). Also, community forestry is practiced in more than 3000 communities (Hogdon *et al.* 2013). So, our main objective is to initiate a discussion on this important topic that may contribute to assuring the long-term success of restoration projects worldwide (Reid *et al.* 2017).

Effective Social Participation in Restoration Projects

For social participation be effective and engaged at an appropriate level, according to Nistal (2004) and the INAFED (Instituto Nacional para el Federalismo y el Desarrollo Municipal) (2020), the following stages of planning should be followed:

> Participative Diagnostic: to collectively decide on solutions for degradation problems using both scientific data and local knowledge and perceptions. The first step is identifying degraded sites and the causes of degradation to understand agricultural and ecological problems from the farmers' point of view, for example, through "participant observation" in the field, mapping the region, including local villages and neighborhoods, using local classifications for soils and vegetation, or organizing workshops with farmers to draw up an agenda of socioecological problems. The second step is to gather and analyze the necessary data. Finally, it is important to schematically socialize the results throughout the community. The diagnosis of environmental degradation, made through collective discussions and reflections, can increase environmental awareness within the community.
>
> Planning: setting goals and determining how to achieve the final objectives. Also, stimulating local discussion with respect to the dynamics of the vegetation through gathering oral history and by asking the informants to imagine how the landscape will look in the future (Pinilla and Ceccon 2008). It is important to formulate goals that consider the ecological and social limitations of the restoration project and the participative decision-making process. Biological limitations can play a critical role and discourage social participation. Therefore, it is important to bring to bear appropriate scientific knowledge and maintain a cost/benefit ratio of the project to guarantee positive biological and economic results (Ceccon, 2013).When the community actively participates in this stage, the decisions made are based on a local social reality, which increases the chances of the project's success and continued effectiveness.
>
> Execution: at this stage, there are three important aspects: participation levels, actors, and techniques. Executing previously agreed upon goals should foster further processes that will enable actors to acquire knowledge and skills that are useful for managing the restored ecosystems for the medium and long term.
>
> Evaluation: this stage determines to what extent the proposed objectives, both technical and social, were achieved. The social assessment is made through leadership

evaluation, organization, resources, mobilization, and management, some of which are done collectively. Once the restoration project is established, consistent monitoring will also provide opportunities to correct actions that did not result the expected outcomes using an adaptive management approach (Suding *et al.* 2004; Rout *et al.* 2009). Finally, when the restored ecosystem acquires the capacity for self-regulation and succession, it can proceed to remove the external agents. Also, the restoration project's success cannot be measured by biological outcomes alone; it is very important that the project helps strengthen the capacity of stakeholders to control of the community's natural resources and increase community social representation, legitimation, and reciprocities (Ceccon *et al.* 2020).

Objectives of Effective Social Participation

One of main objectives of social participation in restoration projects is to promote "collective learning" or environmental awareness. Collective learning is a process of social change in which people learn "from each other" so that they can benefit from wider social and ecological systems. Learning is an asset of social participation within the practices of a community (e.g., Argyris and Schön 1996; Wenger 1998; Pahl-Wostl and Hare 2004; Muro and Jeffrey 2008). If a restoration project cannot shift the social paradigm that led to the current degradation, the mere planting of trees will not guarantee the persistence of the restored areas in the future (Reid *et al.* 2017). Social participation also develops the capacity of the local population to initiate a project and increase social cohesion and their ability to work together and with outside experts (Ross 1967).

Social participation has also the potential to strengthen the perception of legitimacy of decision making at a local community level within a restoration project and facilitates its implementation (Muro and Jeffrey 2008). This process also can construct and strengthen networks through trust, reciprocity, and norms (social capital; Durston and López 2006). In short, social participation favors collective learning, environmental awareness, concrete and timely action, empowerment, governance, and the consequent transformative action.

Challenges of Social Participation in Forest Restoration

Despite such guidelines for effective social participation, it is not yet clear how and when participation should take place within the cycles of a project, or which social actors must participate in order for social learning to be effective (e.g., Arheimer *et al.* 2004; Redpath *et al.* 2004). Although participatory processes are designed to promote social learning and deliberative democracy in socio-ecological management, the equitable distribution of power is not always easy to achieve, and management can become autocratic. Stringer *et al.* (2006), evaluating participative processes in different countries, concluded that the participation process must be flexible and should always include mechanisms to facilitate feedback and social learning.

Methods

As noted above, our data are from a national assessment on the current status of terrestrial restoration projects and initiatives in Mexico (Méndez-Toribio *et al.* 2018). Firstly, we conducted an exhaustive search using several complementary procedures:

- A Google digital search with the keywords: restaur *, recuper *, restor *, recover *, Mexico, and vegetation (in Spanish).
- Direct enquiries with restoration practitioners and relevant institutions in Mexico.
- Reviewing conference abstracts from scientific meetings since 2000 (Botanical Society of Mexico, Mexican Scientific Society of Ecology, and the 2011 Society for Ecological Restoration meeting held in Mexico).
- Consultation of the abstracts from the first Mexican Ecosystem Restoration Symposium in 2014.
- Searching databases of ecological restoration projects (Global Restoration Network, EcoIndex, Commission for the Knowledge and Use of Biodiversity (CONABIO in Spanish), National Institute of Ecology and Climate Change (INECC in Spanish), and the Mexican Network for Environmental Restoration (REPARA in Spanish)).
- Searching grey literature online.

We obtained an initial list of 188 projects, which we later reduced to 150 after excluding projects in marine or aquatic environments and those for which only information from the diagnostic stage was available. We also excluded projects for which no technical reports were available and where the responsible parties could not be contacted. We consulted the Mexican Conservation Board in an effort to identify restoration projects that we may have missed with our other search strategies; this body included academic and governmental institutions as well as civil society organizations whose mission is implementing ecological restoration. This allowed the identification of 293 institutions that could potentially have been involved in ecological restoration projects in Mexico.

We adapted a survey from the assessment protocol designed by Murcia and Guariguata (2014) for Colombia. We formulated additional assessment questions with restoration scientists and practitioners at an expert workshop in 2015 in Mexico City (Appendix 1). In total, the survey was distributed digitally via email and online through an open source application (LimeSurvey version 2.65.0; https://www.limesurvey.

org) to 443 recipients. Twenty-one people invited to participate in the survey declined because they were not involved in restoration projects or did not wish to respond. The survey was open for three months, by which time we had received information from 58 projects. Published technical reports were available for 17 restoration initiatives and we extracted relevant information from them. Overall, we were able to obtain information for 75 restoration projects, which we compiled automatically in the Lime Survey digital platform. We accepted responses in good faith and made no field visits to corroborate the accuracy or veracity of the reported data.

Results

Unfortunately, even though social participation was generally high in our sample (86% of projects) (Fig. 1), effective participation was rare since most of these projects were limited to the execution of field implementation tasks only (78% participated in weeding, seedling planting, digging holes, etc.; Fig.2e) or field establishment of research projects (55%) (Fig. 2g). Very few community members participated in the diagnosis or the planning phase: 28% (Fig. 2a) and 38% (Fig. 2b) respectively. Also, only a few participated in subsequent evaluations and monitoring (41%; Fig. 2h), training, or in the dissemination of the project (39% each; Fig. 2i).

Although the inclusion of women in the forest restoration projects was not particularly low in our study (62%; Fig. 1), they were underrepresented in the diagnosis, planning management, and monitoring tasks (25% each; Fig. 2a, b, h). Following the same trend as the rest of the community, the highest percentage of female participation was in the execution of the restoration activities (48% in land preparation, tree planting, weeding, etc.; Fig. 2f).

Only 35% of vulnerable community members (under the age of 15, the elderly, people with disabilities, and prison inmates) participated in the restoration projects (Fig. 1). Only 4% were involved in planning management tasks (Fig. 2b), somewhat more in executing restoration field actions (22%; Fig. 2e), as well as in training and in the dissemination of the project results (22% each; Fig. 2i).

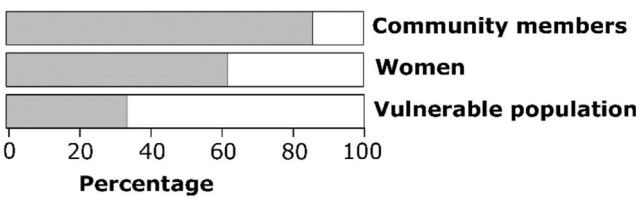

Fig. 1 Percentage of forest restoration projects in which each social group of interest participated

The Socioecological Goals of Restoration Projects

Two of the most frequently cited goals of the projects that we analyzed were related to improving ecosystem services (93%) or biodiversity (92%). However, the third most cited goal was explicitly social: generating employment (84%). On the other hand, only 32% of the 75 projects we evaluated aimed to increase land productivity and/or food security through agroforestry or silvo-pastoral techniques.

Discussion

Extent of Social Participation and Social Inclusion in Restoration Projects

Even though the percentage of projects with social participation was high (86%), a large part of this (78%) was limited to field activities, such as weeding, seedling planting, digging holes, etc. Few people participated in the diagnosis, planning, monitoring, training, or dissemination of the projects. This unfortunately reduced the opportunities for local community members to obtain any benefits from effective social participation and to develop a common purpose or to identify with the restoration project (e.g., Muro and Jeffrey 2008; Colmenares 2012). In practical terms, with reduced participation in most of the stages of the projects, collaborative adaptive management (CAM) (Childs *et al.* 2013; Scarlett 2013) with the community will be difficult. Adaptive management offers the opportunity of exploring alternative actions to those of the initial restoration project as these actions can be monitored collectively to determine whether outcomes coincided with those predicted. These results can be used to adjust future restoration project planning (Conley and Moote 2003). In our study, if the majority of the participants carried out only field work, they remain unaware of the problems leading to the degradation that led to the project's realization in the first place. In addition, if they did not participate in its planning, they will never be able to know if the project met the desired objectives, nor be able to propose any kind of adaptive management plan. Thus, these communities lose their opportunity to generate collective learning and of finding a common goal in restoration. This same tendency of low social participation of community members was also found in a similar assessment of restoration projects in Colombia. There, communities had an effective participation in fewer than 10% of 119 forest restoration projects (as either project managers or project conveners) (Murcia and Guariguata 2014).

An analysis of environmental problems from a gender perspective found that the relationship that men and women have with nature is rooted in their material, social, and cultural reality, is socially constructed, and varies among different groups of men and women in diverse environmental scenarios

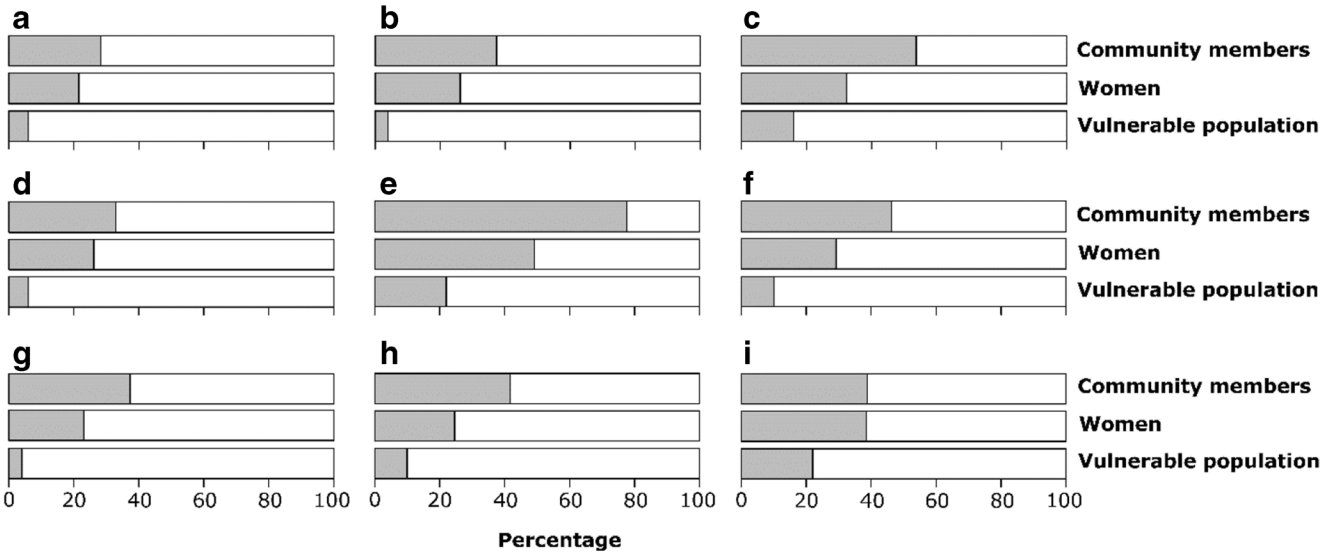

Fig. 2 Percentage participation during nine stages of the restoration process. Stages: A. diagnosis (in process, management), B. planning (pending funding or approval), C. development and field establishment of the pilot project (experimental phase and / or investigation), D. person responsible for project execution, E. execution of the actions (land preparation, planting or field establishment), F. supervision of the actions (land preparation, planting or implementation), G. maintenance or research, H. subsequent evaluation and monitoring (monitoring), I. training and dissemination of the project. Community members ($N = 67$), women ($N = 65$) and vulnerable population (under 15 years of age, elderly people, people with disabilities, and inmates; $N = 50$)

(Velázquez 2003). In a review of gender and ecological restoration, Broeckhoven and Cliquet (2015) found that in different case studies ecological restoration is not gender neutral. They suggest that integrating a consideration of gender into restoration planning requires asking more gender-related questions and making significant adjustments in the planning and execution of restoration projects. Despite the recognition of synergies between restoration and gender equality (Coleman and Mwangi 2013; Leisher *et al.* 2016), restoration research and practices remain poorly addressed worldwide (Clewell and Aronson 2013; Broeckhoven and Cliquet 2015).

Mexico is no exception, despite the fact that the inclusion of women in the forest restoration projects was not low (62%). Nevertheless, women were very poorly represented in the diagnosis, planning management, and monitoring tasks. This low participation in rural areas is also reflected in terms of property rights; only 26% of women own some sort of agricultural rights certificate (SEDATU 2020). According to Velázquez (2003), there are many important implications concerning incentives and opportunities for sustainable environmental management due to these gender differences, and therefore, in the construction of social sustainability processes.

The objective of social inclusion is to comprehensively improve the living conditions of individuals who are normally excluded from society for various reasons, to offer them the same educational, economic, and employment opportunities that the wider society enjoys (Cameron 2006). Therefore, the participation of this social sector in restoration projects has ethical relevance in terms of equity, which is also relevant to the democratic social order and governance. Unfortunately, in Mexico the participation of vulnerable groups was even lower in the field activities and insignificant in diagnosis and planning. In fact, there are very few published restoration projects around the world that have an explicit policy of inclusion of vulnerable groups. This leads us to conclude that the inclusion of vulnerable people is still not an important topic in forest restoration design and planning. A notable example of social inclusion was carried out by the State Water and Sewage Company of Rio de Janeiro (CEDAE in Portuguese) in Brazil, which has offered jobs and training in ecological restoration to more than 2700 inmates in the State penitentiary system to improve the quality of the water for human consumption from the main river basins in the state of Rio de Janeiro, and at the same time to acknowledge their value (Abreu *et al.* 2017).

The Socioecological Goals of Restoration Projects

Job creation was an important socioeconomic issue in restoration activities in Mexico (the third most important goal), but unfortunately, the labor force employed was temporary and only served to alleviate social tensions for a short time, since most of the jobs ended when field activities finished. Temporary employment constitutes a significant source of income for the poorest rural populations in developing countries. However, the main limitation of this policy is its similarity to welfare handouts. With more public spending on social programs, poorer populations are provided with certain essentials, such as food and money, but not the opportunity to get out of poverty. By

failing to connect social policy with economic policy, efforts to reduce poverty are unrelated to systemic changes that could result in greater equity (CEPAL 2015).

However, in some countries, mainly those that already have the equivalent of a National Restoration Plan, the linkage of public social and economic policy has created a large demand for ecosystem restoration that has led to permanent and equitable jobs, for example the "Working-for-Water" program in South Africa has employed more than 30,000 people over a period of ten years in order to eradicate invasive woody plants and restore native plants and agricultural lands (Van Wilgen *et al.* 2004).

Brazil provides another example, having passed the Forest Act in 1934 (last reviewed in 2012), a robust policy tool, even for privately owned lands, to ensure the conservation and restoration of ecosystem services. The Forest Act has been decisive in determining whether agro-industrial companies are granted environmental certification and financial credit (Brancalion *et al.* 2010), and in engaging smaller landowners in various voluntary and mandatory restoration programs (Wuethrich 2007). The Forest Act's two main mandates regarding forest restoration and conservation are the Legal Reserves (Legal Amazon: 80% of the forest area, savanna: 35%, other regions and biomes: 20%) and the Permanent Preservation Areas (riparian zone banks, hill tops, >45^{o} inclination zones, among others). To comply with these mandates, a National Plan of Restoration was also created (PLANAVEG in Portuguese), as well as municipal and regional plans and the "Rural Environmental Cadaster" (CAR in Portuguese). CAR is a geo-positioning program that monitors compliance with the Forest Act (through forest conservation or restoration) by rural landowners. All rural landowners are obliged to register the geo-positioning coordinates of their preserved or restored areas in order to receive credits or any other government financial support (Méndez -Toribio *et al.* 2017). It has been estimated that this instrument will create more than a million jobs in the next 40 years because of the demand for restoration projects; 200 new jobs will be created for every thousand hectares being restored (Calmon *et al.* 2011). Because of this great job demand, democratic and independent organizations (e.g., cooperatives) that provide fair and formal restoration employment, such as seed collection and seedling production, have been developed in several regions (Lemgruber *et al.* 2017). In short, ecosystem restoration should be part of any national plan, together with a long-term social development program supported by laws and regulations that promote effective monitoring, the creation of permanent jobs, and involve multiple social actors and sectors.

Another factor likely to influence the success of these policies in promoting social participation in forest restoration is their capacity to provide tangible benefits to those directly affected by degradation, such as compensation for landholders supplying goods such as timber or food, or payments for generating one or more ecosystem services (Blignaut and Aronson 2008; Zilberman *et al.* 2008; Edwards *et al.* 2010; Brancalion *et al.* 2017). This is key, because restoration will not succeed unless it also improves rural livelihoods (Baynes *et al.* 2015; Ceccon and Perez 2017; Ceccon 2020). Unfortunately, in our assessment only a third of the projects were designed to increase land productivity and food security (productive restoration; sensu Ceccon 2013). These types of projects could supply goods such as wood or food or generate payments for ecosystem services that could, in the long run, contribute to poverty reduction (Ceccon and Miramontes 2008; Edwards *et al.* 2012; Baynes *et al.* 2015; Brancalion *et al.* 2017; Ceccon 2020) as well as contributing to connecting fragmented native vegetation (e.g., Uezu *et al.* 2008).

In Mexico, the newly elected government (known as the 4th transformation) is generating great expectations regarding forest restoration. The "sowing life" program gives financial support of around 250 USD to each farmer in the poorest regions of the country in order to establish agroforestry projects (productive restoration). This program intends to create around 4000 thousand jobs. However, its sustainability over time and its planned duration are not yet clear (Programa Sembrando Vida 2019).

Final Considerations

Effective social participation obtained through a knowledge dialogue among the stakeholders involved can increase social capital and change relationships with the natural environment. A better understanding of the ecological processes of restoration, and incentives to follow through with the original restoration plan and carry out collaborative and adaptive ecosystem managements, are necessary for effective and sustainable outcomes. This participatory process can also trigger a broader political and social transformation, which may allow rural populations to become an integral part of the larger social and political systems, improving the governance process.

The results of our assessment make clear that effective social participation is not well understood by project planners and managers, since "social participation" in most of the projects was limited to the use of a local short-term work force for the field tasks (e.g., digging holes, weeding, planting seedlings). Regarding social objectives, restoration projects in Mexico have been designed only to alleviate immediate social tensions, without any long-term and sustainable national plan. There are no efforts to create a demand for restoration and democratic independent organizations that could provide more long-term and formal employment. In addition, virtually no considerations of other potential social achievements, such as gender or vulnerable inclusion, increase of social capital within the participating local social organizations, increase of community empowerment beyond their own natural resources, improvement of local governance, or changes to

environmental paradigms through either formal or non-formal education-based restoration programs, were incorporated into the projects' aims and objectives. To achieve effective outcomes, political and technical solutions to ecosystem degradation need to be formulated in parallel with local knowledge and perceptions of the environment and include long-term strategies to improve local livelihoods.

Acknowledgements We would like to thank Manuel Guariguata for his support during all of the phases of the project and for the financial support of the Department for International Development of the United Kingdom (DFID) by way of the CIFOR-KNOWFOR project and the CGIAR Forest, Trees and Agroforestry Research Program. We are also grateful to the Managing Editor, Ludomir R. Lozny, for his support in review and editing process. CM-G gratefully acknowledges logistical support from the Centro de Investigación en Biodiversidad y Conservación, Universidad Autónoma del Estado de Morelos (UAEM). EC is grateful for the support of PAPIIT IN300119.

Compliance with Ethical Standards

Informed Consent: All the participants in the survey were given an information sheet about the project and asked to provide informed consent in writing. Research was approved by the Universidad Nacional Autónoma de México in compliance with its code of research integrity.

Conflict of Interest The authors declare that they have no conflict of interest.

Appendix 1: Survey used to collect the data

1. During the restoration project:

   1.1 Did community members participate?

a. Yes, b. No

   1.2 Did women participate?

a. Yes, b. No

   1.3 Did vulnerable populations (e.g. children under 15 years old, elderly people, people with disabilities, or inmates) participate?

a. Yes, b. No

   1.4 If the answer to 5.1, 5.2 or 5.3 questions is yes, in what phase of the process was the participation of each social group was incorporated?

A. diagnosis (in process, management),
B. planning (pending funding or approval),
C. development and field establishment of the pilot project (experimental phase and / or investigation),
D. person responsible for project execution,
E. execution of the actions (land preparation, planting or field establishment),
F. supervision of the actions (land preparation, planting or implementation),
G. maintenance or research,
H. subsequent evaluation and monitoring (monitoring),
I. training and dissemination of the project.

2. What are the socioecological goals of project?
3. Did the project seek to generate local employment? (Does not apply to commercial plantings)

   a. Yes, b. No

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