Triggering Community Conservation Through the Trade of Carbon Offsets: The Case of the Ejido Felipe Carrillo Puerto, Mexico

Octavio Tolentino¹, Eduardo García-Frapolli¹, Luciana Porter-Bolland², Isabel Ruíz-Mallén³, Victoria Reyes-Garcia³,⁴, María-Consuelo Sánchez-Gonzalez⁵, and María-Elena López-Méndez³

Abstract
Based on qualitative research and a case study analysis, this article describes how a local conservation initiative grounded on the potential to trade carbon offsets in the voluntary market has triggered a multipurpose scheme for community conservation in the ejido of Felipe Carrillo Puerto, Mexico. We describe how the Felipe Carrillo Puerto has engaged in the creation of two community-conserved areas, an ecotourism venture, and two projects of payment for environmental services. We show how...

¹Centro de Investigaciones en Ecosistemas, Universidad Nacional Autónoma de México, Morelia, Mexico
²Instituto de Ecología, A.C., Xalapa, México
³Institut de Ciència i Tecnologia Ambientals, Universitat Autònoma de Barcelona, Barcelona, Spain
⁴Institució Catalana de Recerca i Estudis Avançats (ICREA), Universitat Autònoma de Barcelona, Barcelona, Spain
⁵Centro de Investigaciones Históricas y Sociales, Universidad Autónoma de Campeche, Campeche, México

Corresponding Author:
Eduardo García-Frapolli, Centro de Investigaciones en Ecosistemas, Universidad Nacional Autónoma de México, Antigua Carretera a Patzcuaro 8701, Colonia Ex-Hacienda de San José de la Huerta 58190, Morelia, Michoacán, Mexico.
Email: garcia.frapolli@gmail.com
creating a portfolio of conservation projects has allowed the ejido to diversify their sources of income in addition to creating an important number of jobs related to conservation. We discuss the implications of the community experiences with different conservation schemes, the market-based instruments that can trigger community conservation, and the importance of giving local communities the opportunity to define their own conservation paths.

Keywords
community conservation, market-based instruments, carbon sequestration, payment for ecosystem services, Mexico

Over the past 50 years, forest conservation actions in Mexico have experienced different phases and approaches. Broadly speaking, during the decades of 1960 and 1970, state-coordinated efforts sought to keep local people’s livelihood activities out of the conservation territories (Simonian, 1995). This strict protectionist approach was often enforced through authoritarian practices that criminalized local land-use practices and created numerous social conflicts (García-Frapolli, Ramos-Fernández, Galicia, & Serrano, 2009). Next, around the decade of 1990, came the influence of the sustainable development trend with the implementation of the “integrated conservation and development projects” (Rico García-Amado, Ruiz Pérez, & Barrasa García, 2013). This approach gained wide acceptance because it offered win–win solutions (i.e., biodiversity conservation and local development; Christensen, 2004). However, less than a decade later, the success of the integrated conservation and development projects proved to be elusive. Many scholars and practitioners were disillusioned with the results of overly ambitious projects that were based on “weak assumptions and little evidence” (Christensen, 2004, p. 18). As a last trend in this evolution of forest conservation, in recent years, locally based conservation initiatives have been promoted by the government and nongovernmental organizations (NGOs; Porter-Bolland, Ruiz-Mallén, Camacho-Benavides, & McCandless, 2013). According to Pathak, Bhatt, Balasinorwala, Kothari, and Borrini-Feyerabend (2004), these initiatives differ from the above-mentioned ones because they involve communities culturally linked to ecosystems and tend to favor conservation, even though conservation may not be the primary objective, because they are the major decision makers, and many times hold institutions that help enforce natural resources’ management regulations.

The idea that—throughout history, but also nowadays—indigenous and local communities play a role in biodiversity conservation has recently received attention by conservation organizations and in the international political scenario (Martin, Campo, Camacho, Sauceda, & Juan, 2010). For example, since 2004, the International Union for Conservation of Nature (IUCN) has incorporated
Indigenous Peoples’ and Community Conserved Territories and Areas (ICCAs) as a distinct governance category in its protected area matrix. Similarly, the United Nations Environment Program’s World Conservation Monitoring Center has initiated a global voluntary registry of ICCAs (cf. Martin et al., 2010). Mexico, in tune with the international trend began a certification process for areas voluntarily set aside for conservation by communities. Since 2008, such community reserves (together with private reserves or areas designated for conservation by private owners) have received legal recognition as protected areas under the category of Voluntary Areas Devoted to Conservation (ADVC). The aforementioned national and international programs aim at legitimizing local conservation initiatives while offering an alternative to the formal systems of state-managed or otherwise externally driven protected areas (Robson, 2007). However, in practice, these models do not necessarily contribute to advance an alternative conservation paradigm based on the maintenance of locally meaningful multifunctional landscapes (Reyes-Garcia et al., 2013).

Beside collective environmental management and long-standing community practices that maintain forested areas with minimal human impact, exogenous incentives such as programs like payment for environmental services (PES) are fostering the community conservation movement in Mexico (Bray, Duran, Anta, Martin, & Mondragon, 2008). For more than a decade, ICCAs in Mexico have been linked to PES, most often to finance conservation activities but in other occasions to simply expand the community areas devoted to conservation. The PES program in Mexico is based on the idea that direct incentives are more cost-effective than traditional and indirect conservation policy tools in reaching biodiversity or deforestation targets (Ferraro & Kiss, 2002). Thus, PES programs are designed to provide compensation costs for the services that ecosystems supply to society, including carbon sequestration, biodiversity, scenic beauty, and watershed protection, among others (Montagnini & Finney, 2011). The core concept of this approach is that external beneficiaries pay local landowners (in a direct, contractual, and conditioned manner) for the adoption of practices that secure or enhance ecosystem services through conservation or restoration. This instrument is a component of a relatively new conservation paradigm that recognizes the need to bridge the interests of landowners and outsiders (Wunder, 2006).

Although initiatives driven by private and NGOs exist, the most important PES programs in Mexico are government financed (Rico García-Amado, Ruiz Pérez, Reyes Escutia, Barrasa García, & Contreras Mejia, 2011). In a decade, the program has financed more than US$300 million and covered more than 2.3 million ha. At the beginning in 2003, the program covered hydrological, carbon sequestration, biodiversity, and agro-forestry services. By 2010, only biodiversity and hydrological services projects are financed.

The complexity of implementing this instrument is evidenced by the case of carbon sequestration. When creating the carbon sequestration PES program, the
Mexican government “had an interest in supporting carbon sequestration projects, which may potentially become sources of tradable Certified Emission Reductions after the 5 years of government funding ended” (Corbera, 2011, p. 60). However, more than 85% of the projects were rejected during the period 2004–2006 because they failed to meet eligibility criteria. To date, only a few projects have been able to trade carbon offsets in the voluntary market (see, for instance, Charchalac Santay, 2012; Corbera, Soberanis, & Brown, 2009).

Although it was developed to primarily address deforestation, the current PES program has also adopted a pro-poor rationale. Narloch, Drucker, and Pascual (2011) argue that fairness in PES is more complex than the poor having access to or benefitting from a particular scheme. This win–win double rationale is based on the evidence that the rural poor are disproportionally the largest group of managers of ecosystems that produce ecosystem services (Mcafee & Shapiro, 2010).

The fact that local communities are simultaneously putting into practice several instruments for conservation (i.e., ICCAs and PES) has generated interesting dynamics among conservation practitioners and financers. For instance, an approach that bundles or layers biodiversity with one or more additional ecosystem services has become a recent theme of discussion (Montagnini & Finney, 2011). An example of this bundling is the PES scheme implemented in Coahuila, which water consumers have provided voluntary payments for watershed management actions in the upstream mountains since 2002 while simultaneously paying for the protection of upstream bird habitats (Wunder & Wertz-Kanounnikoff, 2009). According to Ingram (2012), this approach could jointly promote economic adaptation strategies for the sellers of ecosystem services by creating financial incentives that promote more diverse approaches for protecting ecosystems functions, rather than emphasizing specialization in one conservation approach that focuses on one unique ecological attribute. With this in mind, conservation practitioners are rapidly incorporating projects that deliver biodiversity plus the benefits of other ecosystem services (Wendland et al., 2010). However, even if these dynamics are generating interesting opportunities for conservation diversification, we have to be conscious of the context in which most of these programs operate, that is, the ideology of market environmentalism, which find the pricing of nature’s services, the assignation of property rights and the expansion of commodity markets, the way to solve the world’s development and environmental problems (Arsel & Büscher, 2012). Furthermore, because setting up markets for environmental services usually entail high transaction costs (Muradian, 2013), most cases in which PES operate do not entail a market relation but are actually projects that are heavily financed by agencies and governments.

The main purpose of this article is to describe how a local conservation initiative grounded on the potential to trade carbon offsets in the voluntary market has triggered a multipurpose community conservation strategy. Our case study
refers to the ejido\(^1\) of Felipe Carrillo Puerto (FCP), in Quintana Roo, Mexico. The article describes how a group of ejidatarios,\(^2\) in conjunction with an NGO, has promoted conservation initiatives in the area. These projects include the creation of two ICCAs, an ecotourism center, two governmental financed PES projects, community-based research, and a proactive mechanism for long-term financial sustainability of their conservation strategy. We address the role that the market-logic has had in fostering these initiatives.

**The Ejido of FCP**

FCP is an administrative entity that simultaneously contains several political unities and identities. It is a municipality with 13,806 km\(^2\) of extension, which represents 32% of the state of Quintana Roo’s total surface. It is also a city with more than 25,000 inhabitants (Instituto Nacional de Estadística y Geografía, 2011) as well as the administrative urban district of the municipality with the same name. Finally, FCP is also an ejido with 47,223 ha and 227 ejidatarios. All of these political unities are located in the central-western part of the state of Quintana Roo in the Yucatan Peninsula with more than 20 km bordering the Sian Ka’an Biosphere Reserve (SKBR; Figure 1). This area, known “the Mayan Zone,” was virtually uninhabited for centuries after the collapse of the ancient Mayan civilization but was resettled by Mayan refugees fleeing religious taxes

![Ejido and conservation areas Felipe Carrillo Puerto (FCP)](image)

**Figure 1.** Location map of the ejido of Felipe Carrillo Puerto in Quintana Roo, Mexico.
and expanding sugar plantations in Yucatan in the mid-19th century (Bray, Ellis, Armijo-Canto, & Beck, 2004). During the 1920s, people from different parts of the country came to the area because of a boom in the extraction of gum (the sap of the *chicozapote* tree [*Manilkara zapota*]). At present, the area is mainly inhabited by Mayans practicing slash and burn agriculture (*milpa* farming) and forest management through community forest enterprises (Ellis & Porter-Bolland, 2008).

The ejido of FCP was formed in 1940 as a Forest Reserve. The ejido is composed of Yucatec Mayan families that retain some of their traditional cultural characteristics, such as language, religious ceremonies related to productive activities, and a traditional appropriation of natural resources. Similar to most ejidos in Mexico (see Tellez, 1993), land in the FCP is divided into three main uses: (a) human settlement, (b) common-use lands (including forests, water sources, and other resources) with collective rules for access and use, and (c) parceled land for individual exploitation. The assembly regulates the use, management, access, and conservation of commonly used lands.

Historically, the main economic activities implemented in FCP have been associated with agro-forestry management. From the establishment of the ejido until the 1960s, selective logging of mahogany (*Swietenia macrophylla*) and Spanish cedar (*Cedrela odorata*) was prominent. Subsequently, the economic importance of non-timber forest products, such as sabal palm (*Sabal mexicana*), and the lack of additional cedar and mahogany led ejidatarios to establish a large common property forest enterprise dedicated to the extraction of gum from the *chicozapote* tree (*Manilkara zapota*; Bray et al., 2004). By the mid-1980s, the ejido strengthened their organizational structures and management practices through their participation in the Forestry Pilot Plan (see Taylor & Zabin, 2000). Currently, with 25,000 ha of permanent forest areas, community forestry is still the most important economic activity in the ejido.

In 2005, FCP and the local NGO, U’yo’olché (Tree sprout in Yucatec Mayan), developed a zoning plan for designating permitted uses of land for the four main areas of the ejido: urban, agriculture, forestry, and conservation (U’yo’olché, 2005). This local NGO has been working on the area for more than a decade executing programs designed for the economic development of local communities with the conservation of their natural resources and local culture.

As a result of this process, FCP designated two ICCAs. One of those areas, known as Much Kanan K’aa (together taking care of the forest) with 1,230 ha of extension, was the first ADVC in the Yucatan Peninsula certified by the National Commission of Natural Protected Areas (CONANP). This area is subject to active intervention for conservation purposes. The other conserved area, with an extension of 10,000 ha, adjoins the SKBR and its main objective is to preserve its natural condition.
Methods

We carried out research within the framework of a research project on community-based conservation that was implemented between 2009 and 2011 (see Reyes-Garcia et al., 2013). For this particular research, we applied observational research (Newing, 2011) and used a case study design (Denscombe, 2010) because it helped with building in-depth descriptions and understanding of the different conservation schemes implemented by ejidatarios in FCP. The FCP General Assembly provided written consent for the study, and all individual participants (around 30) provided informed oral consent. We worked with this group of ejidatarios, including men and women, because it is they who are directly associated with the conservation projects (carbon sequestration, ecotourism, and PES projects), either receiving a salary or as volunteers. According to FCP agreements, any family member of the ejidatarios can participate in these projects. However, as the ejido overlaps with the administrative urban district of the municipality, the economic activity of a significant number of the 227 ejidatarios currently lies in the service sector. We collected data with the following methods: (a) semistructured interviews, (b) a timeline focus group, (c) a group interview, and (d) participant observation.

Semistructured Interviews

To gather basic information about the history of the conservation initiatives (i.e., events and actors involved), we conducted 13 semistructured interviews with key informants involved in management decision making of the conservation initiatives: 10 ejidatarios, 2 local authorities, and the former director of the local NGO U’yo’olché. We used Atlas.ti (6.2) to inductively and qualitatively analyze data from interviews through annotations and no predefined codes (Newing, 2011). We sorted interviewees’ answers into two main categories: (a) carbon sequestration project and (b) complementary conservation initiatives (i.e., ICCA, ecotourism, and reforestation). We used this information not only to create the narrative of each conservation initiative but also to prepare the timeline focus group exercise and the group interview.

Timeline Focus Group

The timeline is a qualitative research instrument that attempts to capture events, actors, relationships, mechanisms, and spaces for participation that—in our case—influenced in the decisions that resulted in the implementation of a project (Adriansen, 2012). This instrument provided with information on the temporality for the conservation events in FCP, thus delivering a local historical context that was related and discussed in the words and vocabulary of the ejidatarios who experienced the events. We chose to implement this instrument through a focus group, which is a form of qualitative group interview, to obtain
information that reflected group agreement, rather than independent statements that we already had from the semistructured interviews.

The timeline focus group was carried out in the ejidos’ office with the active participation of nine ejidatarios working in conservation initiatives. Ejidatarios were openly invited to attend to the focus group. The interview had three different objectives: (a) to obtain a list of dates and important events that originated the creation of the local conservation initiatives, (b) to identify the people involved in the conservation initiatives and the way in which they have participated over time, and (c) to encourage participants to think about the meaning that participation in their conservation strategy has had for them.

**Group Interview**

We carried out one group interview with five ejidatarios in charge of community conservation initiatives and with the former director of the NGO U’yo’olché. Attendees were selected purposely because of their knowledge, experience, and expertise in the conservation initiatives. This interview, which took place in March 2012, was designed to achieve two objectives. First, to fill in information gaps on community conservation projects. We decided to carry out this interview because this information was not obtained with the semistructured interviews and the focus group. Questions were asked in the open to all attendees. Second, to validate the previously gathered information around the history of community conservation in FCP. On the basis of the information gathered through the timeline and participant observation, we provided a description of how community conservation has occurred in FCP and attendees corrected and complemented our interpretation.

**Participant Observation**

Participant observation, which is an “unstructured interactive method for studying people as they go about their daily routines and activities” (Newing, 2011, p. 85), refers to a form of qualitative research methodology in which the researcher observes, describes, and interacts with local actors in different public scenarios and assumes a role in the social situation under observation (Taylor & Bodgan, 1998). In this research, we carried out participant observation to enrich the information gathered through other methodological instruments; we gathered information from trivial conversations, perceptions, reflections, and feelings during fieldwork. This process allowed us to better understand the relationship between the local people and their environment, and the technique was implemented from the outset and throughout all of the processes of this research.
Community Conservation in FCP: A Mutually Supporting Scheme

Ejidatarios from FCP identified as important one process and one event during the 1980s that drove them to take action on conservation in the ejido’s lands (see Figure 2). The process had to do with the impact of the rapid and uncontrolled growth of tourism due to the development of Cancun. According to the informants, observing the consequences of the pressures generated by tourism development on the forest and the overexploitation of natural resources in the area made them realize that this model was not the one that they desired for their land. For instance, the number of hotel rooms in the area increased from approximately 7,000 in 1980 to 85,000 in 2014. This has led to massive migration, national and regional, for employment reasons.

The event was the establishment of the SKBR, with its powerful discourse on conservation and the significant flow of money that was delivered to NGOs for conservation projects. Both the ongoing tourism development process and the establishment of the SKBR aided the ejidatarios from FCP in building an awareness of the importance of conserving and sustainably managing their natural resources. It also set the groundwork for specific conservation initiatives. Figure 2 indicates all processes, in action and terminated, as well as events recognized by ejidatarios in the focus group.

Figure 2. Timeline of important events and processes in Felipe Carrillo Puerto.
The Carbon Sequestration Pilot Project

The FCP carbon sequestration pilot project (FCP-CSPP) was established as a development phase in 2006, with the aim to generate an alternative method that would finance forest conservation activities by exploring carbon markets. Particularly, this effort sought to avoid deforestation, restore the forests, and identify ways to improve local livelihoods by developing new sources of income and employment. The goal has been to be able to sell carbon bonds from reforestation and other activities in the voluntary markets.

The project has been remarkable in the sense of stimulating processes and initiatives for community conservation in the ejido. In FCP, all conservation strategies have been built around this project. The idea of establishing a CSPP came directly from the ejido’s commissioner of communal land. During a conference organized by the National Forestry Commission (CONAFOR) in 2005, the commissioner heard about the possibility of ejidos for conserving their forests through the selling of carbon bonds. To analyze the viability of such an enterprise, the commissioner contacted the NGO U’yö’olché, the group developing the zoning plan of the ejido at the time, which also supported the idea of establishing a CSPP, as one ejidatario explained: “It was promoted by the Director of U’yö’olché, and then 20 ejidatarios talked to him, we presented it in the ejido assembly and it got approved” (71-year-old ejidatario of FCP, December 2009).

Since then, the implementation of the FCP-CSPP has followed a long process of networking involving numerous organizations. The first challenge was to explain the concept of carbon sequestration and its importance to climate change to the rest of the ejidatarios, which also implied explaining the concept of climate change as well as its main drivers. U’yö’olché provided this information to the ejidatarios with the assistance of the academic sector through participative workshops. During these workshops, the ejido explored the feasibility of a carbon sequestration PES scheme (which was one of the possibilities of the Mexican PES federal program at the time) including the delimitation of the area where such a project could be developed. The local authority at that time claimed that it was a complex process: “The carbon sequestration project took us a long time, because no one understood, people were asking if we were going to burn coal, even for myself was hard to understand it” (55-year-old ejidatario of FCP, January 2010).

Once the assembly approved the project, a group of ejidatarios and U’yö’olché began the planning process. One of the first activities that took place was a feasibility study, funded by CONAFOR, followed by the demarcation of possible areas where the FCP-CSPP could be developed. The process took advantage of the fact that FCP zoning plan was taking place at the time, and it was agreed that the area assigned to the CSPP should be located inside one of the ADVCs, specifically the area of the forest that was degraded due to
anthropogenic activities (see Zone 2 in Figure 1). As the director of U’yo’olché told us (April 2010),

We presented a set of criteria based on the workshops. It was clear to the ejidatarios that carbon sequestration could not be done in the mature forest, but in regrowth areas of the forest. Based on that issue, we brought the ejidos’ map and made two proposals in the agricultural area, and one of those was approved.

FCP and U’yo’olché also used CONAFOR’s funds in 2007 to train technicians within the ejido who have been actively involved in reforestation activities. The plants used for this purpose are native and come from a plant-tree nursery that has a long history in the ejido tied to the community forestry enterprise. In conjunction with U’yo’olché and the academic sector, locally trained technicians have used remote sensing and on-the-ground surveys to construct an allometric model for estimating the amount of carbon stored in the biomass across the different types of ecosystems found in the reserve (medium semi-evergreen forest and wetlands).

Despite the fact that the PES federal program completely discarded the possibility of financing carbon sequestration projects, the ejido assembly decided that the FCP-CSPP had to move forward and decided to enter the voluntary market. The project has been developed in accordance with the Plan Vivo Standard methodology (www.planvivo.org), and validation to this standard is underway. In 2011, certifiers evaluated the FCP-CSPP and the main recommendations aimed at technical issues such as the baseline estimation of how many carbon credits would be generated. Additional funding is still required to correct the technical issues mentioned in the report, and FCP is evaluating the possibility of obtaining this funding from CONAFOR.

As a pilot project, the FCP-CSPP has developed methodologies and generated useful knowledge for the development of other forest carbon projects in the region (Global Environment Facility-Small Grants Programme [GEF-SGP], 2012). As the director of U’yo’olché told us (April 2010) during the interview,

We also see the carbon sequestration project as a laboratory. In here, people from other communities come, get trained and can apply what they learned in their ejidos. In fact, people from neighboring ejidos have come specifically to see and know about the project. ( . . . ) This year we will try to obtain the certification. It would greatly strengthen us because it would be something unique in the Peninsula and it would have a huge impact. It would generate pride. It strengthens the identity.

At present, the FCP-CSPP is attempting to capitalize a portion of their project with the tourist sector from the Riviera Maya. According to project managers, they prefer to trade carbon offsets bonds to hotels in the Riviera Maya.
because this compensation would occur in the same location where the degradation is occurring.

**Community Conservation Strategies Founded After the FCP-CSPP**

Due to the interest of the ejidatarios in the FCP-CSPP, other conservation initiatives have arisen with the aim of financing or sustaining a portion of the project. Eventually, a subset of these initiatives has sufficiently matured. Although the project for selling carbon offset is not yet formally functioning, it has nevertheless become the driving force for other conservation initiatives that we detail next.

**Much Kanan K’aax.** The Much Kanan K’aax, located in the southern end of the ejido, is one of two conservation areas designated during the zoning plan of FCP in 2005 (see Figure 3). The reserve has an extension of 1,230 ha consisting of semi-evergreen forest and adjoins four lagoons of the Chan Cah system (Ejido de Felipe Carrillo Puerto, 2009). The reserve was created in part because certain organizations, such as the United Nations Development Program (UNDP), placed conditions on the funding to the FCP-CSPP related to the existence of a reserve. In fact, for Plan Vivo, the reserve could address the demand for avoidance of emissions credits. This came out in some interviews:

> At first, we thought a place for carbon sequestration, not a conservation reserve, but then came the idea that if we do not care for the forest there is no point, and the

![Figure 3. Map of the area devoted voluntarily to conservation Much Kanan K’aax, in the ejido Felipe Carrillo Puerto in Quintana Roo, Mexico.](image)
person from UNDP told us that it had to be a conserved area in order to have funding. Then, the ejidal assembly decided to decree the area as protected. (71-year-old ejidatario of FCP, December 2009)

Once the reserve was created, community members were trained as monitors. Currently, local people monitor the water and biodiversity, including plants and animals, of the area. The community established 16 permanent sampling sites for vegetation; and for fauna, cameras and other devices are in use. Three major projects are currently taking place in Much Kanan K’aax: (a) a reforestation project that is a component of the FCP-CSPP, in which 250 ha have been reforested with local species such as *Ceiba petandra*, *Pseudobombax ellipticum*, *Dendropanax arboreus*, and *Brosimun alicastrum*; (b) an ecotourism center known as Sijil Noh Ha; and (c) two PES projects financed by the government.

**Sijil Noh Ha.** The Sijil Noh Ha is an ecotourism project located inside the community reserve of Much Kanan K’aax (see Figure 3). Most of the area allotted to the ecotourism project is covered by semi-evergreen forest, but the main attractions are the lagoons and sinkholes. The activities developed in the ecotourism center include kayaking, boat tours, swimming, interpretative hiking, scientific tourism, and environmental education, including reforestation activities and the development of eco-technologies. Many seminars related to the FCP-CSPP take place at this center. For instance, during the COP-16 that took place in Cancun in 2011, journalists, students, NGOs, international civil servants, and officials visited the community reserve and the tourism center to learn about the experience of FCP-CSPP.

Although the center does not generate a significant amount of money, it is important to the ejido in many respects. First, it has demonstrated that tourism activities can be developed without degrading the forest. Second, it has contributed to equip the ejido with technology such as global positioning system, measurement instruments, fire-extinguishing pumps, computers, handheld transceivers, and tools in general. Third, it has created a transverse environmental education program among the community reserve, the ecotourism center, the eco-technologies development, and the FCP-CSPP, which is implemented at local schools from the city of FCP. Finally, the center employs two persons from the ejido during the week and three to four persons during the weekends on a full-time basis. Similar to other projects, Sijil Noh Ha was conceived to support the FCP-CSPP, but it has become one of the most important projects; although it does not generate significant amounts of money, it does generate in kind resources and labor.

**Felipe Carrillo Puerto projects of PES.** The Much Kanan K’aax’s forest areas are classified as conserved or degraded. As shown previously, the degraded areas
are involved in reforestation activities, and the conserved areas have been involved in two PES projects, one hydrological and one for biodiversity. The hydrological PES, implemented between 2008 and 2012, had a total of 694 ha of conserved forest under the program and represented an annual income of approximately US$22,000 for the ejido. According to the PES guidelines, monitoring and maintenance of the conserved area must be performed year-round, which represents employment for five or six persons from the ejido. Similar to Sijil Noh Ha, the equipment acquired for this project is shared with the other conservation projects. The PES for biodiversity, with a total of 2000 ha eligible for receiving the payment, started in 2012 and will last until 2016. During the whole period, the project will receive approximately US$309,000, of which US$17,000 will be used to technical assistance and the rest will be given to the ejido (US$58,400 annually).

According to interviewees, the project objectives are twofold. One aim was to obtain funds for financing a portion of the FCP-CSPP. The other aim was to illustrate to the FCP’s ejidatarios how a PES program functions and can generate funds, which has been the key to maintaining local support for the FCP-CSPP. In addition, because overlap exists among the reserve area, the PES projects, and the FCP-CSPP, the community conservation strategy is an empirical example of layering in which different revenues are associated with different environmental services.

Financing the Conservation Scheme in the Ejido of FCP

In most ejidos, the earnings from group projects are distributed in equal shares among the ejidatarios for free use, which often jeopardizes the future of projects due to a lack of reinvestment. In FCP, assembly decisions on the distribution and reinvestment of earnings obtained through conservation activities have created an interesting financial scheme for the ejido’s conservation projects, as well as for ejidatarios.

These projects, besides sharing some objectives, are sharing also some of the earnings or are cross-subsidizing some of the conservation activities, as one of the interviewees mentioned:

Before the ejidal commissioner at the time had finished his legal mandate, we saw with the Director of U’yo’olché the possibility to make the ecotourism initiative grow. Before that, we got around US$105,000 from UNDP for a 5 year project, which will start (month and year). Annually, they are going to give us US$21,000 for reforestation and maintenance, to continue reforesting the conserved area of 1200 ha. But that is with the idea of taking care of the forest very strictly, and for the functioning of the carbon sequestration project. (55-year-old ejidatario of FCP, January 2010)
A percentage of all money earned from the conservation projects goes to a social welfare fund that is primarily used for medical expenses of ejidatarios, especially the elders. The ejidatarios are granted up to US$385 annually for medical expenses. In particular cases, the allocation can be higher; the beneficiaries only need to present prescriptions to the administrative office of FCP. For instance, of the approximately US$22,154 obtained yearly through the hydrological PES project, 14% went to the technician’s salary (US$3,154), 26% to the social welfare fund (US$5,692), and 60% to the project itself (US$13,308), which also meant financing the FCP-CSPP due to all of the shared activities. Similar percentages are noted in the other conservation projects.

Creating a multipurpose community conservation scheme has allowed the ejido to create a web of funds and activities that are so interrelated that it decreases their dependence on one project. The ejido activities have diversified the income and employment sources, allowing certain ejidatarios to work with U’yo’olché in the CSP without the necessity of becoming employed by it because their economic support comes from other sources. As the NGO representative highlighted, these projects have contributed to the local economy:

A lot of employment has been generated, about 70 temporary jobs, mainly in forest maintenance, wildfire prevention measures such as firebreaks, monitoring. Like I said before, it is a management vision, but also for scientific purposes. Many scholar groups have come and ejidatarios get paid for explaining the project to the people. (Director of the NGO U’yo’olché, April 2010)

Despite the funding stream created by FCP, the ejido has demonstrated to have a strong dependence on funds coming from government organizations and NGOs. After 8 years of implementing community conservation, not a single project as it is nowadays can be financially sustainable by itself. However, although it is difficult to establish an average time for the consolidation of community conservation projects, perhaps the lapse of time of most FCP’s projects has not been very long.

Discussion

This case study reveals several aspects that improve our understanding of the potentialities and complexities of community conservation. We grouped the discussion around the different phases and approaches that FCP and Mexico have experienced toward forest conservation, recognizing that these trends are not exclusive of this community or Mexico but have been fostered globally (Arsel & Büscher, 2012).

As described, during the past two decades, either by their own initiative or as external participants, FCP has used several management approaches to forest
conservation, which have generated dynamics such as receiving multiple funds or payments for services generated on a single area of land. This experimentation has forced a detailed examination of the advantages and disadvantages of each conservation scheme. Since 1980, FCP experienced with the establishment of the SKBR, a typical top-down exclusionary approach to conservation. Despite the fact that part of their land is inside the SKBR, local people were not consulted nor included in the decision-making process for the establishment and management of the area (Brenner, 2010). This has been common currency in the implementation of protected areas in Mexico (García-Frapolli et al., 2009) and elsewhere (Chapin, 2004). In many cases, local people tend to be uninformed, to the point there have been cases where locals have learned about their land been declared as a protected area after a year into the process (Haenn, 1999).

Another conservation scheme experienced by the FCP was the establishment of two ICCAs, the one adjacent to the SKBR and Much Kanan K’ax, in which practically all community conservation activities are carried out. This scheme of local management has been important at least in two respects. First, it has generated a positive synergy with large NGOs and institutions working in the area, such as CONANP, UNDP, GEF, and others. The synergy has resulted in project financing, consulting, and training, among others. It has been documented (Chapin, 2004) that communities that work in accordance with the mainstream model of conservation are recurring beneficiaries of national and international funds for development of conservation programs, which has been clearly the case for FCP. The second aspect is related to developing and strengthening local capacities for conservation action. Local people from FCP have developed these capacities in many fields, from management of conservation projects to the acquisition of technical skills for carrying out vegetation sampling, techniques for propagating species, geo-referencing, carbon measurements, and many others. In addition to contributing their workforce and knowledge to carry out conservation activities, it has been documented (Elbroch et al., 2011) that the active involvement of local communities in conservation initiatives is an efficient and lasting form of conserving forests and creating consciousness.

Probably one of the most noticeable aspects of this community conservation experience is the evidence that local communities can generate initiatives to manage and conserve their natural resources while maintaining at some level the decision-making process at the local scale. This situation contrasts with many other cases in which local communities manage their natural resources primarily according to government programs, thus undervaluing their local initiatives. This has been the case in many communities that have adopted production specialization programs (Barkin, 1987) or have uncritically embraced programs such as PES (Mcafee & Shapiro, 2010). Of course, in the case of FCP, many external agents have supported local conservation effort, which has been key to obtaining positive results for many of the initiatives.
Using the specific outcomes of their local capacities for deciding their own conservation path, the ejido of FCP has created an ecotourism center and has declared two different ICCAs, one of which was the first area certified by CONANP in the Yucatan Peninsula. Additionally, they have established specific actions to avoid deforestation, to prevent fires, and to allow carbon capture in one of the ICCAs. Simultaneously, they have initiated different capacity-building activities in which, instead of hiring outside experts, community members have been trained to carry out some of the monitoring and evaluation practices, acquiring important skills for this. This outcome has been positive for the enhancement of the local capacities to understand climate change, forest carbon monitoring, and other sustainable management issues and methodologies (GEF-SGP, 2012).

However, we have to highlight the fact that the local discourse and actions on conservation in FCP, perhaps because of their close relation with mainstream conservation organizations, reflect more the globalized conservation narratives than the local Maya narratives of the value of their forest (Faust, 2001). This situation has been already analyzed (Reyes-Garcia et al., 2013). According to these findings, community-based initiatives are modifying natural resources management strategies and are conforming to the biodiversity conservation paradigm that emphasizes restricted use of and access to resources. External actors, in this sense, have become the “social carriers” of ideas and values that establish uniformity in environmental and conservation concepts (Schelhas & Pfeffer, 2009).

Another conservation scheme experienced by FCP is related to market-based instruments. Although the market-based initiative of the carbon sequestration project in FCP has not been completely materialized, it has become one of the driving forces for the local conservation strategy in the ejido. It is clear that in the beginning the ejido was mostly interested in incorporating their project into the federal PES program. However, at that moment, the federal government did not move forward in the consolidation of the scheme for carbon sequestration, and thus, ejidatarios decided to experiment with the voluntary market. In this sense, according to locals, relying on the voluntary market instead of the federal government could be a pathway to reducing the dependency on the constant rule changes that occur in government policies fostering a relation with established markets. As well, moving from governmental policies to the market logic offers the possibility of maintaining their project over the long term because as soon as the ejido gains the certification, they may be able to retain management standards, periodically renewing the certification, to sell carbon offsets for a longer period of time, instead of being constrained to the 5-year period that the Mexican PES stipulates. In addition, it opens the possibility of negotiating the sale of carbon offsets with more locally contextualized economic agents, such as the tourist sector in the Riviera Maya. As mentioned previously, contacts have existed between FCP and certain hotels in the area for establishing contracts in
which hotels can pay to compensate their emissions and those from their guests, and at the same time, the hotels can offer their customers the opportunity of getting to know the on-site conservation project with which the carbon emissions are neutralized.

As in other local conservation initiatives (Luzar & Diagne, 1999), approaching the market-logic has promoted different natural resources management practices of ejidatarios toward conservation. This change could be due to the fact that some locals are convinced that conservation and sound management of their forests can have a monetary value in the market, and therefore, an economic reward is easily recognizable. In part, this is how the PES program operates in Mexico, by rewarding ejidatarios for their performance, as well as paying them directly for carrying out some of the conservation activities. However, these positive behavioral attitudes have to be interpreted with caution at least for three reasons. First, because when dealing with economic rewards, the interaction between agents (users and providers) is not actually based on a transaction of a particular ecosystem service, which is the main argument of the PES program. We can argue that the interaction is not relying on the market per se, but rather on the presence of a socially recognized management scheme (Muradian, 2013). Second, because not all people from the community are actually receiving the economic rewards. As other studies have demonstrated (Agarwal, 2001), participation in natural resource management is often relying on particular groups, such as literate men holding land rights and involved in local organizations. In fact, from our observation in the area, we know that information given by organizations at FCP about conservation projects and opportunities are usually transmitted in official meetings, where young people and women are legally excluded. In this sense, we need to challenge the idea that these particular groups represent the whole community. Third, because as it has been widely discussed (Kinzig et al., 2011; Muradian & Rival, 2012; Roth & Dressler, 2012; TEEB, 2011), the scope of applicability of market-based instruments has not been observed to actually occur, although generalizations about their effectiveness can be found in influential reports such as *The Economics of Ecosystems and Biodiversity* (2009) or *Towards a Green Economy* (United Nations Environment Programme, 2011).

While market-based instruments may be creating positive attitudes, it cannot be said that this change of attitude is due to the price incentive, as it is a combination of the incentive with social agreements that is causing it. Advocates of these instruments argue that market-based policies have advantages over command-and-control approaches in terms of additional cost-effectiveness and provision of dynamic incentives for allocating capital (United Nations Environment Programme, 2011). However, this has not been the case for the federal PES program, as it has low additionality and conditionality (Rico García-Amado et al., 2011).
As described, although market-based instruments may have been driven decisions toward FCP conservation initiatives, locals have not actually interacted with the market yet (i.e., the FCP-CSPP is in its second validation phase, the PES projects are based on political will and subsidies rather than on market-efficiency principles, contacts with nearby hotels have not actually translated into contracts, and the ecotourism initiative has not greatly benefited from the nearby world-known tourist industry). In this sense, we can argue that FCP conservation initiatives are expectations grounded on a market-based discourse, while the significant flow of money has not come from the market but from government programs (i.e., CONAFOR) and non-governmental agencies (i.e., UNDP, GEF). Therefore, instead of targeting cost-effectiveness criteria, conservation programs need to be designed with a broader vision with respect to social norms and preferences built around local communities’ fairness principles (Narloch et al., 2011). They also need to be designed to be flexible and compatible with different programs so that communities can combine different programs and diversify their income sources, making them less dependent and more resilient. Our findings indicate that PES and other conservation programs’ income are identifying fairness principles in the community, which most probably vary greatly from other communities.

Conclusion

Over the past decades, global conservation discourses and actions have moved from the establishment of protected areas, to the implementation of development projects with orientation toward communities and participatory experiments. Nowadays, this trend has shift toward an increased presence of market-oriented conservation governance. What these approaches have had in common is their weak arguments about win–win solutions (i.e., biodiversity conservation, efficiency in resource allocation, improving local livelihoods, etc.). However, as this research depicts, in practice what we see at the local scale is that conservation is usually implemented through a wide variety of instruments and conceptual models, moving away from the logic of the existence of one ideal managerial approach. When combining approaches, scales, instruments, and tools, risks are diversified and dependencies on specialization are diminished due to the multiple possibilities for conservation. This situation has allowed the ejido of FCP to create a portfolio of conservation projects for diversifying their sources of income in addition to creating an important number of jobs related to conservation. This case study gives on-ground confirmation that local communities in developing countries can generate and sustain alternative approaches to managing and conserving natural resources while maintaining decision-making processes at the local scale.
Declaration of conflicting interest

The authors received no financial support for the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by Programa de Apoyo a Proyectos de Investigación e Innovación Tecnológica–Universidad Nacional Autónoma de México (PAPIIT IN301910), by Fondo de Cooperación Internacional en Ciencia y Tecnología UE-México (FONCICYT 94395) and Programa de Cooperación Inter-Universitaria e Investigación Científica, Ministerio de Asuntos Exteriores y Cooperación (A/023406/09 and A/030044/10).

Notes

1. The ejido is a form of land tenure based on common-pool resources resulting from the land redistribution process of the Mexican revolution.
2. Ejidatarios are people with vested land tenure rights in an ejido.
3. In Spanish, the word used for carbon is carbono and for coal is carbon.

References


**Author Biographies**

**Octavio Tolentino** received a bachelor’s degree in Environmental Sciences from the National Autonomous University of Mexico (UNAM). He then studied a specialization in Environmental and Ecological Economics also at UNAM, and now he is currently studying MSc in Ecological Economics at the University of Edinburgh.

**Eduardo García-Frapolli** received a PhD in Environmental Sciences: Area of Ecological Economics from the Autonomous University of Barcelona. He works as a researcher at the Ecosystems Research Centre of the National Autonomous University of Mexico coordinating the Laboratory in Ecological Economics. His main research interests are the social aspects and policies of
nature conservation and the management of natural resources by indigenous communities.

**Luciana Porter-Bolland** received a PhD at the School of Forest Resources and Conservation of the University of Florida. She works as a researcher at the Instituto de Ecología, A.C. in Xalapa, México. Her research interests relates to aspects of natural resource management in tropical areas with a focus on landscape ecology and conservation.

**Isabel Ruiz-Mallén** received a PhD in Environmental Sciences from the Autonomous University of Barcelona (UAB). She is currently working as a postdoctoral researcher at the Institute of Environmental Science and Technology (ICTA-UAB). Her research interests lie in the acquisition and transmission of traditional ecological knowledge and its role in shaping rural vulnerability and adaptive capacity to environmental changes, community conservation and natural resource management, environmental education, and science communication.

**Victoria Reyes-Garcia** received a PhD in Anthropology from the University of Florida. She is ICREA Professor at the Environmental Science and Technology Institute from the Autonomous University of Barcelona. Her research addresses the benefits generated by local ecological knowledge and the drivers of change of this type of knowledge. She coordinates the Ethnoecology Laboratory, which catalyses projects studying the dynamic relations among people, biota, and environments.

**María-Consuelo Sánchez-Gonzalez** received a PhD in anthropology from the Catholic University of America—Washington, DC. Her research addresses gender issues in rural communities of Southern Mexico. She works as a researcher at the Autonomous University of Campeche.

**María-Elena López-Méndez** received a PhD in environmental sciences from the Autonomous University of Barcelona. Her PhD research project examined the participation of local people in different conservation schemes in Mexico. She is currently teaching at the National School of Higher Education-Campus Morelia from the National Autonomous University of Mexico and at the Intercultural Indigenous University of Michoacan.