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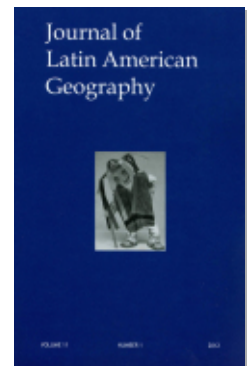
Participatory Action Research Applied to the Management of Natural Areas: The Case Study of Cinquera in El Salvador

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Participatory Action Research Applied to the Management of Natural Areas: The Case Study of Cinquera in El Salvador

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Abstract

How can a Participatory Action Research (PAR) approach promote the co-production of knowledge for the management of natural areas? This article describes the experience of over ten years of implementation of the PAR approach in the management of the Cinquera Natural Area in El Salvador, which is maintained by local communities with an organizational history and attachment to their territory that goes back to the armed conflict in El Salvador in the 1980s. The article exposes the cycle of reflection-research-action-reflection that has been developed in Cinquera, resulting in the co-production of knowledge and its use in specific actions for the protection of the natural area and local sustainable development. We discuss the progress achieved by the community and the lessons learned by applying the PAR research approach.

Keywords: *participatory action research, co-production of knowledge, participatory management of natural areas, sustainable use of forests.*

Resumen

¿Puede el enfoque de Investigación- Acción Participativa (IAP) aplicado a la gestión de áreas naturales promover la co-producción de conocimiento, de tal forma que contribuya a mejorar el manejo participativo de recursos naturales? Este artículo describe la experiencia de más de diez años de aplicación del enfoque IAP al manejo del Área Natural de Cinquera (ANC) en El Salvador, la cual es gestionada por comunidades campesinas locales con una historia de organización y arraigo al territorio que viene desde el conflicto armado de la década de 1980. El artículo expone el círculo de reflexión-investigación-acción-reflexión que se ha desarrollado en Cinquera, dando como

resultados la co-producción de conocimientos y la utilización de dichos conocimientos en acciones concretas para la protección del área natural y el desarrollo sostenible local. En este artículo discutimos los logros alcanzados por la comunidad local y las lecciones aprendidas a través de la aplicación de IAP como enfoque de investigación. Palabras clave: *investigación-acción participativa, co-producción de conocimiento, manejo participativo de áreas naturales, uso sostenible de bosques.*

Introduction

The traditional approach to the protection of natural areas all over the world has always been based on the “traditional model” that favors natural areas “without people” (Meyer 1996). This often gives rise to social and environmental conflicts between the authorities managing natural areas and the indigenous or farming communities inhabiting within or around these areas (Stegeborn 1996, Maikhuri *et al.* 2000, Seeland 2000, McLean and Straede 2003). Nonetheless, many experiences, particularly in developing countries, have shown that the presence of a human settlement is an important factor in the management of natural areas (Perfecto *et al.* 1996, Méndez *et al.* 2007, Walker *et al.* 2002). Alternative models for this management have been revealed, recognizing the capacity and knowledge acquired by local communities through many years of managing their own natural resources (Barton *et al.* 2003, Chazdon and Harvey *et al.* 2009, Chazdon and Peres *et al.* 2009, Guyot 2011).

This approach of participatory management may be strengthened through research, by supporting biodiversity protection tasks carried by the local communities and exploring alternatives for these communities to improve their livelihoods. The purpose of PAR is to generate knowledge to inform action (Savin-Baden and Wimpenny 2007). Therefore, it is important that the knowledge generated through research is shared with and used by the local communities. Thereby, the Participatory Action Research (PAR) approach can be a valuable tool for the participatory management of natural areas, through the “co-production of knowledge”; which is understood as a collaborative endeavor of academic and non-academic actors with the goal that the results of their research will result in the promotion of natural resources management actions (Phol *et al.* 2010).

PAR covers a series of participatory approaches to action-oriented research (Kindon *et al.* 2007). This approach involves researchers and local participant groups working together observing, reflecting and analyzing the local problems and developing actions to improve their livelihoods (Wadsworth 1998 Cahill 2007).

In this paper, we examine a PAR process carried out in the Cinquera Natural Area (CNA) for more than ten years. This process was performed in several stages with different researchers and with the local organization that manages CNA. The local organization in CNA defined a management approach that encourages a local sustainable development paired with biodiversity protection, which is a very innovative approach in the Salvadorian context. We used the participatory management of the CNA as a case study to evaluate the application of PAR to the management of natural areas, emphasizing on its potential for the co-production of knowledge and the use of this knowledge in specific initiatives for the protection of the natural area and local sustainable development. Thanks to this case study, we were able to discuss the achievements and the difficulties that were faced in the application of the PAR-approach to the participatory management of natural areas.

Participatory Action Research

Participatory approaches have been used for several decades by researchers in a variety of disciplines, including education, psychology, community health, sociology, agriculture and rural development (Chambers 1994, Boog 2003). Recently, a growing interest in the application of these approaches to geography (Pain 2004, Cahill *et al.* 2007, Kesby 2007, Kindon *et al.* 2007, Pain and Kindon 2007) forestry, wildlife management, and restoration (see Bacon *et al.* 2005, Ferreyra 2006, Gavin *et al.* 2007, Fortmann 2008, Ballard and Belsky 2010, Barreteau *et al.* 2010) has been observed. This is done in such a way that the application of participatory research is expanding geographically, especially in developing countries, where it has shown to produce very positive results in terms of generation of knowledge and social changes (Valencia-Sandoval *et al.* 2009).

The creation of participatory action research has been attributed to social psychologist Kurt Lewin, who worked with community action programs in the United States during the 1940s (Savin-Baden and Wimpenny 2007). Lewin's ideas were echoed years later by Fals Borda and other social scientists, who proposed the creation of the Center for Research and Social Action that led to the formulation of PAR, as it is known today (Balcazar 2003). This approach proposed an increasingly involved research, by the insertion of the researcher in the community, focusing on solving the problems of that community (Ferreyra 2006). Castellanet and Jordan mentioned that

“PAR breaks with the traditional view of a research program, at least from the point of view of search agencies and academic tradition, in which researchers first define their subject, and then narrow it progressively until they find relevant mechanisms to analyze. The participatory research agenda cannot be planned in advance because it must be renegotiated with the end users periodically” (Castellanet and Jordan 2002 pp. 29).

In this approach, the research is focused on supporting efforts to transform the social reality of the people involved (Freire 1970), questioning the social function of traditional scientific research and discussing the practical value of applied research work in action with social groups or communities, thus promoting self-development (Fals Borda 1985, Reardon 1998).

Nevertheless, it is important to mention that criticism of participatory research models (including PAR), speak of a partial and unrealistic approach (Hayward, Simpson, and Word 2004). Another fact worth mentioning is that sometimes participation is limited to the use of a series of participatory tools, without a serious commitment to work together with the communities (Cahill 2007), therefore, participatory research models have the inherent risk of being used to promote political agendas while establishing unequal power relationships (Cooke and Kothari 2001, Kesby 2005). We consider that such remarks are important and that, parting from the idea that researchers have an ethical commitment with the local communities, it is very important to address the power relationships that are generated between the researchers and the local community and within the local community itself.

The PAR approach implies a systematic reflection on the perspectives and vital experiences of the community members around an issue to be solved. It is a cyclical process: an issue or situation that requires a transformation that is identified by the community participants. Together, participants and researchers initiate their investigation, identifying the local abilities and active resources that may contribute to an action, and they reflect and learn together from the results of this action to decide if a new cycle should be initiated (Bacon *et al.* 2005).

The PAR process generally is initiated by an external agent (an academic researcher), who can play an initial main role, promoting a critical conscience and an evaluation of the needs of the community or group. This role starts to change as the process continues to advance, given that the local leaders are who direct the process of change. The local community controls the agenda and the researcher facilitates and provides logistic support based on experience and previously-acquired knowledge (Barcazar 2003). The research methodology is jointly determined by the researchers and the participating local community, considering the importance of scientific-academic knowledge and the local knowledge.

The application of the PAR approach to the management of natural resources has generated knowledge, promoting the sustainable management of natural resources that incorporates the traditional ecological knowledge of local communities (Haupt and Muller-Boker 2005, Rist *et al.* 2006, Pohl *et al.* 2010). As an example, Pohol *et al.* (2010) showed an interesting case in the Tunari National Park in Bolivia, where research provided scientific arguments for a shared use of the park. The positive contribution of the knowledge of the local community was highlighted as a way to solve the conflict between the indigenous peasants who inhabited park areas and the central government who wanted to implement a conservation plan that excluded the indigenous population. After discussion between both actors, a re-categorization of the park as an Area of Integrated Development was achieved, thus ending the conflict.

A co-production of knowledge between academic researchers and local communities is expected through the application of PAR (Rist *et al.* 2006). This means that members of the local community participate actively in the research process, enabling them to use the acquired knowledge later for solving further problems. The following section discusses the PAR experience within natural areas.

Applying the PAR approach to the management of Cinquera Natural Area

The paper now describes the use of PAR within the management of natural areas in the Cinquera Natural Area (CNA). First, we will provide a background summary about the history of CNA.

Background: civil war, peace agreements, new arrangements for land tenure and the new forest landscape of El Salvador.

El Salvador experienced a civil war that lasted more than one decade (1979 - 1992) in which more than fifty thousand people died (Mason 1999, Stanley 2006). During the early 1980s, several guerrilla groups joined together in the Frente Farabundo Martí para la Liberación Nacional (FMLN), concentrating particularly in the north and west of the country (Allison 2006). Bombings by the national army in several villages within these areas forced the surviving population to abandon their homes and seek refuge in churches and other sheltering centers. The landscape of these areas changed rapidly because abandoned farms favored the resurgence of various areas of secondary forests, some of which are still maintained today (Hetch and Saatchi 2007).

The Peace Agreements ending the armed conflict were signed in 1992. One of the points of the negotiation was the transfer of land to ex-combatants of both sides through the accord-mandated Land Transfer Program known as the Programa de Transferencia de Tierras (PIT), designed to support ex-combatants in their reintegration to life, by working in farming activities. About 10 percent of the agricultural land in the country was transferred to ex-combatants under very favorable credit conditions

(Garibay 2006, Hecht *et al.* 2006, De Bremond 2007). In some cases, lands transferred to ex-combatants coincided with secondary forest areas that had previously been dedicated to agriculture.

This was the case of Cinquera, a rural village of the Cabañas department, which had been totally devastated. After signing the peace agreements in 1992, the population of Cinquera returned and began reconstruction of the former village. The change of the landscape was notable: cultivation areas had turned into thick forests that had become an icon for the population because they had safeguarded the lives of countless combatants and had been the scene of many battles (Herrador *et al.* 2010). One of the active village inhabitants spoke in this way:

“We initiated the protection of the forest as our heritage that identifies us with our past. In this way we learned... Today we conceive a natural area with people, with activities that modify the landscape and that provide sustainability to the area... The natural area plays an important role in the search of a solution to the socioeconomic problems of the people.”

(Debriefing interview with Pablo Alvarenga, 22 November 2009).

The Cinquera forest is shared among the former owners and the beneficiaries of the PTT, a majority of which are former FMLN combatants. The process of overcoming the basic post-conflict crisis gave rise to the establishment of a new social scheme in El Salvador, with the implementation of community organization mechanisms aimed to address the challenges of reconstruction and local economic reactivation. One of these mechanisms has been the Association for the Reconstruction and Municipal Development of Cinquera (ARDM), its goal was to reconstruct the village by incorporating a new element: the forest, which later became a protected natural area and the cornerstone for the development of the whole area.

This local organization is made-up by members representing rural communities from five counties sharing the natural area, although the majority of the members are from the village of Cinquera. These members form an assembly, which elects a board of directors regularly that makes decisions on the different projects to be carried out and leads the PAR process. Cinquera is considered one of the villages in “severe extreme poverty” in the El Salvador poverty map (FLACSO 2005). Therefore, ARDM has addressed the protection of forest biodiversity through sustainable management, which allows owners to continue activities ensuring the improvement of their living conditions.

From its origin, ARDM established a permanent alliance with the municipal government of Cinquera that has fostered the work of both, additionally relying on supportive international organizations. The latter provide support through small projects such as the reconstruction of the village and the protection of the natural area, thus fostering village development.

Cinquera Natural Area

The Cinquera Natural Area (CNA) is located in the mountainous region in Northern El Salvador, constituted by a secondary forest that is approximately twenty years old, which re-grew in lands that had been abandoned during the armed conflict that took place in the country. The forest has an extension of 5,300 ha and is distributed among five municipalities: Cinquera, Suchitoto, Tenancingo, Jutiapa and Tejutepique (Figures 1 and 2). The forest possesses natural attributes that make it one of the Dry

Forests of Pacific Central America and this eco-region has been classified as “critically threatened” due to its state of fragmentation (Dinerstein *et al.* 1995).

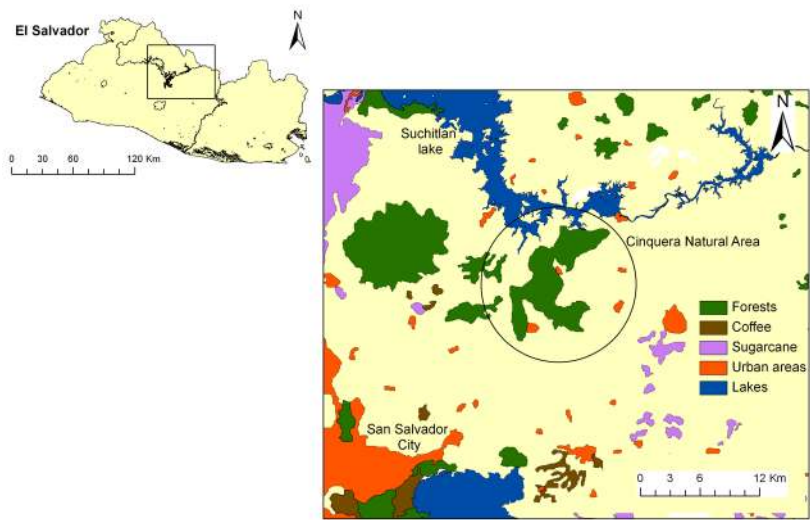


Figure 1. Location of the Cinquera Natural Area
(Source: prepared based on data of the Ministry of Environment of El Salvador)

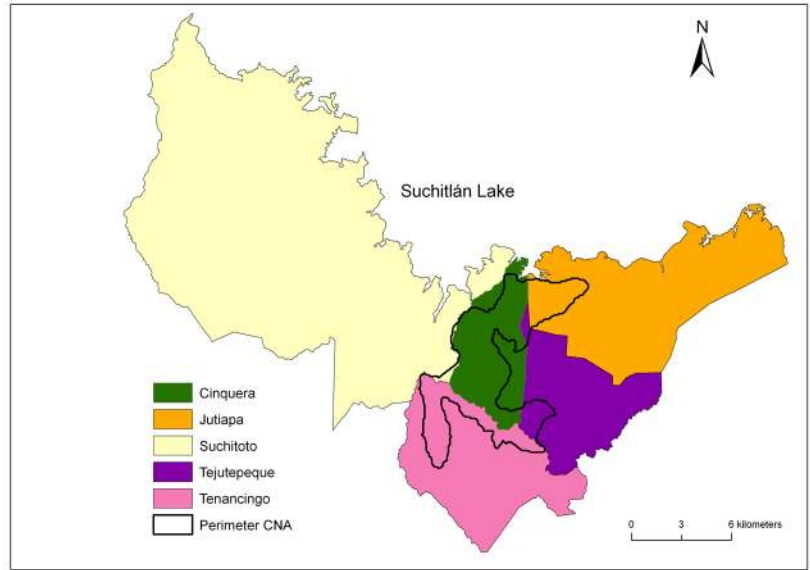


Figure 2. Cinquera Natural Area: municipalities
(Source: prepared based on data of the Ministry of Environment of El Salvador)

Applying the PAR approach

The PAR process has been carried out in the CNA for more than ten years, starting with research on its forest biodiversity. The PAR process involved two groups in a cyclic process of reflection, research and action, dealing with various aspects of the Cinquera's problem: (A) academic researchers and (B) the local actors group, which integrated the ARDM, local government members in Cinquera and CNA rangers.

Group A is an interdisciplinary group. Nowadays the team is composed of four Salvadorian researchers, supported by three researchers from two universities in Catalonia. These researchers have taken on various roles in the process: 1) Facilitators of discussions and analysis; 2) enablers, involving people in Group B to participate in the research work; and 3) researchers, providing knowledge and methodological tools.

Group B also plays several roles in the PAR process: 1) taking decisions in the processes of discussion and analysis; 2) researchers, having an active participation in the research projects by some of the members; and 3) carrying out the actions agreed during the discussion and analysis process to reach the goals set at the beginning of each research project. The members of Group B who actively participate in the research are volunteers of both genders, most of them young people who have more available time than the adult population.

Both groups participate in this way in the co-production of key knowledge for the implementation of specific actions towards the two main goals: biodiversity conservation in the CNA and local sustainable development. Each research project gives rise to knowledge that is used subsequently in actions oriented to reaching a specific goal that was set at the beginning of the project.

First research work directed to the identification of the forest in the PAR process

By the end of the 20th century, El Salvador reported extremely low forest coverage of around 3-5 percent over the national territory (FAO 2001). However, recent research has revealed the existence of areas with secondary forest that has grown as a result of natural recovery. According to this research, the percentage has increased to 19 percent of the territory (Hecht and Saatchi 2007).

Policymakers used the 1970s land map up until the mid-1990s, so the existence of the Cinquera forest was unknown to them at the time. When ARDM started its work, the organization decided to protect the forest, as illegal logging followed the lack of control in the first postwar years. ARDM considered that government support was necessary, but obtaining this support required proving the existence of the forest and demonstrating its ecological importance. Hence the first research done in the PAR process attempted to answer the following questions: "What is there in the forest?" And, "What is the ecological importance of the forest."

To answer these questions a botanical inventory was performed, distinguishing four types of habitats. In these habitats about 70 tree species, belonging to more than 30 families were identified (Cruz 1997), some of which were listed as "threatened" or "endangered" species. After a group discussion and reflection was made with the results of the botanical inventory, the ARDM started to dialog with officers of the National Parks and Wildlife Agency (*Oficina de Parques Nacionales y Vida Silvestre*) to obtain the administration's recognition of the ecological importance of the forest. This dialog process with PANAIVIS, supported by the botanical inventory, resulted in the inclusion of the forest in the Protected Natural Areas System (*Sistema de Áreas Naturales Protegidas -SANP*), thereby securing government support for the protection of the Cinquera Natural Area, allowing the commencement of additional managing projects with co-operation institutions.

The reflection-research-action-reflection cycles in Cinquera

Figure 2 demonstrates the PAR cycles that have been carried out in Cinquera, starting with the first research project in 1993 in which ARDM asked the question, “What is there in the forest?” And “what is its ecological importance?” The forest owners, who were the previous agricultural land owners, did not know of the forest’s ecological importance at this time, even though they were familiar with the forest.

This initial work represented the scientific basis for the recognition of the Cinquera Natural Area, as a result of the actions taken by the ARDM for the dissemination of the work and the search for support among the environmental authorities in the country. It was because of these first research studies in the area that the National Parks Agency, and later the Ministry of the Environment and Natural Resources (*Ministerio de Medio Ambiente y Recursos Naturales*, MARN), recognized and included the area in the Protected Natural Areas System (*Sistema de Areas Naturales Protegidas*, SANP) of El Salvador.

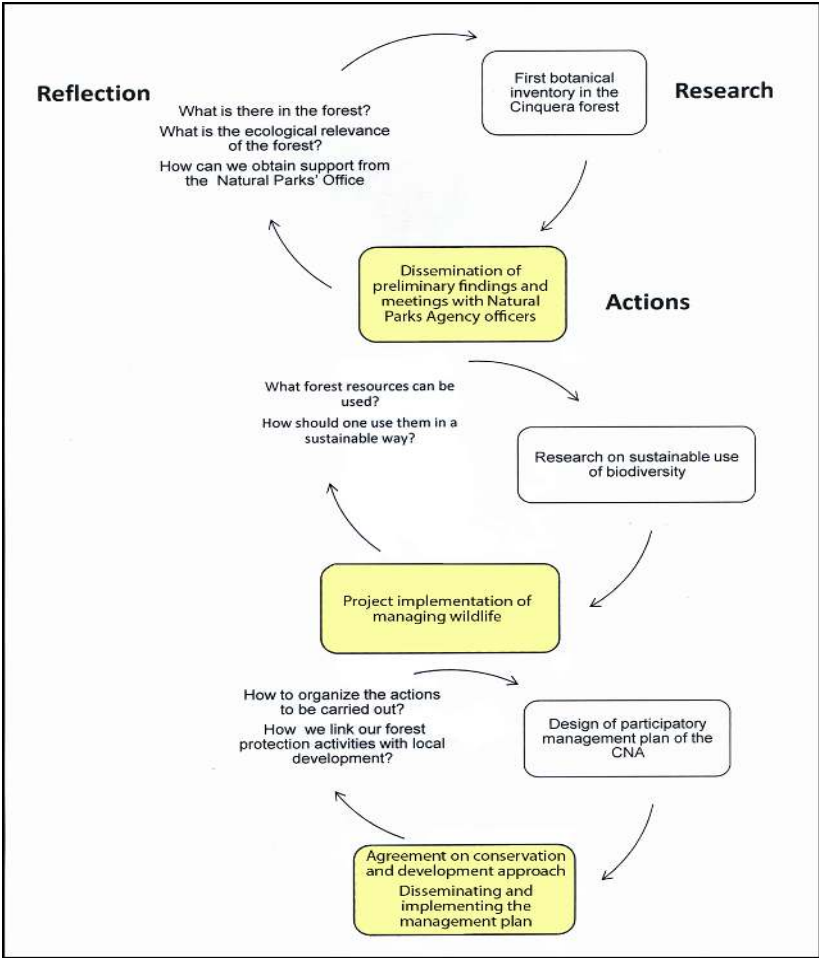


Figure 3. PAR process in the Cinquera Natural Area: reflection, research and action cycles.

Unfortunately, this recognition did not imply the change of legal category to natural area, because the legal declaration of a natural space under private ownership can only take place in El Salvador when the owners voluntarily request it from the MARN. This is particularly difficult when there are many owners, as is the case of Cinquera. Nevertheless, for ARDM, this recognition has proven to be useful, ensuring a limited assessment by the MARN and granting the opportunity of managing many projects with the support of some international organizations.

Figure 2 shows how the first research project was performed answering a question posed in ARDM. The results of this research lead to an exercise of discussion and reflection to decide on the following actions: presentation of the botanical inventory to the National Parks Agency and earn their support for the protection of the forest. Next, a new process of discussion and reflection is carried out within Groups A and B, opening a new cycle as two new questions were proposed: "What forest resources can be used?" and "How should one use them in a sustainable way?"

To answer these questions, studies of sustainable uses of wildlife were performed, such as a Lepidoptera inventory and a viability study of their captive breeding, as well as craftsmanship opportunities and the feasibility of captive breeding of iguanas (*Iguana iguana*). Results of this new research were discussed and then ARDM designed proposals for a sustainable use of biodiversity. At present, three of these proposals have been implemented with good results for the population involved in them. Several research projects have been carried out in the context of degree, master and doctoral theses, involving local community members and initiating the dynamics of a dialog of knowledge between the community and the researchers (Medina 2003, Herrera *et al.* 2004, Herrera 2005, Vega 2005, Echeverría 2006, Henríquez 2006).

Later, both groups identified the need to systematize their experiences reflecting on past actions for the purpose of identifying and prioritizing new activities for natural area management, opening another cycle. Thereby, a new research was executed: the management plan of the Cinquera Natural Area. The management plan was finished in 2007, and ARDM continued implementing many of the proposed actions in the plan with support from national and international organizations.

The realization of the proposed actions in the management plan has opened the cycle of reflection-research-action-reflection, for example in the case of the water management issue, for which a research project is being done at present. Each one of these cycles implies a new research work supporting actions that ARDM wants to complete. In each of these cycles, various methodological tools are applied such as participatory observation, focus groups, partially structured interviews, transect walks (a tool for describing and showing the location and distribution of resources, features, landscapes and main land uses of a given transect). Participative maps were also used to show the location of areas being cleared, main land usage, and to locate future management tasks (Ahamed *et al.* 2009, Austin *et al.* 2009, Brown 2009). We consider that a PAR process is open to the use of several participative methodological tools and we must remark that the use of participatory tools alone does not imply that PAR is being implemented (Kesby 2005).

The communities involved must lead their own process to decide if they consider it appropriate to use these participatory tools. Occasionally, selection of these tools generates disagreements, so enough time needs to be set aside for discussion and in order to ensure that participants are well aware of the proposed tools. In the case of Cinquera, explanations by the researcher-facilitator or some of the ARDM members on

the tools that could be used and the presentation of a selection of such tools according to the available resources have helped substantially.

Results: Design and Implementation of a Management Plan for Cinquera Natural Area

After two discussion meetings, ARDM members and the researcher agreed that the management plan for the natural area would be designed by attempting to combine conservation and local development goals. The proposed management approach considered the sustainable use of forest resources through activities such as tourism, organic agriculture in buffer zones and sustainable management of wildlife, allowing for the protection of the forest while, simultaneously, offering sustainable development possibilities to the community members.

In order to carry out the management plan, ARDM decided to create a small group to work with willing participants on this proposal. This small group and the researcher led the investigation. Currently, there is a local group of technicians, which has involved a group of Cinquera's young people (men and women) and forest rangers. This group actively participates in all their research initiatives, making decisions about what tools to use and how to apply them.

Taking into account the two main objectives of protection and development, the first activity was conducted as an exercise to identify ideal management objectives, which would help both the researcher and ARDM members to identify what they considered a priority. This exercise was conducted with different groups for each of the villages within the Cinquera area. We used diagrams, graphs and maps created by the participants to identify and prioritize the goals and strategies that would form the plan. At these meetings the researcher took on the role of a facilitator. Hence, eleven realistic goals were formulated and several strategies were designed by the local ARDM groups.



Figure 4. A local group identifying land use changes in Cinquera with a sketch map.
(Photo: Luis Omar Abrego, 2009)

Several strategies were designed by local ARDM groups for each of the prioritized goals. For example, for the “Conservation of biodiversity” goal, the following strategies were proposed:

- Updating and improving biodiversity inventories.
- Defining biodiversity management priorities.
- Establishing agreements with organizations that support research and conservation.
- Designing a participatory monitoring system.
- Updating the current ecological connectivity proposal.

These strategies are implemented through the operational annual plans carried out by ARDM.

The plan and the implementation of some of its strategies

Following the PAR cycle, the management plan as a product became a source for discussion and reflection as regards to the immediate actions to be carried out. The plan started with actions targeted at establishing legal recognition of the natural area, since, without this, the Law of Protected Natural Areas would not offer protection for Cinquera. According to this law, privately owned natural areas (such as Cinquera) require the agreement of all owners to initiate their legal declaration. Therefore, as a first step a list of the owners had been drafted, and several of them had already agreed to the declaration, while others still needed to be contacted. It should be noted that ARDM is already composed by land owners; nevertheless, the integration of several additional owners to the proposal of the protected natural area is necessary. This is not easy because several owners consider logging and farming their land a better choice. The owners’ argument is that they receive no economic benefits from forest protection, and they think that ARDM aims to improve conditions in the village of Cinquera alone. In the meantime, a convention with MARN has been signed for the management through ARDM, which gives this institution greater credibility to continue a dialog with the land owners to convince them to participate in the plan.

Concerning biodiversity protection, a zoning proposal for the natural area was made with the support of the MARN that includes a core area for biodiversity protection, a public use area for tourist activities and a buffer zone where sustainable agriculture can be performed. Investments in rural and ecological tourism have been made by ARDM in the Cinquera Natural Area, despite funding difficulties and its insufficient equipment for high-quality tourism. ARDM has made considerable progress at the end of 2008, such as the setting up of a hostel for visitors, a small restaurant, the preparation of personal guides who are prepared for several itineraries, and the construction of a museum on the recent history of the armed conflict in El Salvador. The construction of a nature interpretation centre has also been planned.

Discussion Regarding the PAR Process in the Cinquera Natural Area

The PAR process includes traditional scientific research when scientific information is crucial as a guide for action (Bacon *et al.* 2005). In the case of Cinquera, the application of a PAR approach is considered to have produced knowledge through shared research processes between academic researchers and the team of ARDM local researchers, for example, in the case of the botanic and wildlife inventories (Cruz 1993, Echeverría 2006, Herrera-Henríquez and Menéndez 2004; Herrera 2005, Vega 2005), the sustainable use of *Iguana iguana*, land use and land cover change (Herrador *et al.* 2010) and

the management plan. At the same time, the PAR process has stimulated the launching of a bid for local development through activities such as organic agriculture, rural tourism, craftsmanship and sustainable wildlife usage, which regards the natural area in itself as its main asset. We hope that our experience may contribute to enriching the work of other colleagues who are encouraged to work like this, thanks to the following lessons learned in Cinquera.

The great challenge: effective participation

After several decades of cooperative projects, local rural groups in developing countries have become used to attending workshops and being interviewed (Bacon *et al.* 2005). Nevertheless, people in many places, such as Cinquera, often question the researchers on how the information they provide will be used and how they may benefit from the results of a specific research project. Many local groups are aware that their participation in a project provides immediate benefits to them, and they are used to adopting a passive role in the majority of cases. Some forms of participation may actually be coercive (Shackeroff and Campbell 2009). We consider that participatory projects should be understood as those that provide assistance to certain groups and activities, even in the creation of local organizations; however, when the research project finishes, these local organizations usually fade because participation is not always of interest to the targeted communities.

The PAR approach is concerned with the relation between researchers and local actors, and engages partners, involving them in the definition of the issues to be investigated and the methods to access local and traditional ecological knowledge. Local partners use the research results as they act to improve their livelihoods (Hampshire *et al.* 2005, Shackeroff and Campbell 2009).

Two key goals relate to the participation issue: first, to reach a broad participation of the interested actors in the project or process, which is often a significant challenge since not all actors are interested in participating (Wiber *et al.* 2009). The PAR strategy in Cinquera to increase participation was the demonstration of results. An increasing number of actors were integrated as they saw the advances that were achieved and realized how the process was strengthened and continued. Second, an active and horizontal participation within the group that is integrated must be sought. This is also difficult because of the broad range in the level of understanding and the expectations around the research project (Davidson-Hunt and O'Flaherty, 2007), and because of the imbalance in the power relations among the researchers and the local communities. Hampshire *et al.* (2005) found that shifts in the balance of power over the course of a project are possible, but these are often slow and rather limited.

Building a learning environment and spaces for discussion of results and making decisions among all or most members of the community is a key factor in the PAR process (Wiber *et al.* 2009). In this way, local people use and disseminate the research results to the extent that they understand how they can contribute to solve their problems by means of the actions they engage in.

Equitable participation favoring new leadership and promoting tolerance

Strong leadership is often found in groups and, on many occasions, leaders neutralize the ideas and participation of others. In El Salvador, most of the leaders have some common characteristics; they are usually older men with a good knowledge of the territory. It is generally difficult to open the discussion and decision making space to traditionally marginalized groups like the younger generations and women (Klodowsky

2007). In Cinquera, it should be acknowledged that the armed conflict that occurred from 1970 to 1990 resulted in a better participation in women for two reasons: first, a lot of women participated in combats alongside the men, and second, gender equality was strongly urged by the FMLN (Garibay 2006, Navas 2007). In Cinquera, women acquired a stronger desire to participate, many (although not the majority) speak out, and men have become used to this and accept it.

Participation by the younger population has been achieved by means of the creation of small working groups within ARDM. Each new research project becomes a space for new community members who voluntarily wish to participate. Nevertheless, it must be recognized that reaching full participation demands yet a longer timescale for research and additional financial resources.

PAR promotes co-production knowledge

PAR processes are ideal to bring about a “knowledge dialog”, based on the assumption that the merging of scientific and practical knowledge adds value to both research and the management of natural resources, and that interdisciplinary research has an impact on local development if it triggers social learning processes that further contribute to more sustainable outcomes and development (Haupt and Müller-Böker 2005).

The application of PAR to the management of natural resources promotes the valuation and application of traditional ecological knowledge, which may give rise to a tool of local empowerment because this knowledge has often been underestimated and considered as opposed to western (scientific) knowledge (Butler and Menzies 2007). The co-production of knowledge through PAR allows academic and local knowledge to complement each other (Carruthers 1997; Herrman and Torri 2009, Rajaram and Ashutosh 2009). For example, when making the Cinquera botanical inventory, the identification and classification of vegetal species was complemented with local knowledge on the use of plants.

In this context, ensuring that participants achieve ownership throughout the action-research process becomes a challenge. At the same time, it becomes an excellent way to actively engage the participants, although it is important that research is not designed from above. On the contrary, the researcher needs to be flexible enough to change his/her initial research goals, tailoring them to the hopes and concerns of the local population, adapting science to deal with the process in a way that broadens the definition of validity both for recipient groups and for the academic community (Wiber *et al.*, 2004). Arnold and Fernandez-Gimenez (2007) point out that researchers who already have clearly defined goals and methods may not have the flexibility to engage in the participatory process, and research topics that are technically complex may limit the skills for the local people to participate on an equal footing with researchers.

The empowerment of groups

The recognition of local knowledge and the configuration of local research teams are an indication of the researcher's trust in the participants' ability to carry out a positive change in their community (Pain and Francis 2003). This generates confidence among groups that have traditionally been passive about their empowerment. The present recognition acquired by the ARDM technical local research team has increased their confidence and self-esteem. In the beginning, the ARDM members were shy and preferred one of the academic researchers to lead the process. Gradually, the decision-making discussions, facilitated by the academic researchers, and especially the co-

production of knowledge, have been the key for the group's empowerment. The ARDM members are now certain that they have the ability to continue good management of the natural area, and that they can identify technical needs and search for solutions and proposals. PAR has the potential to unite and strengthen local groups, but at the same time it demands a solid local organization to develop successfully. The small accomplishments achieved by the group catalyze its empowerment, enthusiasm and trust in which a collective investment may function.

In the Cinquera case, the botanical inventory that was conducted over ten years ago guided the first actions to promote recognition of forest biodiversity. This early success encouraged ARDM to continue considering new goals, such as the construction of the composting plant, the Lepidoptera inventory and a community tourism project that is currently underway, among others.

A key step: sharing and discussing research results

Cinquera's local communities have been the first to know and discuss the results of the botanical inventory and other research, including the proposed management plan. This required an effort to provide the results and conclusions in simple language that is accessible for the population. Unfortunately, some researchers who agreed to conduct research in the natural area did not discuss the results and did not work with community members, but instead they merely delivered a written report of results at the end. This led ARDM to establish a minimal agreement with researchers who came to the natural area. By virtue of this agreement, researchers are now committed to hold at least one research plan meeting at the beginning with the ARDM board and a second meeting to discuss the results at the end of the research project, in the case of those researchers that do not participate in the PAR process.

When performing specific tasks of scientific research, it is important that the results are presented and discussed with other local community members who did not actively participate in the research. This is a challenge that requires the ability to communicate the results, which is not always inherent to research teams. It is important to encourage the population to act and to make decisions. Researchers must find ways to make the complex research tools and the scientific language accessible to ordinary people through participatory praxis and to develop an environment for discussion and reflection of research results so that the actions to be taken may be identified by the people participating in solving their problems (Kesby 2007).

Continuing or finishing the PAR cycle

The nature of the PAR process encourages the participants to decide the specific issue that they initially want to contribute in. The cyclic nature of PAR gradually helps sort out the ideas and decisions of the participants, helping them design their own strategy. It is this strategy, which is specific to each territory, what indicates if a new PAR cycle can be initiated or if it should be closed. In the Cinquera case, the results of the research that has been carried out have generated several actions such as requesting and securing the recognition of the CNA, strengthening public use activities through tourism and sustainable use of wildlife, and others. The resulting management plan has already been widely discussed and has focused on the needs of more specific research projects that support this management. Therefore, it continues to open new PAR cycles.

We consider that the Cinquera case teaches several lessons on the application of the PAR approach in participatory management processes of natural resources, especially in terms of co-production of knowledge. The PAR approach creates a space

that favors this co-production of knowledge. First, because local ecological knowledge is enriched by academic research; this results in specific research-generated products that can be used for the management of natural resources. Second, because the participation of the local community in the research process -both in the definition of the research's requirements as in the selection of the methodologies to be implemented and the time in which the research is done and the community members that participate as co-researchers- guarantees that the results of the research are used efficiently by the community for the management of their own natural resources. Third, because academic researchers can also learn a great deal from local knowledge, while learning about natural resources management.

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