

Report

Community-based Conservation in Action: What does it Really Imply in Terms of Investment?

Lisa Ernoul^{a,#}, Raphael Mathevet^b, Nicolas Beck^a and Laurianne Legeay^a

^aTour du Valat, Arles, France

^bCEFE CNRS, Montpellier, France

[#]Corresponding author. E-mail: ernoul@tourduvalat.org

Abstract

Community-based conservation is generally implemented on public land and aims to empower local people in the management process. Within the Biosphere Reserve of Camargue (Rhône river delta, southern France), a private research centre on Mediterranean wetland conservation has changed this structure and has attempted to implement a community-based conservation project on its private land. The motivation behind this decision is based on the need to improve wetland conservation and the local public acceptance of the wetland research centre. The project methodology has been adapted from the integrated coastal zone management framework, with the aim of balancing conservation, local development, and social adhesion objectives. This article analyses the results of this project and the cost-benefits of such an endeavour from a private landowner's perspective. This study can help other private landowners or organisations developing future community-based conservation projects on private lands.

Keywords: biosphere reserve, community-based conservation, integrated management, natural regional park, Ramsar site, social and cost-benefit results, wetlands

DOI: 10.4103/0972-4923.64734

INTRODUCTION

There has been a trend, over the last four decades, for development projects to change their implementation strategies. Following the green revolution during the 1960s, experts and scientists developed participatory approaches to improve farming productivity, mainly through technological transfers (Lavigne-Delville *et al.* 2000). During the 1970s and early 1980s, the technological approach changed progressively, with the development of more systemic approaches and farming system research (Collinson 2000). Despite a stronger involvement of the local population, participatory development and research projects continued to be a process where decisions were supported primarily on technical and economical bases and were made by experts and central decision-makers. Interventions, taking into account the social context, increased in popularity during the 1980s and 1990s (Chambers 1983; Chambers *et al.* 1989), actively bringing the community into the management process.

Rapid Rural Appraisals (RRA) and Participative Rural

Appraisals (PRA) helped to integrate the local populations' opinions in order to better adapt technological transfer and innovation to local contexts. Local communities defined their needs and the diagnosis was a compromise between the stakeholders facilitated by scientists and the experts. These tools have helped form the basis for the participatory approach used in project planning and specific actions with different methodologies such as Participatory Learning and Action Approaches (Pretty 1995). The approaches focus on collective definitions of the project objectives, co-learning, empowerment, and capacity building (Pretty 2003).

The objectives of this article are to analyse the methodology used for the implementation of a Community-Based Conservation (CBC) project on private lands, aimed at improving wetland conservation, local social acceptance, and local community engagement; and to evaluate the ecological and social results and the cost-benefits of this approach, to serve other organisations developing future conservation projects on privately owned lands. In order to reach these objectives, this article will first make a literary review of CBC and then

highlight some of the lessons learnt from the CBC implemented on private land.

Community-based Conservation

Taking into account the lessons learnt from development projects, conservation projects have begun to evolve over the last decades from the complete exclusion of local communities on protected areas (Rodary *et al.* 2003) to the development of new approaches aimed at integrating local communities throughout the project cycle. The beneficiaries of the projects gained an active voice in project design and implementation. Local organisations and traditional institutions are increasingly taken into account as entities capable of efficiently managing natural resources, due to their dependence and proximity to them (Berkes *et al.* 1991). Participation itself came to be seen as a means to ensure long-term engagement by those involved in the process of solution finding (Campbell & Vainio-Mattila 2003). In the 1990s, environmental non-governmental organisations began experimenting with CBC as an alternative to protectionism of conservation (Meyer & Helfman 1993). CBC empowers local people in the management process through partnerships in the planning and implementation of conservation projects, with the hope of creating accountability and ownership of conservation objectives (Spiteri *et al.* 2006). Thus community-based approaches are now widespread and have developed throughout the majority of funding organisations (Pimbert & Pretty 1997). CBCs have taken major steps toward co-management, requiring mutual learning and trust-building (Berkes 2004). Adaptive co-management is recently gaining momentum, permitting the local actors to share management responsibilities and learn from their actions (Ruitenbeek & Cartier 2001).

Although there has been much criticism of CBC (Campbell & Vainio-Mattila 2003, Wells & Brandon 1993) involving its sustainability and its ability to incorporate the lessons learnt from over thirty years of participatory development, the two paradigms can be used together to promote biodiversity conservation and local development.

Most of the CBCs have been implemented on public lands, with the aim of involving local residents in the protection of the sites. We took the opportunity to study a CBC project on a privately owned estate in the Camargue Biosphere Reserve in southern France, to analyse the results and costs-benefits of such an approach, from a private landowner's perspective.

Geographical Context

The Camargue is the Rhone river delta in southern France. The entire delta is a Biosphere Reserve from the Man and Biosphere program of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) and one of the largest wetlands in the Mediterranean basin and as such, it is of international importance for water bird breeding, staging and wintering (Ramsar 2005). The Natural Regional Park of the Camargue encompasses over 80,000 ha within the central delta,

with around 15,000 ha of natural reserve, with restricted use (Figure 1). The Camargue National Reserve was established in 1927, with the objective of protecting the species and territory through strong regulation and enforcement. The Regional Natural Park of the Camargue and Biosphere Reserve were later established, during the 1970s, with the triple objectives of protecting the species and territory within its boundaries, supporting the traditional socioeconomic activities and finally opening the area to the public at large (Mathevet 2004). The local authority used participatory, consensus methodologies to maintain a balance between socioeconomic development and conservation issues in the delta.

Approximately 85% of the land in the Camargue is privately owned. The Tour du Valat (TdV) foundation owns a 2,600 ha estate, located within the boundaries of the Regional Natural Park of the Camargue. For over 50 years, the TdV has strived to conserve the rich biodiversity, implement biological research and use traditional socioeconomic activities as management tools.

Project Background

In 2003, the TdV had the opportunity to purchase an additional 120 ha fish farm located on the periphery of Le Sambuc village. The land (Le Verdier) had been dedicated to private fish farming and hunting for over 40 years. Aiming to have a showcase for integrated management of wetlands, the TdV considered buying the land to put in place a community-based, multi-use project for the villagers of Le Sambuc. Le Sambuc is a small community made up of 120 families (550 inhabitants) of diverse economic and educational backgrounds, ranging from large land owners, small business owners, scientists, agricultural workers and hired help. It is important to note that the proximity of Le Sambuc to the TdV has naturally caused an important number of residents from the village to work directly or indirectly for the TdV and for the scientists from the TdV and other host agencies who take up residence in the village. Over the years, various conflicts have arisen between the local villagers, the new residents working for the TdV and the conservation efforts. At times the social tensions have led to open protests against the TdV. Given the social conflicts, the CBC in Le Sambuc had an additional objective of reuniting the villagers (new residents and locals) in a joint community building project. Despite the existing tensions, the population bias has potentially favoured the development and participation of the community-based project.

At present, that is, five years later, the results of this project have been positive in terms of habitat conservation, local development and community participation.

PROJECT METHODOLOGY

The permanent project team is composed of a facilitator, a team leader (financed by TdV) and community members. Occasional experts (financed by TdV) were periodically implicated in the project; these experts contributed as needed in

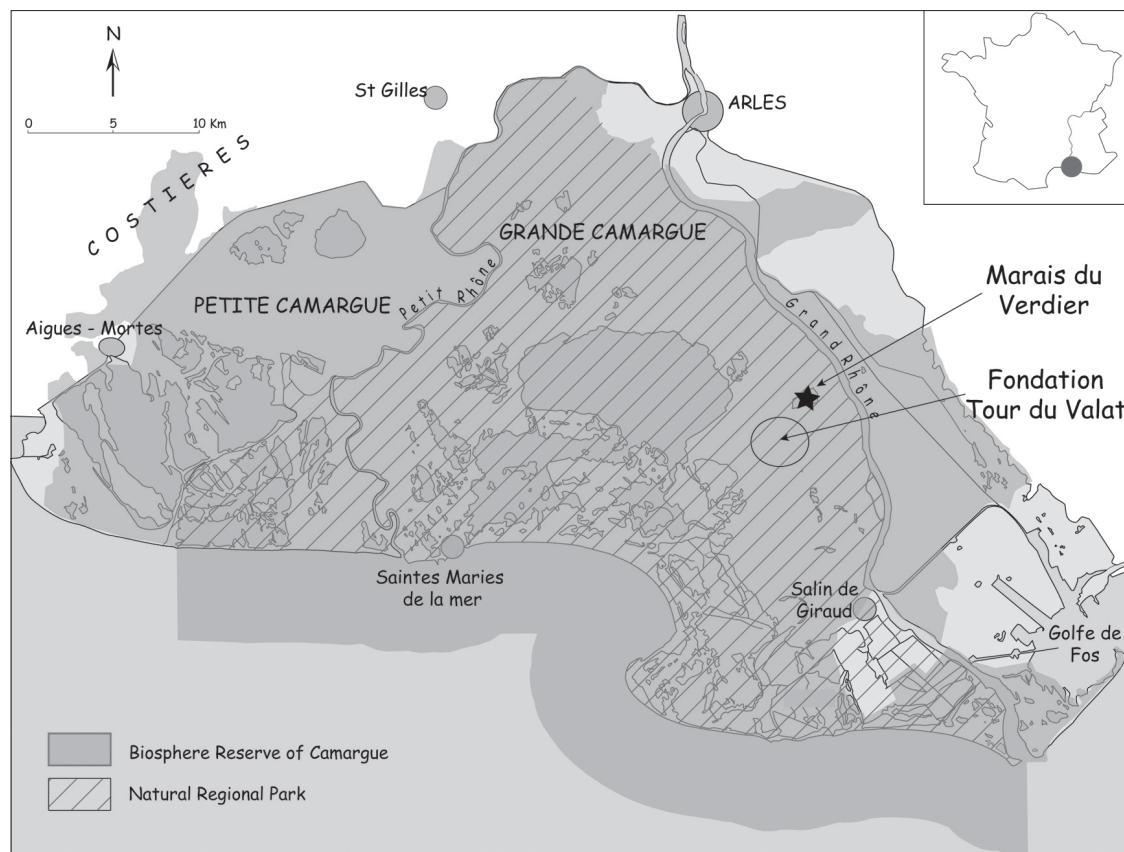


Figure 1

The Biosphere Reserve of Camargue and its main Protected Areas (Rhone river delta, Southern France)

diverse areas ranging from methodological support to scientific expertise (hydrology, plant ecology, bird ecology, etc.). The project used a modified version of the Integrated Coastal Zone Management methodology of Cicin-Sain & Knecht (1998), established by Denis & Henocque (2001). Figure 2 shows the basic chronology of the project implementation. Throughout the five-year project, the team tried to ensure regular activities, bi-monthly general assemblies, working group meetings and social activities. The project activities reflect an effort to balance local development, conservation and social adhesion.

The conservation philosophy envisioned for Le Verdier involved a move from artificial marsh exploitation with high, permanent water levels to a more 'natural management' following the seasonal fluctuations in water levels. The 'natural management' implies a change in habitat that would theoretically create a change in species populations (fauna and flora). Additionally, 'natural management' also requires lower running costs in terms of water management.

Phase 1: Preliminary Research and Project Feasibility (April 2003 – July 2003)

In 2003, after identifying and meeting with the key actors (Mayor, local authorities and leaders from the hunting association), the TdV implemented a simple, one page questionnaire soliciting the interest of the local residents of

Le Sambuc to participate in a community-based, multi-use conservation project. The potential project was based on four pre-established conditions set by the TdV. The project should: conserve the ecological value of the site using a 'natural management' approach, serve the needs / desires of the local villagers, favour multi-use, compatible activities and finally prioritise activities that benefit multiple families over individual activities. The questionnaire was a preliminary exercise to determine the local population's interest in participating in the project and to compile the different ideas that the residents proposed for the ex-fish farm located on the outskirts of the village. A total of 32% of the population responded to the questionnaire and of the responses, only one responded negatively. A simple analysis of the questionnaire showed 91 different ideas for possible project activities; these ideas were then sub-grouped into three categories (recreation, natural resource use and educational activities). After confirming a general acceptance for a community-based, multi-use conservation project, the TdV purchased the land in June 2003, and held the first community-wide open forum to present and adapt the methodologies for the future project.

Phase 2: Project Preparation (August 2003 – December 2004)

The second phase of the project began by creating three

Phase 1: Preliminary Research and Project Feasibility

April – July 2003

- Meetings with key stakeholders
- Interest evaluation

Phase 2: Project Preparation

August 2003 – December 2004

- Socioeconomic assessment
- Bio-physic baseline
- Creation of the local association
- Micro-actions
- Social activities

Phase 3: Project Implementation

January 2004 – December 2009

- Design of three-year management plan
- Implementation of multi-use activities
- Training (biological and administrative)
- Micro-actions and activities
- Social activities
- Project monitoring (biological, social and economic)

Figure 2

Basic chronology of the project implementation

working groups, made up of volunteers from the community, based on the categories established from the conclusions of the preliminary questionnaire. The working groups consisted of 5 – 10 people interested in the selected topic, the project facilitator and one person representing the views of the TdV as property owner. Each working group elected a representative who was responsible for presenting the outputs in the general assemblies. Initially the working groups met regularly for two-hour periods, then in the beginning of 2004, they moved from regular meetings to periodic meetings, as needed, according to the diverse activities. The working groups were animated by the project facilitator and the members collectively decided what was discussed. The monthly meetings and the working groups assembled in the town hall during the evenings to open the attendance to those persons holding day jobs.

A socioeconomic diagnosis was also carried out in October 2003, to develop the baseline information concerning community and the intercommunity dynamics (social, political and economic). The TdV implemented the diagnostic in coordination with the National Agricultural College (ENSA) in Montpellier (Jarrige & Miclet 2003). Different environmental assessments were also realised to establish a benchmark for the biodiversity (flora and fauna) and hydrological conditions.

Local villagers were invited to participate and were later trained in biological monitoring.

Throughout phase two, activities and micro-actions were put in place to create a sense of ownership and develop community building on this newly accessible land. The activities included photography expositions, historical evenings and local product cooking demonstrations, and the micro-actions began with cleaning days, reforestation campaigns and the construction of a pedestrian bridge to improved accessibility to the site. The Sambuc Elementary School, local businesses and villagers were all active in the different activities. This multi-sector approach allowed the project to develop educational, recreational and conservation activities simultaneously.

During this phase, the need for institution building was identified as a key element to guarantee the sustainability of the project and to represent the local interest of the community. Following the recommendations of Ostrom (1990) and Cicin-Sain & Knecht (1998) that institutions may be “crafted” using the elements of rule-making and self-organisation; a non-profit association was established according to the French regulation law of 1901 and officially began operating in August 2004 (16 months after the project’s initiation). A board was elected incorporating local residents and the president from the TdV. The administrative council was made up of one member from

each working group and the board. Membership was then open to people living or working in Le Sambuc or people playing a key role in the project. A small membership fee was established (10€ for individual membership and 15€ for family membership). Initially 17 people joined the association and by 2008, the association comprised of over 80 members.

The key component of the community-based project was to keep the population and local organisations informed. The project leader began to produce quarterly newsletters to highlight the project's activities and increase awareness concerning strategic subjects. The newsletters were visually attractive, simply written and limited to four pages. They were distributed via the local post office and made available through the local government and businesses.

Phase two of the project required a very important contribution by the TdV in terms of community animation, training and organisation. The project leader also assumed the responsibility of project facilitator. His integration in the community was widely accepted and he was present daily through official meetings, social gatherings and work days. The community involvement demonstrated by the project leader helped build confidence among the local population forming the basis of the project.

Phase 3: Project Implementation (2005 – 2009)

The Verdier project has continued to operate actively throughout 2008 and into 2009, but this report will only consider the activities and investments accumulated through the end of 2008. The third phase of the project involved the writing and implementation of a three-year management plan. The management plan was developed by the local residents, expert scientists and the project team. The objective of the management plan was to have an official document, easily accessible to all the actors, which would guide the project activities. The management plan was divided into four principle parts: site history, natural environment, socioeconomic situation and the management objectives and activities.

Attention was paid to ensure that different perspectives and visions of the site were taken into account. The history evenings from the second phase of the project provided a wide range of local information found in the first part of the management plan document, "site history". The monthly meetings and working groups gave the orientation for the management plan, and the project team tried to maintain active participation in every step of the plan's development and often the group meetings or working days were immediately followed by more casual social exchanges. During this period, different volunteers from the community were trained on biological monitoring, water management and administrative organisation.

The activities in this phase included the construction of a compost latrine, rehabilitation of the meeting house, construction of a bird observatory, fencing of grazing land and cleaning of the community dump, putting in place a recycling centre. In addition to the recreational activities (bird watching, nature walks and bicycling), other multi-use functions were

also initiated allowing for grazing (horse and cattle), reed harvesting and hunting. Each of the activities benefited several families and despite the preconceived ideas, the activities took place simultaneously, without any major problems. All the activities were incorporated into the monitoring scheme, allowing the community to make educated management decisions concerning the site's use and to increase or reduce the activities as needed. Reed harvesting and grazing had also become income generating activities for the association, financing the water inputs needed to maintain favourable hunting, grazing and eventually fishing activities.

The project allowed for flexibility in the project's activities, in order to ensure that the activities and micro-actions responded to the community's initiatives. This flexibility permitted the project to encompass waste disposal activities as part of the local development agenda. In the past, a part of Le Verdier was used as the village dump. The disorganised dumping was not only visually shocking, but also attracted additional dumping in and around the site from non-locals. After the community members identified this problem, the local authorities and the association decided to limit access to the dump. The waste disposal site was enclosed and furnished with labelled recycling bins. Access to the recycling area was open to all residents, but the key was kept in the local bakery. This control measure had greatly reduced the quantity of disorganised dumping and had created a new sensibility among the residents favouring recycling.

The quarterly newsletter, bimonthly assemblies, working groups and work days continued throughout this phase. Various scientific and development groups began visiting Le Verdier to learn from the community-based project. The local residents and the head of the project actively shared their experiences and also made field visits to gain ideas from other projects.

PROJECT EVALUATION: 2007

Considering that simply evaluating the community economic benefits is too narrow, too simplistic and potentially counterproductive (Berkes 2004), the project management attempted to evaluate the project to include the impacts concerning community adhesion and biodiversity in addition to socioeconomic development.

In early 2007, the TdV conducted an external evaluation of the project with the aid of Université de Provence and the National Scientific Research Centre (CNRS). The evaluation used information gathered from project monitoring (technical and financial) and semi-structured interviews with the local authorities and organisation project beneficiaries (Legeay 2007). Twenty-three interviewees (i.e., 10 active members, three former active members, six direct beneficiaries from the project and one episodic active member) gave their points of view on the effectiveness of the project and the procedure, their perceived benefits to participate in the project in terms of collective and individual inputs and outputs, the degree of implication of the different stakeholders, the shared responsibility, social cohesion and capacity building. The

report shows positive results in biodiversity, community adhesion and socioeconomic development.

Ecological Results

Baseline and biological monitoring have shown a change in the fauna and flora species due to the changes in hydrological management. Although the number of nesting water birds has decreased due to reduced water inputs; the animals and plants specific to the Camargue, following a natural hydrological cycle, have increased in species and number per species. The use of a more 'natural management' and the consequent habitat changes have created some conflicts leading to a decrease in participation by two key members. In spite of this difference in perspective, it is difficult to make generalisations in terms of biodiversity evaluation mainly because the habitats are changing slowly. However, biologists who participated in the monitoring and assessment concluded that the project has greatly promoted Mediterranean wetland flora and fauna in the Camargue. Within the 120 ha, the main habitats (permanent ponds, temporary marshes, reed beds, pastoral vegetation and bush lands) typical to the Camargue can now be found instead of three permanent fish ponds surrounded by sparse aquatic vegetation.

Social Results

The semi-structured interviews confirmed a very favourable perception by the interviewees concerning community building and adhesion. The project contributed to create or improve social links between inhabitants. Some of the newer residents to Le Sambuc highlighted the importance of the project as an opportunity for them to get involved in the social life of the village. The interviews showed that the local authorities and beneficiaries appreciated their involvement in a co-learning process, where habitat management, plant ecology, local uses of plants and game birds were discussed in depth with scientists and villagers. A majority of the participants of the project considered that they learnt more about nature and human interactions. One of the key results of the project is its contribution to the social animation of the village. The creation of a new public place that local residents can use without conflict of use, and implication of the local association

in its management has increased the villagers' confidence in the collective project. This kind of participatory approach has been very much appreciated. It has created a local collective dynamic and increased the villagers' capacity to participate in the decision-making processes related to the management of the Biosphere Reserve and Natural Regional Park territories.

Cost-Benefit Results

Table 1 shows the total financial and human investment accumulated annually from 2003 to 2008. The project required over 6,241 man / hours and 425,310 € to operate during the five-year period. Almost the entire financial cost for the Tour du Valat was allocated to financing the project team leader / facilitator, with a small allocation given to scientific monitoring and site improvement.

The socioeconomic development has been positive, considering that the local association has increased its contribution to the project functioning and activities (financial and human) from 0% in 2004 to 19% in 2006. The association's financial contribution to the project is based on annual membership fees, grazing and reed harvesting fees and local governmental grants. The human resources contribution includes the man / hours of volunteer work dedicated to site improvement, management and monitoring. Table 2 clearly illustrates that the multi-use, socioeconomic dimension of the project has evolved progressively over the five-year project period.

Direct Benefits

During the five-year project, an average of 1,726 'users' have benefited directly from the project. Ninety-five per cent of the

Table 1
Total financial and human project cost

Total cost	Man / hours	Financial in Euros
Tour du Valat	3,642	356,646
Le Sambuc	2,599	68,664
Total for the project	6,241	425,310

Table 2
Multi-use, socioeconomic activities

Activity	Number of people users						Income in Euros for the association in 2008
Year	2003	2004	2005	2006	2007	2008	
Visitors	0	First year open to the public	Information not available	680	939	1395	Not applicable
Horse grazing	0	0	8	9	10	10	1837
Cattle grazing	0	0	1	1	1	1	1000
Hunting	0	10	10	17	19	21	420
Reed harvesting	0	0	1	1	1	1	1424

users benefited from simple recreational visits: walks, bicycling and bird observations. This estimation may be exaggerated because it does not calculate the fact that the same person may have participated in different activities. Likewise, the same person may be counted multiple times for each visit that he / she made to the site. The village population, that is, the potential direct beneficiaries, is 551 and the total surface area included in the project is 120 ha.

DISCUSSION

The CBC project has proven successful in terms of the project's initial goals, but now, five years after the project's initiation, it is imperative to measure the cost of that success and to determine a future project strategy. First, it must be noted that the economical evaluation of the project does not consider the capital investment made by the TdV to finance the purchase of the Le Verdier estate. Additionally, it does not consider the non-monetary, environmental (i.e., wintering duck increase) and social (i.e., decline of conflicts between stakeholders) values gained from the project that could potentially impact not only the local villagers, but also the larger community as a whole. The analysis, given a little later in the text, considers only the direct users, the potential direct beneficiaries (villagers) and the surface area managed by the project.

Given that the major project cost is for the leader / facilitator, it is important to consider the details of his role and the possibilities of an eventual change in strategy. Although this article does not take into consideration the activities and costs after 2008, the project continues to function with approximately the same financial and human implications as in the previous years. The project leader / facilitator is completely responsible for the project activities (communications, meetings, work days, etc.). His role and importance in the project is highlighted in the 2007 evaluation (Legeay 2007). Considering that the project was originally initiated by the TdV, it is apparent that the role of the facilitator and his ability to involve the local population was essential to the project's success. The board, the members of the association and the TdV realise that, at present, the association is not strong enough to continue the activities without outside assistance, specifically in terms of project animation. At the same time, little has been done to prepare a possible change in strategy (i.e., identifying a legitimate community leader and helping this leader to increase his/her capacity to facilitate the process) or in reducing the direct implication (financial and human) of the TdV in the site management. Literature on the fields of common property and participatory development suggests that institution building at the community level may take on the order of 10 years for simple, local level institutions (Berkes, 2004). Using this parameter and considering that the project is now in its sixth year, steps must be found to gradually increase the association's power and responsibilities in order to promote greater sustainability.

CONCLUSIONS

Community-based management is widespread and is the object of a large diversity of tools and approaches. In this case study we have shown that an adaptation of integrated coastal management framework can lead to a successful approach locally. In the context of wise wetland use, a collective management of natural resources can be used not only on public lands, but also on private estates, where there are issues of collective responsibility and proximity. Given the questions linked to ecological evolutions caused by changes in water management, a dialogue between potential users and scientists helps to collectively build the experiment on the ecological restoration of wetlands. This dialogue also helps establish collective rules for the use and management of the estate. The evaluation results of five years into the project implementation show a clear improvement in the (1) stewardship and ownership of nature conservation issues by villagers; (2) confidence and social network development between residents and between residents and scientists; (3) empowerment and capacity building of villagers; (4) positive changes in natural habitats and biodiversity; (5) high costs of facilitation of the process.

In order to ensure the project's sustainability, a clear strategy must be developed to transfer part of the responsibilities and leadership from the facilitator to the local association. This strategy change should aim to gradually reduce the running costs financed by the TdV and increase the local capacity in terms of project management and animation. Funding of facilitation during several years is thus a critical issue for this kind of project. The exit strategy must be managed in a way to preserve the delicate balance between residents, taking into account the social context and dynamics particular to the village. Despite local issues and implications, with regard to the reliability of the methodology, this study can serve other private landowners or NGOs developing future community-based conservation projects on private lands.

ACKNOWLEDGEMENTS

The authors are especially grateful to the local TdV Verdier team including Coralie Hermeloup and Stephanie Along for their implication in the project during the initial phases of the project. We would also like to recognise the engagement manifested by the TdV management and the members of the local association, *Marais du Verdier*, without whom, conservation and development would not have been possible.

REFERENCES

- Berkes F. 2004. Rethinking community based conservation. *Conservation Biology* 18(3): 621-630.
- Berkes, F., P. George and R. Preston. 1991. Co-management: The evolution of the theory and practice of joint administration of living resources. *Alternatives* 18(2): 12-18.
- Cambell, L. and A. Bainio-Mattila. 2003. Participatory development and community-based conservation: Opportunities missed for lessons learned? *Human Ecology* 31(3): 417-437.

- Chambers, R. 1983. *Rural development: Putting the last first*. London: Longman.
- Chambers, R., A. Pacey and L.A. Thrupp. 1989. *Farmer first: Farmer innovation and agricultural research*. London: ITB.
- Cicin-Sain, B. and R.W. Knecht. 1998. *Integrated coastal and ocean management. Concepts and practices*. Washington D.C: Island Press.
- Collinson, M. 2000. Understanding farmers and their farming. In: *A history of farming systems research* (ed. Collinson, M.). Pp. 5-11. Oxon: CABI Publishing.
- Denis J., Y. Henocque. 2001. *Des outils et des homes pour une gestion intégrée des zones côtières, Methodology guide*, Vol. 2, UNESCO.
- Jarrige, F. and G. Miclet. 2003. *Diagnostic socio-économique préalable à la réhabilitation de l'ancienne pisciculture du Verdier*. Tour du Valat and ENSA, Montpellier.
- Lavigne-Delville, P., N.E. Sellamna and M. Mathieu. 2000. *Les enquêtes participatives en débat. Ambition, pratiques, enjeux*. Paris: Karthala, GRET, ICRA.
- Legeay, L. 2007. *Evaluation d'un processus de concertation pour la gestion d'un espace naturel: le cas des marais du Verdier*. Tour du Valat: Université de Provence and CNRS.
- Mathevet, R. 2004. *Camargue incertaine. Sciences, usages et natures*. Paris: Buchet-Chastel Editions.
- Meyer, J.L. and G.S. Helfman. 1993. The ecological basis of sustainability. *Ecological Applications* 3(4): 569-571.
- Pimbert, M.P. and J. Pretty. 1997. Parks, people, and professionals: Putting participation into protected area management. In: *Social change and conservation* (eds. Ghimire, K. and M.P. Pimbert). Pp. 297-332. London: Earthscan.
- Pretty, J. 1995. Participatory learning for sustainable agriculture. *World Development* 23(8): 1247-1263.
- Pretty, J. 2003. Social capital and the collective management of resources. *Science* 302: 1912-1914.
- Rodary, E., C. Castellagnet and G. Rossi. 2003. *Conservation de la nature et développement: l'intégration impossible?* Paris: Karthala.
- Ruitenbeek J. and C. Cartier. 2001. The invisible wand: Adaptive co-management as an emergent strategy in complex bio-economic systems. Occasion paper 34. Centre for International Forestry Research. Indonesias: Bogor.
- Spieri, A. and S. Nepal. 2006. Incentive-based conservation programs in developing countries: A review of some key issues and suggestions for improvements. *Environmental Management* 37(1): 1-14.
- Wells, M.P. and K.E. Brandon. 1993. The principles and practice of buffer zones and local participation in biodiversity conservation. *Ambio* 22: 57-162.

