Deliverable 4.4
"WORKING PAPER ON CROSS-SITE ANALYSIS OF Ecosystem Based Adaptation"

Work Package 4
Task 4.4

FP7-283163-WP4-083-PU-28-07-2015

CC BY NC SA

Table of contents

Project	
Project acronym:	EcoAdapt
Project full title:	"Ecosystem-based strategies and innovations in water governance networks for adaptation to climate change in Latin American Landscapes"
Grant agreement no.:	283163
Project web-site:	www.ecoadapt.eu
Document	
Deliverable number:	4.4
Deliverable name:	"Working paper on cross-site analysis of EBA adaptation"
Due date of deliverable:	14-July-2015
Actual submission date:	28-July-2015
Led beneficiary	2
Nature:	R
Participating beneficiaries:	CATIE, SEI, BMAAM, FCBC, BMJ
Work Package no.:	4
Work Package title:	Design adaptation strategies and implement key adaptation measures
Work Package leader:	CATIE
Work Package participants:	FM, CIRAD, CATIE
Task N°	4.4
Task name:	Synthesize socio-technical innovations and key barriers and opportunities for ecosystem based adaptation strategies
Task leader:	CATIE
Dissemination level:	PU
Version:	1
Draft/Final:	Final
Authors:	R. Vignola, T. Devisscher, M. Morales, M.Coll Besa
Reviewers:	

Executive summary

In this deliverable we summarize what we learned from implementation of adaptation actions in the three project sites. Of course, the pre-implementation stages are somewhat included as implementation is strictly linked to the design and planning stages. We organized the follow up of implementation in the sites using the Institutional Analysis and Development framework developed by Ostrom (2011) and adapted it to facilitate the interaction between researchers and our civil society organization (CSO) partners in all sites while allowing to capture the most important highlights of implementation lessons. Our results confirm that engagement in early stages of the adaptation diagnostic and design is a prerequisite for a successful implementation and ownership of adaptation actions. However, it is not a sufficient condition as other variables can hamper implementation. The social and political context in which implementation is supposed to take pace influences its scope and achievement. For example, the electoral context might polarize institutional relations and hamper the capacity and possibility of undertaking certain actions as these might be interpreted as actions supported or in support of a specific political party depending on who is benefited or involved in its implementation. Key trade-offs also emerge, especially in relation to the tension between the development-related urgency of most of rural marginal landscapes and the longer-term perspective that is needed to undertake adaptation actions and especially maintain them through changes in environmental and social conditions over time. Given the institutional contexts in which implementation is taking place, we observed that in the Bolivia and Chile sites there is an interesting learning process based on the interlinkages among local, regional and National organizations within the action situation in the field, opening the possibility to scale out and up adaptation actions. In Argentina a growing tension between the local CSO ABMJ and the government's coordination of the National Model Forests Program, in conjunction with the political polarization of the electoral year is hampering implementation of pilot adaptation actions and reducing the possibility of scaling out and up. The success of on-going efforts to secure funding to out-scale and upscale actions or to implement a larger adaptation strategy will depend on how CSOs manage to handle the political and socio-institutional contexts in which they operate.

Disclaimer

This current document is a synthesis of three reports prepared in Spanish that analysing the process of implementation of pilot actions in the Chiquitano Model Forest, Jujuy Model Forest and the Araucaria Model Forest of Alto Malleco. Spanish versions are more extensive and detailed, and present more figures than this synthesis report, which for the purpose of comparison and synthesis could not use all available information in the individual reports.

1. Introduction

The impacts of climate change on natural resources and ecosystems reduce the options for human development and livelihoods and jeopardize the terrestrial, freshwater and marine habitats. The most critical changes will happen in the future, so it is essential to begin now to plan and implement adaptation strategies that can prevent or benefit from them, taking into account different climate change impacts to different sectors of the population. As the crisis of climate change continues to develop, special attention should be given to those who currently are, or who will be in the future, the most vulnerable (Arquiñego et al. 2015).

There is no single approach to adaptation to climate change, but a series of strategies and processes given the context and the spatio-temporal dimensions of a decision problem (Girot et al. 2012, Devisscher et al. 2009). Moreover, evidence accumulated through decades of work in development and disaster risk reduction (Blaikie et al. 1997) indicates that some adaptation approaches may even end up worsening social conditions. This is especially true for those approaches which tend to follow a top-down strategy (e.g. strongly focusing on technical fixes or loaded with high technical content) and which can carry the risk of neglecting the perspective of the most marginalized sectors of society (Levine 2011, DFID 2010) and have higher chances of increasing their vulnerability and thus leading to maladaptation (Barnett & O'Neill 2010).

Bottom-up approaches try to be inclusive and guarantee the informed and respectful participation of local communities, which should help tailoring responses to socio-institutional contexts while accounting for the voice of the largest possible part of societal sectors (and especially including the most marginalized). Additionally, taking into account ecosystem goods and services may ensure more adequacy to local context (CBD 2000, Folke et al. 2009; Girot et al. 2012).

Given these premises a systemic approach to adaptation planning can be adequate if we take into account the role of the local communities, ecosystems and their interactions (Folke et al. 2004, Ostrom 2009). This approach refers to an integrated perspective considering the social and ecological dimensions of adaptation (Berkes y Folke 1998) and integrates principles from the Community-based Adaptation (CbA) and Ecosystem-based Adaptation (EbA) approaches.

On the one side, CbA focuses on the role of communities and their resources (knowledge, networks, money, natural resources) in tackling their own priorities, problems and solutions allowing for their empowerment in adaptation planning (Reid et al. 2009). Participatory processes that consider cultural norms, and social contexts are fundamental to this approach and especially apply to marginal communities. On the other side, EbA focuses on the role of ecosystems' functions, goods and services in buffering the effects of climate change and variability on society (Barrow y Mlenge 2003, Monela et al. 2005, Vignola et al. 2009). It includes the restoration and conservation of natural systems (Andrade et al. 2010, Devisscher 2010, Girot et al. 2012) and agricultural systems (Vignola et al., 2015). The common hypothesis in referring to EbA is its capacity to be culturally appropriate, cost-effective while providing social and economic benefits to society. A common challenge but also the strength of integrating CbA and EbA relates to the need of considering the interactions among society and ecosystems and among the multiple temporal and spatial scales at which the social and ecological system operates. More specifically, this implies that a project focusing on work with local community problems will possibly need also to look at the landscape scale and above. Similarly, adopting an EbA approach requires considering how ecosystem services are produced or used at one scale are dependent on processes at higher or lower scales. In general, the closer the management focus on an ecosystem and a community the higher the responsibility, empowerment, accountability, engagement and use of local knowledge (COP5 Decision V/6, 2000).

The temporal scale in adopting CbA and EbA can also open the opportunity to consider longer term goals by undertaking and addressing shorter-term needs, for example through pilots and demonstrative actions. The condition is to target the design of no-regret options/pilots that are benefitting development and climate change related goals at the same time and are robust to different future scenarios (Hallegatte 2009, Heltberg et al. 2009, Klein et al. 2014).

In this report we focus on the analysis of adaptation implementation processes, that is the implementation of energizing and pilot actions in EcoAdapt study sites. This provides interesting inputs for the discussion on integrating EbA and CbA approaches through three concrete empirical observations. Adopting a socio-ecological perspective (building on Ostrom, 2009) we show how the design and implementation of EbA and CbA pilot actions respond to

and build on local communities' knowledge, leadership to tailor solutions to local contexts while ensuring project ownership. We also highlight barriers and success factors that might provide general insights for similar processes in other landscapes.

2. Methodology

The methodology used in this study helps understanding the context, success factors and barriers that characterize the identification and implementation of concrete adaptation actions designed based on the principles of Community Based Adaptation and Ecosystem Based Adaptation. Our protocol is built on the conceptual framework of socio-ecological systems developed by the Economy Nobel Prize Laureate Elinor Ostrom (2009). This framework recognizes a systemic perspective on the socio-ecological system, thus accounting for interactions among actors, natural resources and existing formal and informal rules and norms to use and access natural resources. It recognizes four sub-systems (Figure 1): resources (e.g. protected areas, water systems, agricultural fields); units or resources (e.g. trees, units of water, wild animals); governance systems (government and other organizations that manage resources systems, standards and rules and how they are created); and users (individuals or groups of people who use the resources for other purposes).

We first characterize actions and briefly describe their contexts (which are more deeply presented in Deliverables 2.4 and 2.5). Then we illustrate the strengths and success factors that helped in the identification and implementation of these adaptation actions referring to communities' resources. We identify then the barriers and obstacles to feed a conclusive discussion that can serve similar processes in other sites.

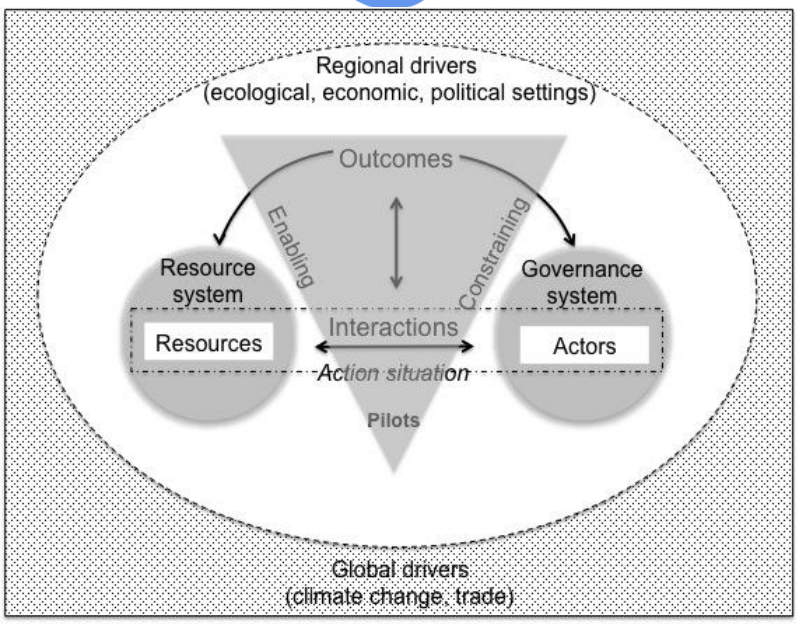

Figure 1: Conceptual framework for identifying factors facilitating or limiting the changes (outcomes) that strengthen adaptive capacity in the socio- ecological system, from process design to implementation of pilot actions (adapted from Ostrom, 2009).

In order to implement this assessment for each site EcoAdapt researchers from CATIE and SEI developed a protocol with guiding questions that were used in a follow-up process with each model forest. We used the Institutional Analysis and Development framework (IAD, Ostrom 1995) to systematize existing information about the pilot actions, and the guiding questions helped us to systematize deliverables from EcoAdapt as well as existing studies and on-going activities in the sites.

The IAD framework allows describing an action–situation where individuals interact, exchange, solve problems and dominate each other or compete, all within a biophysical, social and institutional context. The action situation is affected by three groups of factors related to 1) the nature of resources (biophysical conditions), 2) the rules in use (formal or tacit institutional arrangements , interlocking rules ranging from operational, collective or constitutional), and 3) the attributes and structure of the community (social and cultural context) in which the action - situation occurs.

In this study, we describe the action-situation of each pilot action using all or some of the following variables Ostrom (1995) suggested, namely: participants, positions or roles of the participants, resources, the set of actions, possible outcomes (as most actions are still under

way), interest or value participants share or don't, information and knowledge that participants have generated, processed and used to plan actions linking them to expected results, the control exercised by each participant in relation to this function, and processes that were followed to select a particular course of action. We prepared a semi-structured interview protocol based on the guiding questions prepared based on Ostrom SES framework (2009), and the identification of gaps in the systematization (see Annex 1), with questions to guide the interaction of CATIE and SEI researchers with local CSOs partners in collecting information. Feedbacks and discussions were held regularly to clarify and keep the process up to speed.

3. Results

3.1 Action-situation: actors, resources and their interactions

In this section we present the main findings of our assessment of the implementation of pilot adaptation actions using the socio-ecological analysis lenses. We first introduce the pilot actions characterizing them (in Table 1) according to their objectives, actors involved, resources used, prioritization processes and rules tapped into to promote them. In this initial section we also provide highlights of actors' interactions and lessons learned.

We then introduce success factors across the sites highlighting some slight differences that might have contributed to different achievements. In the final result section we present common and specific obstacles and barriers that can also be applicable to other similar contexts. A full comparative analysis of the processes of implementing solutions for complex socio-ecological systems problems to find causality on results, outcomes or processes is an almost impossible challenge. Therefore here we thrive to highlights factors that can guide action in other similar contexts but without pretension of an exhaustive and deterministic explanation (i.e. of why y results from x), and maintaining the uniqueness of each country process in its own nature as this is depending on specific socio-political and cultural conditions.

As we can see from Table 1, adaptation actions in all sites imply a combination of technical work in identifying solutions and social interventions to build ownership in identification and implementation of actions.

Table 1: Adaptation actions in all sites and their action-situation characteristics.

MF acronym	BMAAM			BMCh			ABMJ
Name of action	**Capture of rainfall**	**Slope protection**	**Building-expanding awareness and advocacy capacity**	**Protection of water sources**	**Domestic health**	**Expansion Protected Area Zapoco**	**Irrigation Efficiency**
Objective	Reduce impact of water scarcity in critical periods (in indigenous community also to embellish through native trees the spiritual site)	Restore and protect key strategic and demonstrative slopes through native trees reforestation	Awareness-raising on the importance of previous actions and building capacities for advocacy	Protect water sources critical for rural communities and livestock by fencing the area and restoring native vegetation	Reduce water-borne diseases in households; improve firewood use efficiency while reducing in-house smoke respiratory problems	Ensure protection of areas critical for water resources	Develop a climate-smart agriculture solution based on irrigation efficiency for marginal smallholder horticultural producers faced with water scarcity issues, and consolidate the organizational capacity of producers.
Coverage	Spiritual common area of the indigenous community of Quilape Lopez (Curacautin); Demonstrative site in Urban area of Lonquimay	A) "Cementerio Slope" in the indigenous community of Pedregoso (Lonquimay); B) "Til Tilco slope" in Mallin del Treile (Lonqumimay) ; C) "Ñanco slope" in Río Blanco (Curacautin)	All users of Radio, local bulletins, media and newspapers, schools	Rural indigenous communities of A) Limoncito (1 ha) used for clothes-washing and as alternative source, B) San Andres (3 ha) used for livestock, C) Candelaria (1 ha) used for livestock	Rural communities of San Fermin, Limoncito and Candelaria	Zapoco Watershed Hydrological Priority Units	137 ha, 33 smallholders in El Pongo state-owned farm in El Cadillal located in the mid-watershed area of the Perico-Manantiales basin

Priorization process	two steps: identification of action with Ecoadapt's stakeholders; identification of sites with high demonstrative value	Two steps: identification of action with Ecoadapt's stakeholders; co-constructed criteria to identify sites with communities where A selected for additional interest in creating a Natural Park promoting EcoTourism, B for its importance to local drinking water sources, C for improving streamflow while providing natural corridor for ecotouristic paths	Identified in several meetings with EcoAdapt's stakeholder group	1) EcoAdapt Socio-institutional diagnostic for the whole watershed; 2) Visits to rural communities for awareness-raising using info generated in point 1; 3) "My water Program" provides electrical pumps for water; 4) SDM (Deliverable 3.5) with EcoAdapt's stakeholders; 5) EcoAdapt Water Sources Assessment for rural Communities; 6) used criteria to prioritize among most critical and emblematic degraded sources	Previous work in other communities and validated for through SDM workshops with EcoAdapt's stakeholders,	Municipality of Concepcion, FCBC mandate for ecosystem conservation	Through workshops with EcoAdapt's stakeholders and new-comer institutions (e.g. Administration of El Pongo, Department of Family Agriculture that joint the planning process in later stages of the project; the SDM process that was helpful in the ranking of adaptation options, and focus on most critical and vulnerable producers (suffering prolonged dry periods and water scarcity frequently)
Actors types	Directly benefitting: Indigenous Community Council; urban focused civil society; indirectly all sensitized population. Supporting organizations: civil society, local Municipal Office, National CONAF	Families in the communities, communities' leaders, civil society (DAS, SEPADE), National agencies (INDAP, CONAF), local municipalities	BMAAM, SEPADE, Communities' leaders	Communities' leaders to coordinate and monitor implementation, communities members to volunteer for implementation, Municipality and FCBC to provide technical assistance	Communities Leaders and households heads, Municipality, FCBC	FCBC, Santa Cruz Departmental Directorate for Protected Areas, EcoAdapt's Stakeholders Group, communities	ABMJ, INTA extension office in Perico, Administration of El Pongo, Agriculture Cooperative of El Pongo, smallholder horticulturalists, Secretary of Family Agriculture,
Natural resources implied	Native trees, soil	Native trees (Roble, *Lenga*, *Ñanco*), degraded soils to be restored, shrubs (*Quila*), Slopes with spiritual values to local communities	All those involved in previous actions	Water sources, shrubland mixed with pastures	Firewood, drinking water	Forest ecosystems and biodiversity and ecosystem services; private pasturelands	water, soil, native and exotic trees used for reforestation of the riparian areas next to the irrigation channels.

Rules	Informal initial agreements to result in formal MoU (based on previously built mutual trust)	Awareness-raising results from a collaboration BMAAM and leaders advocating in their communities. Advocacy capacity building the BMAAM has a major responsibilities in organizing and implementing training	National Law prioritizing human consumption (unattended locally); Forest Law prioritizing protection around water sources; Municipal Territorial Plan	No rule in firewood harvesting; water use measured by counter	National Law for Protected Areas of the Authority of Forests and Land, Municipal Decree; private livestock producers	There is a formal tenancy agreement between the producers and the state-owned farm El Pongo and there are water shifts to irrigate the farms per each producer. There exists an informal set up for reciprocal exchange of irrigation turns' rights between the producers so they can adjust their irrigation needs accordingly.

A clear contextual difference in implementing actions was found between Chile and Bolivia sites on one side and Argentina on the other side. The political and institutional governance settings (as expanded in the section 3.4 on barriers) in these sites resulted in a different scope of actions compared to the Argentina situation. More specifically, in Argentina it was only possible to start implementation of one concrete action (i.e. irrigation efficiency) with a limited coverage (33 smallholder producers) compared with the original potential scope of action, which included four strands of actions and several allies in the implementation process. However, the small coverage is expected to increase given that neighboring producers in the area might adopt the water irrigation practice through peer-to-peer learning. The ABMJ in Argentina is facing a lot of uncertainty and social tensions with the national government as they are not being recognized as entity and have difficulties in implementing project actions. This is the main reason why it then limits the scope of their reach and actions in the field as they are forced to keep their profile low in terms of exposure, which is a challenge in itself for the EcoAdapt project, whereas in Bolivia and in Chile, the contextual socio-political situation is more favorable to implement these pilot actions. Given this contextual differences, the implementation of actions in Bolivia and Chile represented an opportunity to seize specific opportunities and harvest the fruits of a long co-construction process where EcoAdapt's CSOs, local communities and their leaders (following a CbA approach) felt ownership of actions and are using them to build more alliances, scaling out and up their scope. On the other hand, even though the reach and scope of actions are smaller in Argentina because of the challenging socio-political situation they are

faced with, this co-construction process has also been helpful in building new alliances and new opportunities for the future and it has closed areas of past work for the ABMJ (e.g. the dams areas), but on the positive side, it has opened up a new area of work for the ABMJ that the organization never worked before, the farm of El Pongo.

For example, in **Chile** the work started in Rainfall Capture engaged with actors with whom CSO partners had previous common work such as *Foundation Laura Vicuña* or local schools but not on awareness-raising initiatives on water and climate change (Figure 2).

Figure 2: School workshop with Foundation Laura Vicuña.

Similarly, the BMAAM previously was only focusing on forest products, but now is part of the Auracania Regional Platform to discuss and design a proposal of the Regional Water Adaptation Plan being invited by the Departmental Head for Development Planning representing the National Government of Chile. Moreover, local indigenous and *campesino* communities in Chile are currently engaged in implementing slope conservation actions they helped to identify. These actions engage community's organizations, Local Water Supply System Associations (APRs), Civil Society Organizations (SEPADE, DAS) and representatives of National Agencies (INDAP, CONADI, CONAF) as well as local Municipalities each with different mandates (see Table 2).

Table 2: Activities and responsibilities for adaptation actions regarding slope protection in BMAAM.

Activities	**Responsibilities**
Buy and delivery material inputs	Model Forest, SEPADE, Communities' leaders from Mallín del Treile, Pedregoso y Río Blanco.
Building perimetral fences	Communities' leaders and members from Mallín del Treile, Pedregoso y Río Blanco.
Planting native trees	CONAF, Communities' leaders and members from Mallín del Treile, Pedregoso y Río Blanco.
Local population awareness-raising workshops	Model Forest, SEPADE, INDAP, DAS, CONAF, communities' leaders and key actors.
Local radio spots and radio interviews	Radio Pehuén, Radio Bio Bio y Radio Kimün Pu Che with key actors and members of multi-stakeholder platform
Follow up and monitoring of activities	Model Forest and SEPADE.

Interactions among actors involved the use of a series of rules from those based on previously built reciprocal trust to those formalized in written and signed agreements among the parties. For the case of Chile, for example, a formal agreement is signed among the Neighbours Committee of *Til Tilco*, the Territorial Platform of *Cementerio* Slope and the owner of *Ñanco* Slope to guarantee clarity and compromise in slope maintenance while ensuring access for monitoring and field studies (Figure 3). On the other side, local community leaders will ensure community engagement with the maintenance of the fences while elders in Mapuche communities will ensure awareness and engagement of children and adults to maintain slopes that are also of cultural value to them. Also the Dissemination action in Chile provided space for scaling the thematic and network alliances of BMAAM.

Cementerio-Pedregoso Community

Til Tilco - Maillín del Treile community

Ñanco – Curacautín community

Figure 3: slope protection in different communities of BMAAM.

Several media are now engaged with our CSO partner in disseminating EcoAdapt's studies and several community leaders are now empowered to advocate and acknowledge the issues related to the water code and its importance in determining coping capacity with water scarcity periods due to climate variability. This activity is engaging several actors with different roles (see Table 3) to reach more than 25,000 people in the territories and especially train leaders of Rural Water Supply Organizations, other CSOs and Municipal technicians and authorities.

Table 3: Partners in dissemination in Chile, Activities and roles.

Activities	**Responsibilities**
Building Bulletins with information in advance of General Project EcoAdapt	Multi-stakeholder platform members, SEPADE, key actors.
Distribution of the Population Bulletin	Multi-stakeholder platform members, SEPADE, key actors.
Recording radio spots and media literacy project.	Multi-stakeholder platform members, SEPADE, key actors.
Distribution of radio spots media	Multi-stakeholder platform members, SEPADE, key actors and local radio stations.
Interviews on local radio to report the progress of the project for the territory	Multi-stakeholder platform members, SEPADE, key actors and local radio stations.
The publication in the media conducting regional pilot actions.	Multi-stakeholder platform members, SEPADE, key actors and local radio stations.
Distribution of publications in the territory	Multi-stakeholder platform members, SEPADE, key actors.

In **Bolivia** local communities are engaged in the reforestation process to protect key water sources areas. Communities have been engaged since the beginning of the project and have participated in the discussion meetings to identify problems and solutions (i.e. through plenary discussions). As a result of these visits with communities we identified that out of the 42 water bodies, 28% were very degraded while 72% were either somewhat preserved or in a very good conservation state. These constituted one of the criteria for prioritization of communities for intervention along with other criteria of accessibility and willingness to actively engage in implementation. Rules enabling implementation of water sources protection were shaped by National and Municipal rules as the Forest Law regulating permissions for accessing and use forests also near water bodies and enforced by the National Authority on Forests (ABT), or the

Municipal Land Use Plan which are known to communities but are rarely enforced at their scale of action (these rules are more easily applicable to larger scales of water bodies) (Figure 4).

Manantial in Limoncito community

Digged well in San Andrés community

Paúro in Candelaria community

Figure 4: three types of water sources EcoAdapt helped to protect in rural communities of the Zapoco Watershed.

Also communities' informal rules are adopted as avoiding washing clothes or allowing cows in main water bodies or allowing for natural regeneration near water sources. The Municipality plays an advisory role when requested by communities but in general although there are Water Committees formed by the National Program "*Mi Agua"* there are no formal rules to protect these critical sources.

For the case of households' health related actions (firewood use efficiency and water hygiene), women engagement has been key for their role in firewood collection and use in households. EcoAdapt CSO partner FCBC has provided technical training and material and the municipality the institutional backup and physical storage of some material. For the expansion of the protected area, the FCBC and the Municipality have played a major role from the identification of the need for it to the follow up on the procedure to formalize support from the Municipal Council and from on-going consultation with communities. They also were key in building support from the EcoAdapt's stakeholder group, the Provincial Government of Ñuflo de Chávez and the Supervisory Committee (*Comité de Vigilancia*).

Several actions were identified with stakeholders during the initial part of EcoAdapt's work in **Argentina** including actions to improve water quality in the most important drinking water sources and tourism attraction; improve water quantity (including water for irrigation); reduce the risk of flooding and improving soil management (especially in upstream areas). Among all these actions and through the SDM phases with stakeholders we identified the pilot actions consisting in irrigation efficiency, and dissemination and awareness-raising on water resources management in a context of adaptation planning under a changing climate. However, at the end of EcoAdapt's diagnostic and planning period when implementation had to start the institutional and political environment changed in an unfavorable way and reduced the scope of action to only one action aiming at improving irrigation efficiency with marginal smallholder producers that are vulnerable to water scarcity (Figure 5).

Figure 5. Improved irrigation system established in a plot of an Horticulturalist.

Dissemination and awareness-raising in this context was perceived to be risky in an electoral and politically-polarized context where, in addition, there are tensions between the National Environment Secretary and ABMJ with respect to the legitimacy and judicial status of Jujuy Model forest. The irrigation project will benefit marginal horticulturalists who are facing several obstacles in accessing water to irrigate their crops, especially during drier periods in which certain crops require more water for their growth (e.g. tobacco) besides a series of other problems, namely:

1) Need to invest time to manually deviate the water flow by removing the mud
2) Insecurity especially during irrigation night shifts
3) By manually deviating the water flow it opens up opportunities to do fraud by getting more water than they are supposed to get among producers
4) Water loss due to infiltration in water channels done manually
5) Need to rent more land to get more water (especially during water scarcity periods) but not to cultivate it as water rights are related to the surface that is rented, not to the surface cultivated.

The irrigation for this farm is managed by the Irrigation Consortium of the Perico Valley, which is predominantly formed by medium and large landholders (mainly tobacco producers) that dominate decisions on the assignment of water rights (i.e. smallholder horticulturalists depend on their concessions), which is especially critical during water scarcity periods. It is worth mentioning here that given the breakdown in formal and informal institutional support to our CSO partner (i.e. the ABMJ) there have been some valuable lessons regarding interaction with key allies. More specifically, even if most of the public agencies (e.g. Intendencia de los Diques,

Secretaría de Gestión Ambiental, etc.) primarily in the dams area have reduced their engagement (given the tension between the ABMJ and the National Environment secretary), the INTA (extension agency) has been able to keep its engagement for its technical interest and mandate in supporting the agricultural production in a context of water scarcity, development and climate change, and especially to support vulnerable groups such as smallholder horticulturalists.

3.2 Success factors, innovations, networks and outcomes

Among the most important success factors across all sites we can mention the importance of stakeholders' engagement from the very start of the project diagnostic phase. Even though there have been changes among some specific actors engaged (e.g. in Bolivia some urban stakeholders dropped off along the process; in Argentina there was a collapse of participation due to the socio-political situation and the electoral process and institutional conflicts) some other actors have maintained their engagement and have represented the core group for planning and implementation of energizing pilot actions. EcoAdapt's approach embracing a co-construction of knowledge to inform diagnosis of problems and identification of solutions has helped maintain engagement and the project ownership among stakeholders. The creation of a common space for dialogue and exchange of knowledge in which existing interests, motivations, knowledge and perceptions on problems related to water resources and to the changes in the frequency or intensity of climate events are part of the human dimension factors and are shared, has made possible an on-going engagement of multiple stakeholders and has helped build trust, commitment and project ownership along the way. Thus, this can be considered as success factor across all sites.

Other key success factors across sites are also part of the EcoAdapt approach adopted to design and implement the first diagnostic and planning phases of the project and we can mention: working through previously recognized key agents of change (e.g. in Argentina the extension office INTA, in Bolivia the Municipality and the Communities' leaders, in Chile the Municipality of Curacautin, or local education centers), building on the existing trust among our EcoAdapt's CSOs partners with local communities and stakeholders (which was built on previous

collaborations) and, building on these previous points, we were able to navigate through contrasting interests, motivations and working languages of different stakeholders (private, public, civil society) thanks to the ownership and leadership of our local CSOs partners and their close allies.

The success factors can also be related to the expansion of interest generated through the implementation of energizing actions as in the case of Argentina. Neighboring producers or early adopters might get interested through organized peer-to-peer learning events/activities. In this respect, a domino effect was common in all sites where communities, through the exchange of experiences among them were part of a social collective learning process that engaged new communities/stakeholders to adopt similar solutions. This was the case in Bolivia at different scales, namely: at the community level where the community of San Fermin decided to join similar pilot actions after having learnt from the experience of Limoncito through the EcoAdapt workshops at the household level for the case of water hygiene intervention; at the Municipal level where the Municipality of San Ignacio is willing to replicate the experience of establishing a protected area to conserve water bodies and create a Stakeholders group with informal authority that enables discussion for priority actions while representing important social forces and sectors; at the regional level where the Multi municipality platform of the Chiquitania Model Forest is adopting the model implemented by EcoAdapt for engaging local communities and sectors in the region to discuss climate adaptation and water issues.

The capacity to build new alliances represents a key success factor as the scope of action can be expanded to other communities through the exchange of experiences (e.g. scaling out in Bolivia through leaders' visits to learn about innovations in other communities or water management committees) or through engagement of higher officials and/or organizations working at other scales that can be regarded as disseminators of innovations promoting adoption at higher scales (e.g. scaling up in Bolivia working through the Multi-Municipal platform of the Model Forest at the Chiquitania regional level or through the engagement of the Stakeholder group in the Climate Change Provincial Platform or the Joint Mechanism for Adaptation and Mitigation Committee, or the engagement of the BMAAM into the National-Government-mandated Regional Water Adaptation Planning process for the whole Auracania).

In Argentina, although the implementation of pilot actions is in its early stage, there is a plan to engage other local and regional extension INTA offices to share experiences and lessons learned through the pilots and be able to up-scale and out-scale early adoptions of an improved irrigation system for smallholder producers and other vulnerable groups. Of course the capacity to reach out and build alliances is influenced by context-specific enabling conditions (some conjunctural, and some structural) that open the possibility for scaling out or up and which represent an additional and complementary success factor. For example, the recent interest of the Chilean Government to start discussions on reforms of the Water Code promoted the initiatives of regional Governments such as in Auracania to start designing regional water adaptation strategies which can benefit from and, actually, invite to their table experiences such as the one of BMAAM in EcoAdapt. By engaging in the water resources management in a context of development and adaptation planning/implementation, new actors joined the BMAAM network of stakeholders and they are currently applying to National funding for innovation to promote further actions in water and local economic development. They are being recognized as leaders in the landscape and beyond on themes related to water resources, social participation and adaptation planning. Similarly, in Bolivia the National Joint Mechanism for Mitigation and Adaptation adopts perspectives that are relevant for both CbA (i.e. by recognizing the importance of communities' participation) and EbA (i.e. by recognizing the role of ecosystem services) approaches, thus opening to the possibility to include local experiences such as the ones from EcoAdapt to provide examples for scaling up and out to other landscapes and communities.

Some success factors are also associated with the methodologies and approaches used that enabled good communication practices, and project ownership of tools following an adaptive management approach. For example, the use of visual methods in workshops, the use of participatory techniques that eased the access to information by participants and their provision of feedbacks on content and results are part of successful factors in the implementation phase. Expanding the implementation support network and the engagement of local formal authority as Municipalities in all sites was also key, though it was complicated due to the electoral years in all sites at some stage of the project. Regional Government in Chile and Bolivia have also been critical success factors as they provide the institutional back-up for the

sustainable implementation and scaling out of actions in the landscapes. The use of different communication media was also part of a success factors that helped to consolidate legitimacy of processes (e.g. the existence and communication work of the Stakeholders group in Bolivia, or building the social momentum in Chile or disseminating and building support through the fairs such as the Expodinamica in Argentina).

3.3 Barriers, controversies, trade-offs and uncertainties

Barriers

When analyzing the major barriers for implementation we should look back at the project approach and its emphasis on building capacity of stakeholders and communities to participate in adaptation planning as this process requires time and engagement to achieve the implementation phases. In this respect, the diagnostic phase might have presented in all sites some level of stakeholder fatigue, thus inducing some level of drop-off of key stakeholders. In Bolivia for example, rural communities maintained their interest in the diagnostic, planning and especially implementation phases; possibly motivated by their needs to find solutions to concrete problems. In Argentina we faced some level of stakeholders' drop-off due to fatigue in participation processes that engage multiple stakeholders and that in the past have not materialized in concrete actions combined with a context of socio-institutional weakness and political conflicts in an electoral year.

Some barriers were physical as, especially in Chile and Bolivia, the landscapes are large in extension, and logistics to follow up implementation might have been a challenge. This is especially so in Bolivia where the EcoAdapt CSO partner is based far from the Zapoco landscape. So visits to communities required investing significant logistic arrangements, which challenged the possibility to keep momentum and to provide more continuous technical assistance and follow up/back up. In this respect, the communities with proactive leaders that maintained closer relation with the Municipality had an easier path to implementation, as the Municipality was able to commit more resources for implementation.

There were also some other more invisible barriers such as those related to cultural idiosyncrasy and differences in working languages, which were significant in the process. More

specifically, the passive attitude of some communities in Bolivia represented a barrier to their engagement, e.g. wait for solutions to be identified and brought to them. In addition, in all sites differences in languages posed barriers to build a common understanding of terms between technical staff, researchers, communities and policy makers. This was true for the terms adaptation, zonification (i.e. in Bolivia), or the functional use of PARDI's graphs or the SDM matrixes. Although we (RTDs and CSOs partners) devoted significant efforts in designing and tailoring languages to participants it is possibly been unavoidable that some participants felt little ownership and understanding of the key messages. In this regard, the numerous workshops undertaken under the EcoAdapt project have helped in creating a common view or shared perception of issues.

Controversies

Several controversies emerged in the design and implementation process of adaptation actions. For example, in Chile and Bolivia most rural communities engaged in implementation are indigenous communities. During the identification of actions, controversies emerged between the indigenous *cosmovision* on water resources and the *progressive* paradigm of the private sector (e.g. mining and livestock in Bolivia and Chile). This was evident not only at the community level but also at the national level in the legal frameworks. In Bolivia, for example, the National Authority on Forest in charge of promoting conservation, restoration and audit deforestation actions has a controversial mandate in relation to the recent agreement between the Vice-Presidency and the private sector (Livestock and Agro-industry Associations) aiming at expanding the agricultural frontier by an additional 10 million ha by 2025 for national food security .

Another controversy is in regards to the different perspectives on adaptation actions in the face of water scarcity. While private actors (especially the most resources-endowed) feel they have the experience and capacity to cope with scarcity (i.e. have a de-facto clear preference for autonomous adaptation) and are reluctant to join collective efforts, the public and civil society actors are more oriented towards collective planning and implementation efforts (i.e. planned adaptation). This can be a clear barrier in implementing some actions (for example the

improved irrigation efficiency system in Argentina or the expansion of the protected areas in Bolivia) where private vs collective benefits are controversial.

Other controversies relate to different expectations that diverse group of participants have regarding the design and implementation process. Researchers aimed at generating new knowledge while serving the collective interest of local stakeholders but felt a tension between scientific rigor vs practical knowledge. Local communities expected these processes to result in concrete solutions mainly to address their daily problems regarding water resources and less interested in acquiring knowledge, methods and tools. Of course while this represented a motivation for engagement it was also an advantage to stimulate their engagement and empowerment acquiring new information and sharing their knowledge. On the other side, policy makers had the expectation to promote local economic and social development while ensuring their political power was not eroded but expanded. The advantage of having worked with legitimate local leadership (of local CSOs) has helped EcoAdapt level off these controversies and steer a successful implementation process.

Trade-offs

Several trade-offs have characterized the design and implementation of adaptation pilots. For example, the daily needs of communities facing water shortages and other series of development-related contingencies have put pressure on the identification and implementation of responses and pilot actions to solve these needs. Actions with potential benefits in the longer term have normally received little preference by the communities unless benefits were perceived also in the medium or shorter term. This was the case of the slope conservation efforts in Chile where the benefits for the water cycle (e.g. increasing infiltration and conserving soil once trees have well-developed root systems) might be accrued in the longer term but communities also perceive they might accrue the medium term benefits of eco-tourism or of the improved aspect of slopes relevant to their spiritual-cultural life. Other trade-offs can be reported in terms of the different perspectives of urban-based public-administration stakeholders as the Municipality preferring soft-type of adaptation measure (as the expansion of the protected area of Zapoco in Bolivia) vs rural communities preferring hard-type measures (fixing or investing in water pumping systems) again aiming at solving concrete material

development-related water problems. Finally we can notice the process-related trade-off between action and participation-related activities that has accompanied different moments of interactions among researchers and civil society partners, local population and stakeholders. Most pilot actions required several meetings to motivate and get stakeholders involved in implementation and in developing agreements for formalizing their engagement. Time devoted to these activities has always been in tension with the pressing needs for actions that communities and stakeholders have to cope with in their daily problems and also because of a certain level of fatigue in participation processes.

Uncertainties

Inherent uncertainties characterize the technical impact of the pilot actions on the water and environmental systems as climate variability increases along with water demand and generally pressure on ecosystems. However, important uncertainties faced by the implementation of adaptation actions are related with how the social system can maintain these actions and/or even expand them (outscaling or upscaling) especially as the authorities and institutions provide unstable back up.

More specifically, in all sites Municipalities have played a central role in identification (e.g. during the diagnostic phase) and in supporting implementation of most actions. However, electoral years have influenced the implementation of EcoAdapt and have showed how social processes in adaptation planning and implementation are dependent on local administrative and political interests that frame what is possible and what is not in a given time. For example, in Argentina the Municipality has been very involved at the beginning of the project but has withdrawn its support to implementation given the polarized electoral context in which actions were meant to be implemented. Similarly, in Bolivia the pre-electoral context in which actions were meant to start has limited the possibility to use communication and dissemination activities given the risk multi-stakeholder group to be considered as part of a political campaign (local perception of the group). The new municipality has shown willingness to support on-going processes, but the rule is that social processes related to implementation must, as in the words of some stakeholders and EcoAdapt's CSO partners, "start from zero" to convince and train new authorities and their technical staff.

Besides these conjunctural problems related to polarized political contexts, more structural problems associated to implementation are related to corruption and bad management of funds. For example, in Bolivia the local water cooperative of Concepcion Municipality had to change all directive-level personnel given mismanagement of funds of the previous administration, or the former Municipality which left a public debt which hampered the possibility to match funds and resources to implement adaptation actions. In Argentina the situation given the National electoral year is even more complicated as the pre-existing institutional tension between the local CSO coordinating the multi-stakeholder platform of the model forest (i.e. including public and private stakeholders) and National Government has been amplified by the local political polarization of the electoral year which has resulted in many public administration officers withdrawing from the social process of designing and implementing adaptation actions. In such a context, at least the INTA has been able to maintain its support to the process, because it is an organization with a clear technical mandate and genuine interest in improving the irrigation systems of marginal producers. With INTA's support, EcoAdapt in Argentina has been able to maintain actions in the field and has led to a strong and hopefully long-lasting tie with the ABMJ.

4. Discussion and conclusions

As general conclusions, important progress has been achieved in terms of strengthening long-lasting alliances and creating awareness in the sites. For example the *Stakeholder group* in Bolivia has been created and has been serving as an example for other municipalities. We can also mention that, at least for Bolivia and Chile, the implementation of the diagnostic studies and the design and implementation of adaptation actions concerned with water resources for development have empowered EcoAdapt's CSOs partners, which are now recognized regionally for their capacity to stir social process in implementing such actions with communities' support.

In Chile, Argentina and Bolivia there is physical evidence of adaptation actions that can serve as demonstrative actions to scale out and up, as is already occurring in most sites. The use of communication and dissemination strategies through local media and events has also served to

this objective as the efforts of communities and stakeholders are being known by other similar actors.

Adopting a clear leadership role in promoting adaptation to climate change in water resources has opened EcoAdapt's CSOs partners new funding opportunities as well as expanded their network of allies to achieve their corporate objective. This is especially true for the case of Bolivia and Chile. For Argentina, this is yet to be seen but there are chances for this to happen, especially because the joint efforts to implement the pilot action have been highly appreciated by each actor and the approach taken in the project has been regarded as innovative and unique, creating a possible avenue to develop further collaborations if other funding streams are sought and interest is well maintained until the end of the implementation of the pilot activities. In Bolivia, for example, the FCBC has facilitated the dissemination of experience in creating the Stakeholders group for adaptation planning and implementation, which has been taken as an example by other municipalities in the Chiquitania region. Moreover this has opened the opportunity to identify Concepcion as a pilot site (together with San Ignacio) for the implementation of the Joint Mechanism for Mitigation and Adaptation promoted by the Bolivian National Government. The Stakeholders group could be an interesting platform to implement this pilot depending on the support provided by the Municipality. Moreover, Concepcion has also been suggested as the site for the Regional Forum on Water Resources, which would be facilitated by the Stakeholders group, the municipality and the local water cooperative.

Finally, we can confirm, along with other authors (Van Aalst et al., 2008) that to achieve local impact engaging communities and local stakeholders from the beginning is a key strategy for successful collaborative and joint efforts that address local problems, local empowerment and project ownership as well as to ensure the project sustainability in the longer term. Moreover, ensuring the engagement of local formal and informal authorities is also strategic as it can facilitate ownership in the design and implementation of adaptation actions. Communication and dissemination should always be seen as adaptation implementation actions as they allow for empowerment and open opportunities for scaling up and out of these actions. At this stage, it is essential to ensure the identification and application of additional funding sources to

expand the scope of adaptation actions and thus implementation of the larger adaptation strategic plans in the sites.

ANNEX 1

Elementos clave y preguntas guía para el análisis de la tarea 4.4

1. ***Factores de éxito (capturar la forma en la que la identificación e implementación de medidas piloto han contribuido de forma positiva)***

1.1 Motivaciones o beneficios percibidos

Por qué los participantes se unieron y organizaron para las acciones piloto (acción colectiva)? Qué tan motivadoras han sido estas acciones? (*d)

Cuáles son los beneficios percibidos por los participantes y por qué estos beneficios se percibieron mayores que los costos asociados a diseñar e implementar estas acciones?

Cuáles son las motivaciones intrínsecas (motivaciones que movían a los participantes inclusive antes de saber sobre los recursos del proyecto piloto) y cuáles las externas (a raíz de los recursos/ apoyo recibido del proyecto piloto)?

Qué tanto podría darse un efecto '*crowding-out*' con relación al *outcome* (Frey & Jegen 2001, Rode et al. 2014), i.e. en qué medida la motivación externa mina (o podría minar) la motivación intrínseca de los participantes *?*

Cómo se generó y mantuvo la motivación para que se involucren distintos tipos de actores con motivaciones heterogéneas? (*b)

Cuál es el rol de *'soft power'* (Nye 2004) en generar motivación para las acciones piloto, es decir qué habilidades o mecanismos de persuasión han sido exitosos en lograr persuadir a los participantes a través de la atracción y co-optación en vez de l fuerza o retribución monetaria?

1.2 Valor del proceso de participación

Quiénes se unieron al proceso y por qué esos actores específicamente y no otros? Quiénes más se hubieran unido al proceso de haberse dado la oportunidad de una puerta abierta?

En qué ayudó el proceso de co-construcción que se implementó para la identificación y selección de medidas piloto, cuál fue el valor de este proceso? (*a, f)

Cómo y en qué medida facilitó este proceso las variables específicas de *Interaction y Outcomes* del marco de Ostrom?

Cuáles fueron los factores de éxito de este proceso? Elaborar por ejemplo sobre los factores identificados en el D 4.3: participación de *boundary agents* como los equipos de los BM que pueden contextualizar la información y al mismo tiempo traducir la teoría en práctica,

involucramiento de diferentes actores minimiza las controversias a largo plazo, participación de autoridades formales dan credibilidad y sostenibilidad al proceso de planificación

Cómo y en qué medida este proceso ayudó a facilitar cambio en *boundary partners* de cada BM con relación a marcadores de cambio (Earl et al. 2001) identificados bajo la teoría de cambio? (ver matrices y cambios en las redes del consorcio)

1.3 Valor de las acciones piloto (la sección 1.2 trata del proceso de identificación y diseño de acciones, aquí se trata de su implementación)

Cómo y en qué medida facilitaron estas acciones variables específicas de *Interaction y Outcomes* del marco de Ostrom?

Cómo y en qué medida estas acciones ayudaron a facilitar cambio en *boundary partners* de cada BM con relación a marcadores de cambio identificados bajo la teoría de cambio? (ver matrices y cambios en las redes del consorcio)

Cuáles fueron los factores de éxito de este proceso? Elaborar por ejemplo sobre los factores identificados en el D 4.3: acciones de rápido arranque (*quick-start actions*) generan motivación, interés, visibilidad y momentum y sirven de palanca para acciones más grandes, participación de autoridades formales dan credibilidad y sostenibilidad al proceso de implementación, acciones permiten generar un polo de atracción entre los participantes para consolidar los grupos impulsores, aprender haciendo, intercambios y visitas de campo permiten aprender de la experiencia (peer-to-peer learning) y generar confianza y local know-how

Cómo contribuyeron estas medidas a balancear asimetrías de género y/o ética? (*g) Elaborar por ejemplo como la práctica 'manga' a permitido mejorar la participación de mujeres y ha generado una oportunidad para la equidad de género

2 Barreras, trade-offs y controversias que emergen en el proceso (identificar las barreras que han obstaculizado el proceso y posibles trade-offs y conflictos que emergen, de posible también analizar si se han podido mediar/ resolver y en este caso explicar cómo y señalar como factor de éxito)

2.1 Tensiones intrínsecas del proceso

Qué dinámicas internas existen que debilitan el proceso? Elaborar por ejemplo sobre las siguientes dinámicas identificadas en el D 2.4 y D 4.3: fatiga sobre procesos de participación, falta de acción (pérdida de credibilidad), inestabilidad institucional (cambio de plantel, falta de capacidades, falta de liderazgo o visión), traslape y poca claridad de roles, falta de aplicación de normas, poca cohesión social y/o colaboración en relación a recursos hídricos

Qué controversias y trade-offs (negociaciones) surgieron en el proceso de priorización e implementación de acciones y por qué? (*c)

Cómo se balancearon estas controversias y trade-offs (en caso de que se haya podido mediar) y es esto producto del proceso del proyecto o capacidadesç instituciones existentes anteriormente?

Cómo obstaculizan estas tensiones la medida en la que las acciones facilitan variables específicas de *Interactions y Outcomes* del marco de Ostrom?

2.2 Barreras externas que afectan el proceso

Qué barreras o dinámicas han generado mucho ruido en el proceso y por qué? (*c) Elaborar por ejemplo sobre las siguientes barreras identificadas en el D 4.3: dinámicas políticas (tensiones, elecciones, etc), protestas o prioridades sociales que mueven la atención a otro tema, crisis económicas

Cómo y en qué medida estas barreras han afectado los factores de éxito identificados anteriormente?

3 Incertidumbres (qué aspectos implican un alto nivel de incertidumbre y cómo se pueden monitorear)

3.1 Incertidumbres intrínsecas del proceso

Cómo se puede medir el proceso de cambio observado? Elaborar con base en teoría de cambio y otras ideas sugeridas por participantes

Qué aspectos son difíciles de evaluar y/o medir porque implican un alto nivel de incertidumbre pero son clave para el objetivo del proyecto? En otras palabras, qué incertidumbres intrínsecas son importantes a considerar en el proceso y cómo se pueden caracterizar?

Cómo se podría monitorear el cambio en estos aspectos clave y qué mecanismos institucionales existen que se podrían usar para manejar mejor estas incertidumbres?

3.2 Incertidumbres externas

Qué aspectos están 'fuera de control' de los participantes liderando las acciones piloto y pueden incrementar la incertidumbre en los cambios deseados?

Qué mecanismos se podrían considerar para prevenir o minimizar los posibles efectos negativos de estas incertidumbres? Elaborar tomando en cuenta los planes de contingencia de cada BM

4 Mecanismos para *out-scaling* y *up-scaling*

*4.1 Mecanismos creados (*externalidades institucionales positivas)

Cómo se ha involucrado estratégicamente a las entidades del gobierno para conseguir apoyo en la planificación e implementación de las acciones piloto y más adelante en la estrategia de adaptación? (*e)

Cómo se ha aprovechado de instrumentos legales existentes y se los ha complementado para poder implementar las acciones y su réplica fuera de las áreas de estudio? Elaborar por ejemplo sobre oportunidades mencionadas en el D 2.4 y D 4.3: el mejoramiento o construcción de los planes de gestión de áreas protegidas, fortalecimiento de los Planes de Gestión Integral de Bosques y Tierras.

Cómo se ha mejorado las interacciones en las redes de información y colaboración en los sitios y fortalecido conexiones con centros de investigación, educación y media que antes no existían o eran muy débiles? Elaborar por ejemplo sobre nuevos enlaces con universidades locales, media, campanas

4.2 Oportunidades existentes

Cómo se ha aprovechado de foros nacionales y regionales para dar a conocer las experiencias obtenidas con el proceso / las acciones? Elaborar por ejemplo la participación en diferentes foros mencionados en el D 4.3 como Diálogo Provincial, Foro Regional, COP

Cómo se abren más canales de incidencia que van a permitir escalar o replicar las acciones y lecciones aprendidas? Elaborar sobre actividades que se planean desarrollar en este sentido

Cómo se ha utilizado o se planea utilizar las acciones piloto como palanca para seguir avanzando en una estrategia de adaptación legítima a nivel de paisaje, país, región? (*e)

5 Recomendaciones para informar decisiones/ políticas sub-nacionales, nacionales y regionales

Como conclusión podemos presentar recomendaciones/ reflexiones/ lecciones/ principios a considerar en la formulación de estrategias, planes y políticas para la adaptación basada en ecosistemas:

Qué podemos destilar como mensajes clave de toda la información sistematizada en torno a los elementos de análisis presentados arriba?

Cuáles son lecciones aprendidas sobre los elementos que permitieron que las acciones tengan un impacto positivo que deberíamos compartir con la comunidad internacional?

Qué necesidades (en términos de contenido y formato) existen en la comunidad de práctica y de investigación con relación a la información que hemos generado? Cómo podemos compartir la sistematización con diferentes audiencias?

References

Arquiñego, S., Olivera Rojas, L. & Orellana Lopez, A. (2015) En la mira: vulnerabilidad del cambio climático en Bolivia (on line). URL: http://cambioclimatico.democracyctr.org/?page_id=541

Barnett, J., O'Neill, S. (2010) Maladaptation, *Global Environmental Change* 20, 211–213.

Barrow, E. & Mlenge, W. (2003) Trees as Key to Pastoralist Risk Management in Semi-Arid Landscapes in Shinyanga, Tanzania, and Turkana, Kenya. International Conference on Rural Livelihoods, Forest and Biodiversity, Bonn.

Berkes, F. & Folke, C. (eds.) (1998). *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge: Cambridge University Press.

Blaikie, P., Cannon, T., Davis, I. & Wisner, B. (1997) At Risk: Natural Hazards, People's Vulnerability and Disasters. Routledge, London.

Devisscher. T., G. O'Brien, P. O'Keefe and I. Tellam (eds.) (2009) The Adaptation Continuum: Groundwork for the Future. ETC Foundation, Leusden.

Devisscher, T. (2010) Ecosystem-based Adaptation in Africa. Rationale, Pathways, and Cost Estimates. Sectoral Report for the AdaptCost Study. UNEP, Nairobi.

Earl et al. (2001). Outcome Mapping. IDRC, Ottawa.

Folke, C., Carpernter, S., Walker, B., Scheffer, M., Elmqvist, T., Gunderson, L. & Holling, C.S. (2004) Regime Shifts, Resilience, and Biodiversity in Ecosystem Management, *Annual Review of Ecology, Evolution, and Systematics* 35: 557-581.

Girot, P., Ehrhart, C., Oglethorpe, J., Reif, H., Rossing, T. Gambarelli, G., Ikkala, N. & Phillips, J. (2012) Integrating Community and Ecosystem-based Approahces in Climate Change Adaptation Responses. Ecosystems & Livelihoods Adaptation Network.

Folke, C., Chapin, F. S. & Olsson, P. (2009) *Transformations in Ecosystem Stewardship*. In: Principles of Ecosystem Stewardship, Chapin, F.S., Kofinas, G.P., Folke, C. (Eds.). Springer Science+Business Media, New York.

Frey, B & Jegen, R. (2001). Motivation Crowding Theory. Journal of Economic Surveys

Hallegatte, S. (2009) Strategies to adapt to an uncertain climate change. *Global Environmental Change*, 19(2): 240-247.

Heltberg, R., Siegel, P.B. & Jorgensen, S.L. (2009) Addressing human vulnerability to climate change: toward a 'no-regrets' approach, *Global Environmental Change*, 19(1): 89-99.

Jones, H. 2011. Taking responsibility for complexity. ODI Working paper, London.

Levine, S, Ludi E. & Jones, L. (2011) Rethinking Support for Adaptive Capacity to Climate Change: The Role of Development Interventions, ACCRA. ODI, London.

Monela, G. C., Chamshama, S. A. O. Mwaipopo R. & Gamassa, D. M. (2005) A Study on the Social, Economic and Environmental Impacts of Forest Landscape Restoration in Shinyanga Region, Tanzania. Dar-es-Salaam, Tanzania, Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism, United Republic of Tanzania, and IUCN - The World Conservation Union Eastern Africa Regional Office.

Nye, J. (2004) Soft Power: The Means to Success in World Politics. Public Affairs, New York.

Ostrom , E. (1990) Governing the Commons: The Evolution of Institutions for Collective Action

Ostrom, E. (2007) A diagnostic approach for going beyond panaceas. PNAS

Ostrom, E. et al. (2007) Going beyond panaceas. PNAS

Ostrom, E. (2009) A General Framework for Analyzing Sustainability of Social-Ecological Systems. Science

Reid, H., M., Alam, R. Berger, T. Cannon, S. Huq, & Milligan, A. (2009) Community-based adaptation to climate change: an overview. In *Participatory Learning and Action*, issue 60, pg. 13.

Rode, J. et al. (2014) Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence. Ecological Economics

Van Aalst, M. K., Cannon, T., & Burton, I. (2008). Community level adaptation to climate change: the potential role of participatory community risk assessment. Global environmental change, 18(1), 165-179.

Vignola, R. et al. (2009). Adaptación al cambio climático y servicios ecosistémicos en América Latina, libro de actas del seminario internacional SIASSE 2008, Turrialba.

Vignola, R., Harvey, C. A., Bautista-Solis, P., Avelino, J., Rapidel, B., Donatti, C., & Martinez, R. (2015). Ecosystem-based adaptation for smallholder farmers: Definitions, opportunities and constraints. Agriculture, Ecosystems & Environment, 211, 126-132.