



# A Methodological Orientation for Social Learning Based Adaptation Planning: Lessons from Pilot Interventions in Rural Communities of Burkina Faso, Chile and Senegal

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## Abstract

Social learning processes have untapped potential to integrate knowledge and experiences across a diverse group of stakeholders, including strengthening a community's ability to transfer their local knowledge and experiences in dealing with change, to develop locally relevant Climate Change Adaptation (CCA) strategies. This paper evaluates experiences from the application of a CCA planning methodology that leverages social learning as the main approach for local communities to plan and design their CCA strategies in Burkina Faso, Chile and Senegal. In each case, the paper analyses the key features of the emerging social learning processes during the application of the methodology, presents and analyses participants' feedback and impressions of the process, as well as facilitators' feedback on the strengths and weaknesses of the methodology. An engaging social learning process was demonstrated through observing varying levels of occurrence of seven features - the pooling of different fields and forms of knowledge amongst the participants; creation of joint language; reshaping of perceptions and preconceptions; transformation of attitudes and patterns of communications; redefining of roles in the learning process; establishment of common values and mutual trust building. The methodology was referred to as being simple, inclusive, helping create ownership and highly interactive, by facilitators who used it. While this research demonstrated the immediate and short-term impacts of social learning to be positive for the CCA planning process, longer term monitoring is needed to fully understand the opportunities and limitations of social learning for CCA planning. In doing so, it is important to recognise the project driven modalities of CCA for rural communities is a limitation in itself in truly benefiting from the long-term benefits of social learning.

**Keywords** Climate change adaptation · Social learning · Participatory tool · Transdisciplinary research

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## Introduction

Since the early 2000s, Community based Adaptation (CBA) has emerged as a key approach for poor and marginalised communities to identify and implement actions in order to adapt to climate change. CBA aims to facilitate mapping of vulnerabilities and development of locally relevant responses to climate change impacts, as identified and prioritized by the communities, themselves (Forsyth 2013). In doing so they use their local knowledge, experiences and skills to determine activities, usually within the contexts of projects and initiatives led by external actors such as those from international or local development and conservation organisations. CBA does not have a formal definition. However, a recognised general description is ‘a bottom-up and strengths- based approach to strengthening community level adaptive capacity, focused upon vulnerable communities’ (Kirkby et al. 2017, p1).

As argued by Dodman and Mitlin (2013), the evolution of CBA practices in the last 10 to 15 years can be viewed as analogous to how efforts were made in localising sustainable development practices in the face of shocks and stresses. Consequently, CBA can learn from the various debates and approaches that resulted from failures of top-down development models and subsequent efforts to define good practices for ‘participatory development’. It is further argued that “for this to happen, CBA needs to include tools and methods that enable a more explicit transfer of power to local communities, as otherwise decisions are made by those outside the community who are only partially or not at all accountable to local residents” (p 654). Similarly, Reed (2008) discusses the disillusionment resulting from unrealised claims of participation within environmental management. Participation centred on planning and outcomes versus people and capacity development, consultation fatigue where stakeholders see little returns or rewards for their inputs, as well as absence of evaluation criteria for assessing participation, have been some key lessons learnt within the environment management practice (Reed 2008).

Adger (2003) argues, that, often decisions on adaptation are based on individual or selective group interests, leaving out key vulnerable and marginalised groups. Instead, collective decision-making and action, based on interdependencies due to relationships amongst all actors, is required for locally relevant and sustainable solutions that benefit the most vulnerable. According to Gordard et al. (2016) decision making perspectives for adaptation challenges concerning e.g. climate change must be broadened to include societal values, rules and knowledge. It cannot merely be based on defining the problem and selecting options by a particular decision maker. If these aspects are not included in the decision-making framework, they later end up constraining the actions needed for adaptation. Boillat and Berkes (2013) take these arguments even further when explaining that the very meaning, interpretation and perceptions of climate change from indigenous and local community perspectives should be a strong focus for decision making for adaption, in order to harness a community’s inherent abilities to live with change rather than viewing them as helpless victims.

In light of this, there is growing recognition of the role of social learning in facilitating societal values, collective learning and behavioural changes and traditional knowledge in adaptation decision-making (Harvey et al. 2013; Boillat and Berkes 2013; Measham 2013; Nakashima et al. 2012). Social learning is defined as a collective and reflexive process, preferably happening in face-to-face interactions. It aims at allowing participants recognizing how the one-sided pursuit of their individual interests is part of the problems they are facing and uncover, through this, untapped potentials for changing constraining wider societal structures. Social learning is hence based on fostering collective action that aims at revising

and re-integrating individual interests in view of a joint understanding of problems and solutions oriented towards the common good (Rist et al. 2006). Consequently, a social learning *process* must “1) demonstrate that a change in understanding has taken place in the individuals involved; 2) demonstrate that this change goes beyond the individual and becomes situated within wider social units or communities of practice; and 3) occur through social interactions and processes between actors within a social network” (Reed et al. 2010, p1). According to Rist et al. (2006) social learning spaces enable co-creation of communicative action, which can be assumed as a common understanding of the situation that facilitates collective, coordinated and collaborative actions amongst diverse external and local actors.

Albert et al. (2012) argue that social learning can strengthen the significance of planning outcomes on the final decision-making and generates knowledge and skills that can be useful beyond a single planning process. Similarly, Bormann et al. (2012) demonstrate that social learning can help in combining scientific climate change information with local and stakeholder knowledge for decision-making. Using ‘Participatory Systemic Inquiry’, Butler et al. (2015) promote social learning in rural provinces of Indonesia and Papua New Guinea in order to integrate top-down and bottom-up adaptation planning for strengthening adaptive capacities. The former authors assert that by intentionally designing a process, which promotes learning and mitigates power dynamics, all stakeholders and resulting social networks were empowered. In arguing that adaptation to environmental changes (including climate change) within socio-ecological systems involves two parallel processes – managing actual change in the present and preparing for expected future changes, Brown et al. (2016) demonstrate that social learning in Mexico, Colombia and Argentina - if focused on participatory approaches - can catalyse forward-looking, pro-active and innovative planning for adaptation.

Such studies strengthen the argument for applying social learning approaches to CCA. However, the commonly promoted CCA planning tools and approaches in the Nairobi Compendium (UNFCCC 2005) do not leverage the potential of social learning. While the facilitation of CCA planning processes through social learning have been successfully tested (Albert et al. 2012) or social learning was integrated with other theoretical frameworks assessing adaptation options (Reed et al. (2013), published literature on methodological orientation of how social learning can be used to improve local CCA planning is scarce.

This paper evaluates experiences from the application of a CCA planning methodology that leverages social learning as the main approach for local communities to plan and design their CCA strategies in Burkina Faso, Chile and Senegal. In each case, the paper analyses the key features of the emerging social learning processes during the application of the methodology, presents and analyses participants’ feedback and impressions of the process, as well as facilitators’ feedback on the strengths and weaknesses of the methodology.

## Methodology

### Research Approach

This study adopted a transdisciplinary research approach for seeking locally relevant solutions for climate change risks in rural communities from Burkina Faso, Chile and Senegal. Such research approaches can be defined as ‘...research that includes cooperation within the scientific community and a debate between research and the society at large’ (Wiesmann et al. (2008, p453) and aims to identify solutions for a societal sustainability challenge. The

challenge, in this case, being able to adapt to climate change impacts on livelihoods and natural resources through identifying and assessing existing solutions and explore the need for including new knowledge and practices. Understandably, such an endeavour requires the involvement and active contribution of a wide range of stakeholders who may be concerned with the site. In addition, the societal challenge and the possible solutions need to be determined. An important consideration in determining such solutions is the need for bringing together different forms of knowledge, understanding the implications of each other's roles and ensuring equity and fairness in the process, as well as regarding the distribution of the resulting benefits and costs (Hirsch Hadorn 2006).

In order to leverage the potential of transdisciplinarity for such sustainability related problem solving, a key consideration is the design and use of tools and methods employed for facilitating stakeholder convening and planning. Accordingly, this research focused on exploring the opportunities and limitations of a social learning based participatory planning tool for CCA in the 3 case studies (Roth and Rist 2012). The research was based on analysing a social learning process resulting from the application of the above-mentioned participatory planning tool for CCA, which was aiming at an interactive knowledge co-production through proactively facilitating interactions between science and non-science local actors.

In transdisciplinary research the generation of scientific insights from an involvement in concrete action is considered as “mode 2” knowledge production that according to Limoges (1996:14–15) means talking of “... ‘context-driven research, meaning research carried out in a context of application, arising from the very work of problem solving and not governed by the paradigms of traditional disciplines of knowledge.” ‘Mode 2’ knowledge production goes beyond classical academic and researcher-driven disciplinary forms of inquiry (‘mode 1’ knowledge production) and aims at co-producing socially robust knowledge, in which the researchers are part of the scenario and social dynamic that is being researched (Pohl et al. 2010; Nowotny 2003). In doing so, the first and second authors of this paper acted as facilitators of the interactive process through applying the planning tool. They fulfilled double roles as trainers and facilitators of local moderators in the tool on the one hand, and as researchers studying the main features and immediate outcomes of the social learning processes on the other hand. These double roles, of course, carry the risk of glossing over critical aspects of the learning processes under investigation were inherent in this form of ‘mode 2’ knowledge production. In order to minimize this risk the two first authors asked the third author, an international expert in transdisciplinary research for sustainability as well as social learning approaches, to cross-check and challenge, where necessary, the empirical insights of the two researchers throughout the process of data interpretation and development of this paper. This proved to be very useful yet in fact, the constant interaction during the process of interpretation of data and in the writing of the paper with the third author, helped uncover some critical and negative aspects related to the main features and immediate outcomes of the social learning process that emerged from the three pilot workshops.

## Case Study Sites

The research was conducted at three rural sites in Burkina Faso, Chile and Senegal in 2013. Three CCA planning and design workshops were carried out in the framework of the *Ecosystems Protecting Infrastructure and Communities (EPIC)* project as pilot applications. The project was implemented by the International Union for Conservation of Nature (IUCN) and its partners, with funding from the International Climate Initiative (IKI) of the Government

of Germany. The criteria for the research sites selection was 1) areas of high vulnerability to climate change, 2) representation of a diversity of socio-economic and environmental contexts, as well as diverse climate risks (see Tables 1 and 3) interest of national project teams in applying the research within EPIC. The project aimed to enhance community resilience to climatic hazards such as droughts and floods through conservation, restoration and sustainable use of ecosystem services.

## Pilot Workshops

The three pilot workshops applied the *Climate Resilience Evaluation for Adaptation Through Empowerment (CREATE)* approach, currently published only as grey literature, IUCN (2016). The tool is based on approaches and lessons from other adaptation planning tools such as CARE's *Climate Vulnerability and Capacity Analysis (CVCA) toolkit* (CARE International and iisd 2010) and the *Designing Climate Change Adaptation Initiatives - A UNDP Toolkit for Practitioners* (UNDP 2010). Social learning is introduced to the integrated CCA toolkit through the *Promoting Local Innovations (PLI)* methodology (Roth and Rist 2012). Innovations are understood as new practices that embrace various aspects of technological, institutional, socio-economic, or environmental change leading towards sustainable development (Rist et al., 2009). The PLI methodology is based on the concept 'Learning for Sustainability' (Lfs) (CDE 1998) and uses interactive pedagogy tools to generate social learning processes that promote mutual reflection and collective action among a group of multiple stakeholders around sustainability issues. Using CREATE, local innovations were selected through a prioritisation exercise and agreed upon by the workshop participants. Hereby the main goal was to motivate the local communities to engage in joint process of knowledge co-creation as a basis for local knowledge based responses to climate change. The workshop steps are summarised in Table 2.

The workshops were organised in collaboration amongst experts of IUCN, the national and local government agencies for environment management and climate change, local communities, research institutes, and non-governmental organisations. Sites were recommended by the government agencies based on their assessment of the most vulnerable communities to climate-induced pressures. Partners for each site were identified through a joint stakeholder mapping, carried out by IUCN and the government. The mapping was based on who was already active within the area of work in those sites, which of these stakeholders would be instrumental in supporting or facilitating implementation in the longer term and what knowledge and skills would be needed during and after the planning process. Partners were either formally or informally approached to be part of the process. The communities were invited to engage either through the local government agencies, the mayors' offices or directly by IUCN officers in the field who were already working in those sites. Due to practicality of managing a limited number of participants for meaningful participation, local communities were invited to appoint representatives. In Burkina Faso and Senegal, representatives were chosen by the villagers during their village meeting. In Chile all interested residents of the territory nominated themselves and attended. The participants for all workshops roughly had equal numbers of men and women. Table 3 provides further details on this. While the Chile workshop consisted of participants in the age range of 25 to 45, the Burkina Faso and Senegal workshops had at least one elder and one youth from each village.

The workshops were hosted by the communities in the field and conducted in the local language. A mixed group of facilitators from local government authorities, IUCN field officers

**Table 1** Social, ecological, economic and climatic context of the three case study sites

Context	Burkina Faso	Chile	Senegal
Social	<ul style="list-style-type: none"> <li>• 6 villages (Tibtenga, Basnéré, Sillia, Ramdolla, Tougou and Birdninga) in the Ouahigouya region;</li> <li>• Population: 100 to 5500 per village;</li> <li>• Strong community based use and management of natural resources.</li> </ul>	<ul style="list-style-type: none"> <li>• 6 localities (San Fabián de Alico, Coihueco, Pinto, El Carmen, Yungay and Pemuco) within the UNESCO Biosphere Reserve “Corredor Biológico Nevados de Chillan – Laguna Del Laja”, in the BioBio región;</li> <li>• Population: 3500 to 24,000 per locality;</li> <li>• Mainly individual family-based agriculture practiced by migrants from other parts of Chile). Absence of community cohesion. Biosphere Reserve management committee was inactive.</li> </ul>	<ul style="list-style-type: none"> <li>• 6 villages of the Djilor community (Djilor, Goudéme, Sidy, Gagué Chérif, Kamatan Mbambara, Péthie and Sadioga) in the Fatick region;</li> <li>• Population: 300 to 2700 per village;</li> <li>• Strong community based use and management of natural resources.</li> </ul>
Ecological	<ul style="list-style-type: none"> <li>• Sahelian agro-climatic zone, long dry season from October to May, which includes dry, cool harmattan winds from November to April; short rainy/monsoon season from June to September;</li> <li>• Temperatures range from 25.7 °C to 42.8 °C;</li> <li>• Forest cover has rapidly decreased in the last decade due to increasing populations and overexploitation. This has resulted in lack of wood, timber, medicinal plants, food, biodiversity and pasture space.</li> </ul>	<ul style="list-style-type: none"> <li>• Cool-temperate climate, with dry summers and cold winters;</li> <li>• Temperatures range from 10 °C to 30 °C;</li> <li>• Increased experience of droughts (leading to water shortages in supply) and increased wildfire occurrences in the past 5 years. Forest cover has rapidly declined due to farming, forestry and energy consumption as well as due to infrastructure development, leading to loss of biodiversity and soil degradation.</li> </ul>	<ul style="list-style-type: none"> <li>• Sudano-Sahelian ecozone, with rainy/monsoon weather (winter) with hot/humid winds from June to October and a dry season from November to May, with hot/dry winds - the Alizé continental or Harmattan;</li> <li>• Temperatures range from 25 °C to 35 °C;</li> <li>• Vegetation cover has declined due to drought, population growth and salt-water intrusion. Rural migration has increased due to this in the past decade and loss of biodiversity has occurred, especially warthogs, lions, jackals, hyenas and migratory birds.</li> </ul>
Economic	<ul style="list-style-type: none"> <li>• Subsistence agriculture, livestock farming and trade in village markets</li> </ul>	<ul style="list-style-type: none"> <li>• Livestock farming, native forest management, collection of non-timber forest products, tourism (especially winter sports) and plantation forestry (Cordero et al. 2014)</li> </ul>	<ul style="list-style-type: none"> <li>• Subsistence and small-scale market-oriented agriculture; livestock rearing, fisheries, tourism and salt extraction and trade in the local markets</li> </ul>
Climate Change related vulnerabilities	<ul style="list-style-type: none"> <li>• Longer dry seasons, irregular rainfalls, an average increase in temperatures plus and overall decrease in rainfall recorded in the past decade.</li> <li>• stronger winds cause more rapid soil erosion, leading to further soil degradation (IUCN and ProAct 2013)</li> </ul>	<ul style="list-style-type: none"> <li>• Rise in temperature in the past decade, which is altering snowmelt. This will exacerbate seasonal floods and droughts (Arumi and Rivera 2013)</li> </ul>	<ul style="list-style-type: none"> <li>• Increased frequency of droughts, higher temperatures and salt intrusion on agricultural land in the past 10 years, according to observations by the communities (IUCN and ProAct 2013)</li> </ul>

**Table 2** Summary of the workshop steps for the integrated toolkit, adapted from Roth and Rist (2012)

Step	Focus	Description	Social Learning Elements
1	Introducing participants to the interactive pedagogy approach and establishing joint teamwork values	Getting to know each other through introductions, establishing a sense of teamwork and common values through role-plays focused on conflict resolution and experiences.	Establishing joint values Assembling a diverse group of 'expertise' for problem solving
2	Participatory climate change vulnerability diagnosis	Using vulnerability assessment matrices, defining the climate change problem. Establishing non-climatic sensitivities and external factors beyond the community's control.	Collective problem diagnosis for collective understanding
3	Joint visioning for the future, in light of 2, above	Visioning for the future through 2-D or 3-D models of the territory discussions on the desired socio-economic and socio-ecological condition.	Collective vision, articulation and ownership for desired change Contextualisation and translation of change, 'localisation process'
4	Identifying adaptation responses (termed innovations) according to 2 above	Communities identify innovations based on local environmental, economic, and social resources and potentials, with inputs from external actors, as needed. Mapping of information gaps on the innovations. Using peer-to-peer learning in a marketplace setting to appraise all responses according to ecological (including CC and disasters) concerns, socio-political/economic considerations and cultural, ethical, health related concerns	Making potentials and limitations of existing local knowledge and practices on CCA explicit and trigger a process of collective reflection about its relevance, transferability or needs of being re-assessed, innovated and complemented by knowledge from external actors.
5	Field visit to analyse existing examples of innovations, nominated and organised by one or group of participants	Existing examples of innovations identified are visited and appraised them within their social, economic and environmental context and consider its positive and negative impacts.	Promote collective validation of existing local knowledge and practices of CCA identifying strengths, weaknesses and possible innovations as seen by those actors interested in replicating local practices carried by other actors.
6	Joint action planning, following identification of, and agreement on, final vulnerabilities and innovations	Identifying resource needs, defining roles and agreeing on a work plan	Collective action needed, understanding and visualising individual roles within it
7 (optional)	Local, public fair to display and explain the final innovations and action plan	An opportunity to communicate and share the workshop journey and its outcomes with the wider community and stakeholders beyond the workshop participants, including with political and religious leaders	Expanding the network of converts to share and promote the vision further

**Table 3** Workshop contexts, climatic vulnerabilities and adaptation responses identified in Burkina Faso, Chile and Senegal

Context	Burkina Faso	Chile	Senegal
Workshop details	<ul style="list-style-type: none"> <li>• <b>Date:</b> 8–12 July, 2013</li> <li>• <b>Duration:</b> 5 days</li> <li>• <b>Participants:</b> 45–15 women and 30 men</li> <li>• 29 village representatives from 6 villages, 20 men and 9 women</li> <li>• 7 local NGO representatives</li> <li>• 4 local technical organisations</li> <li>• 4 local Government agencies</li> <li>• 1 national research organisation representative</li> <li>• <b>Facilitators:</b> 2 facilitators from IUCN Burkina Faso, 2 international experts from IUCN headquarters</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Date:</b> 2–6 September, 2013</li> <li>• <b>Duration:</b> 4.5 days</li> <li>• <b>Participants:</b> 18–7 women and 11 men</li> <li>• 6 national and local NGOs</li> <li>• 7 national and local Government agencies</li> <li>• 2 academic institutions working in the region</li> <li>• 3 private sector, independent representatives</li> <li>• <b>Facilitators:</b> 3 facilitators (1 local NGO officer, 1 regional gov. rep., 1 local researcher); 3 international experts from IUCN and Univ. of Bern</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Date:</b> 15–19 July, 2013</li> <li>• <b>Duration:</b> 4.5 days</li> <li>• <b>Participants:</b> 26–10 women and 16 men</li> <li>• 3 representatives per village total of 18, 9 men and 9 women</li> <li>• 6 national and local Government agencies</li> <li>• 2 regional and village council representatives</li> <li>• <b>Facilitators:</b> 1 facilitator from IUCN Senegal, 2 international experts from IUCN headquarters</li> </ul>
Climatic Vulnerabilities (following prioritisation by communities)	<ul style="list-style-type: none"> <li>• high winds, drought, sandstorms, floods, high temperatures and desertification</li> </ul>	<ul style="list-style-type: none"> <li>• drought, forest fires (including rising temperatures)</li> </ul>	<ul style="list-style-type: none"> <li>• drought, flash flooding, salinization</li> </ul>
Adaptation responses (innovations identified in the workshop)	<ul style="list-style-type: none"> <li>• Soil restoration through endogenous techniques (Zai and stone bunds);</li> <li>• Replanting for increasing the vegetation cover and restoring riverbanks (against erosion and silting).</li> </ul>	<ul style="list-style-type: none"> <li>• Creation of a water committee to regulate the sustainable use of water, including water use in the tourism sector;</li> <li>• Promoting the sustainable management and conservation of native forests;</li> <li>• Establishing an agency to promote eco-tourism and conservation of the Biosphere Reserve;</li> <li>• Promoting sustainable energy consumption by designing lighting solutions, building architectural designs, and encouraging sustainable firewood use.</li> </ul>	<ul style="list-style-type: none"> <li>• Using the “Assisted Natural Regeneration” for conserving forest resources (forest ecosystem);</li> <li>• Construction of anti-salt bunds with local materials (marine and coastal ecosystem);</li> <li>• Establishment of a mechanism for regulating the exploitation of natural resources (forest resources and fishery) for sustainable management (resource governance).</li> </ul>

and other organisations, with knowledge of local language and translation skills were agreed upon amongst the hosts. The local facilitators were also selected for their positive rapport and trust with the communities as well as for their strong understanding of local cultural, norms and traditions. While the local facilitators had prior experiences of facilitating such field based consultations, they were trained previous to the workshop and then coached in the CREATE toolkit by one to two international experts, including the first two authors of this paper. This included preparations for a full day prior to the workshop, continuous training at the end of each day during the workshop itself, and a learning session at the end of the workshop. During the workshop the international experts only stepped in when information or clarifications on the methodology, technical and scientific aspects of climate change and environment management were needed.

## Data Collection and Analysis

The first and second authors of the paper participated in each of the pilot workshops between July and September 2013. They accompanied the groups of participants during the whole process to guide the application of the toolkit, provided technical inputs on climate change and ecosystem management as well as observed the key features of the ongoing process of learning listed in Table 5 and their immediate impacts. Following this, they systematically documented data from observations during the workshop as well as from feedback processes involving participants and facilitators immediately after the events. Data collection for this paper is summarised in Table 4.

In stage 1 of data collection, the authors of this paper carefully observed individual and group behaviour and dynamics during the workshops as well as at the beginning, during breaks and at the end of each day. To guide the observations, the qualitative methodology developed by (Rist et al. 2006) was used. It involved observing and monitoring seven key features from changing patterns of interactions amongst the participants during the workshop. The list of social learning features and their characteristics as they were observed in the context of these workshops are described in Table 5. Trends or changes in behaviour and dynamics

**Table 4** Overview of data collection methods and data types

Stage	Method	Data Type	Amount of Data
1. During the Workshop	Observations of individual and group behaviour and dynamics	Detailed field notes and assigned scores	Processes of 3 workshops observed, with a total of 89 participants <ul style="list-style-type: none"> <li>• 45 – Burkina Faso</li> <li>• 18 – Chile</li> <li>• 26 – Senegal</li> </ul>
	Open ended feedback from participants at the end of each day, through collective reflections	Recorded comments by facilitators	Daily feedback (4 days) from the total of 89 participants of the 3 workshops
2. Following the workshop	Participant evaluation of the workshop through rating against defined criteria per day	Tallied votes per criteria	Evaluation from 89 participants recorded <ul style="list-style-type: none"> <li>• 45 – Burkina Faso</li> <li>• 18 – Chile</li> <li>• 26 – Senegal</li> </ul>
	Semi-structured questionnaires distributed to facilitators	Responses to questionnaires	Responses from 9 facilitators

were recorded on scoring sheets, according to the seven features, with scores of 0, 1, 2 and 3. A score of 0 was co-related to no observed characteristics from Table 5. Scores of 1 and 2 were attributed to some of the characteristics observed and 3 signified all characteristics of each feature that were undoubtedly observed. Participant evaluations were conducted at the end of each day of each workshop. The evaluations aimed to seek feedback from participants on the overall approach of the workshops, their satisfaction or dissatisfaction of the outcomes of the workshops as well as how they felt the process was impacting their behaviours and understanding.

For the second stage, longer feedback sessions were organised as end of workshop evaluations in all three cases, where participants rated the workshop for individual satisfaction levels on methodology, content, results and relevance, facilitation, logistics and self-participation. A total of 89 participants from the three workshops responded to this feedback process (Burkina Faso – 45, Chile – 18, Senegal – 26).

In the months following the workshops, facilitators and international experts also responded to a structured questionnaire. The questionnaire was designed to capture feedback on the effectiveness, user-friendliness and relevance of PLI as a social learning process for CCA. The questionnaire was designed with three sections and eight questions – general reflections on opportunities and challenges of using the methodology for CCA planning, specific feedback on the design and agenda of the workshop sessions and user friendliness and ideas for improvement of the methodology, as facilitators. The questionnaires were distributed in English, French and Spanish in order for facilitators to be able to choose the language they felt most expressive to respond in. The responses were translated by the authors for analysis.

**Table 5** Seven key features observed from social learning interactions, adapted from Rist et al. (2006)

Feature	Observed as
Recognising differences and complementarities of different forms of knowledge	Actively seeking clarification from each other on feasibility of action points for the way forward, embracing peer-to-peer learning approach amongst external and local actors, identifying levels and forms of knowledge dissemination needed to move forward
Creation of joint language	Common understanding of CC concepts, increased use of common jargons, shared understanding and articulation of the problem and solutions
Reshaping of perceptions and preconceptions of other participants	Change of attitudes and types of interactions (less formal, trusting) and through levels of agreement
Transformation of attitudes and patterns of communication	Comparative observations on level of agreements versus disagreements as workshop progressed, constructive interventions that are solution oriented rather than criticism and mistrust (present initially)
Re-defining roles and responsibilities of local and external actors	Agreements on roles and responsibilities of the joint work plans, recognition of leadership role from community representatives (rather than ‘victims’ or ‘recipients’), acknowledgment of roles of external actors as facilitators (rather than ‘leaders’)
Emergence of more common values for development and interactions	Being able to come to consensus on priorities, urgency, timelines and roles as well as support collective interests rather than individual
Mutual Trust Building	Willingness to share information, including being able to voice criticisms and acknowledge mistakes from past efforts to work together

## Results

### Observed Dynamics and Participant Feedback during the Workshops

The social learning processes generated during the workshops were evidenced by the observation of the seven social learning features listed in Table 5. The trends from the three workshops for each feature are displayed in Fig. 1. The dynamics of each feature, as well as the similarities and differences amongst the study sites are presented in the following section. The results are further complemented by open ended participant feedback on the PLI process and outcomes, collated at the end of each day of the workshop.

### Recognising Differences and Complementarities of Different Forms of Knowledge

Recognition of differences and complementarities of different forms of knowledge was very important in this social learning process because of the different stakeholders brought together in the social learning process. Scientists, national and sub-national government representatives, local actors and residents pooled their knowledge in the process, as observed by the facilitators in the three case studies. The feature was observed through noting three things. Firstly, the ‘openness’ to another form of knowledge which was recorded through the level of audience engagement in the form of participants asking questions, seeking clarifications and engaging in debate or discussions once a particular form of knowledge was shared (for example, a local government officer and an offsite scientist agreeing or disagreeing whether crop yields were decreasing). Secondly, ‘assimilation’ of another type of knowledge by sharing how a person understood its meaning through reinterpretation of the knowledge according to one’s own context was taken note of by facilitators. Lastly, ‘confirming’ one form of knowledge using another form of knowledge (for example, scientific knowledge based on meteorological data being validated with experiential knowledge based on community’s observations of the weather pattern changes) was observed and noted by facilitators during discussions. In the three cases, scores for Day 1 were assigned at the same level (2), based on a consistent approach of sharing introductions and backgrounds amongst all participants, who strongly recognised the wide range of stakeholders convened as well as the learning and exchange journey ahead.

As per Fig. 1, there was a rise in the score for Day 2, in all cases. Having been through technical presentations, anecdotes and sharing of experiential knowledge on Day 1, participants increasingly recognised the differences in different forms of knowledge, as observed by facilitators. Various debates amongst participants, including an argument in the case of Senegal, were cautiously facilitated by the authors for everyone to gradually move towards a common and especially agreed understanding of the CC context. Once this was achieved, leveraging of the different forms of knowledge, in order to inform the planning process, was observed by facilitators, with participants asking for specific inputs (local knowledge, scientific clarification or observed changes in climate) from different stakeholders during discussions and group work. An example of this was the exercise on participatory mapping of the socio-ecological context and the historic changes that have occurred in the area. This exercise required knowledge of all the participants, such as youth, elders, local government and local NGOs working in the area over a long time as well as climate modellers who had worked on reconstructing the weather patterns from the past and forecasting for the future.

Furthermore, stages of the process in which the scores remained horizontal on the graph - despite the process of recognition of knowledge complementarities continued – point to other

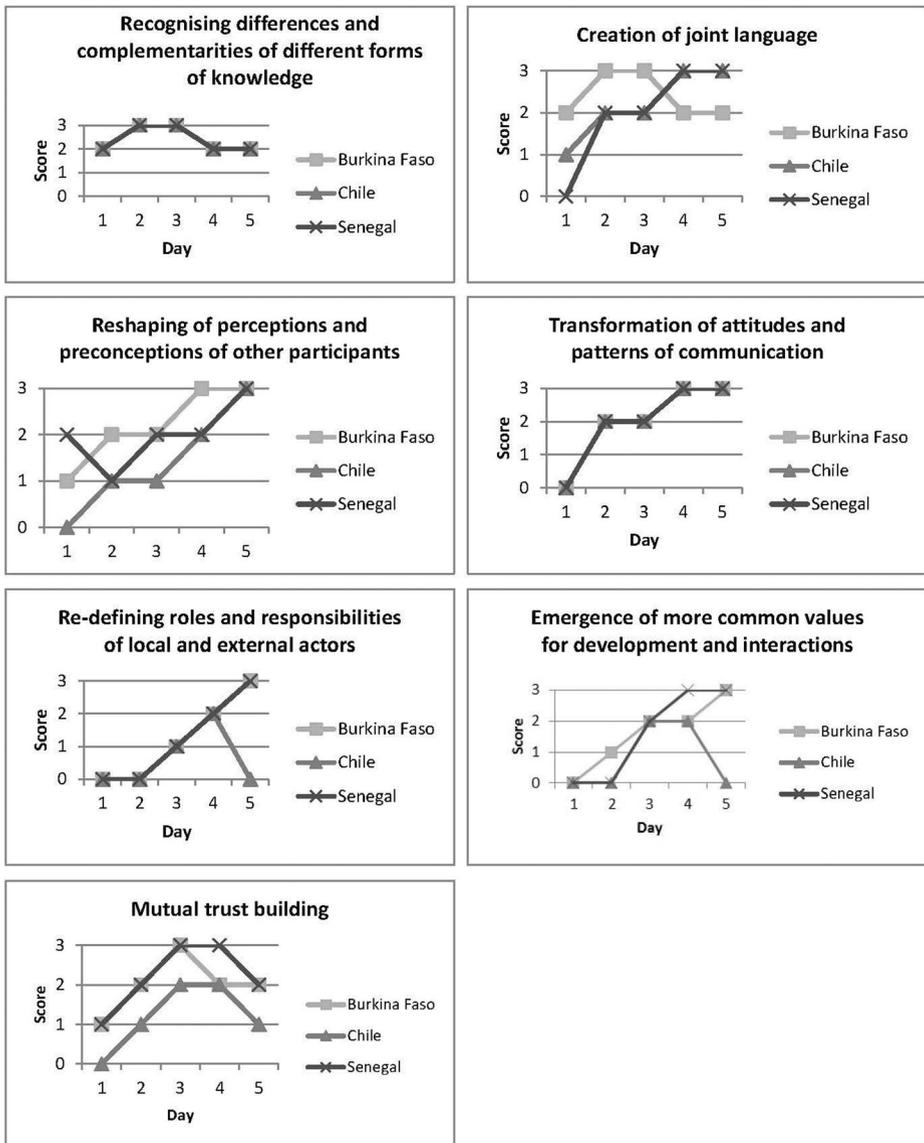


Fig. 1 Scoring for social learning processes during the three pilot workshops

factors that had an impact on the rate of progress. In the case of Chile, it took participants a significant time to agree on the same set of hazards to prioritise. This involved lengthy discussions and debates on what were the most urgent hazards and from whose perspectives, as well as what could be achieved by the group itself, in addressing the challenges associated with those hazards. In the end participants decided to individually vote and follow the 'majority rules' principle. Similarly, when the scores dropped for the 3 cases, participants were struggling to appreciate different innovations (solutions) being proposed, especially if theirs was not the most favoured. In Senegal, following intense debates, it was agreed that 2 innovations would be visited during the field trip instead of 1, with a decision made once all

participants had more in-depth knowledge of both the solutions. It was therefore, important to let the groups identify and agree upon their own decision-making and conflict resolution mechanisms, which helped progress the social learning process. An important aspect in observing this feature of social learning was the increased recognition of the value of local knowledge, and consequent raise in confidence and self-esteem of local participants, as the following statement by a young woman participant in the Chilean workshop shows: “At the beginning, I thought that I could not contribute [to the workshop], as I do not know anything about this topic; but [...] I enjoyed very much the workshop and its approach, as it gave one the motivation to contribute with the best one has to the development of proposals [for adaptation]” (translated from Spanish).

### Creation of Joint Language

The common factors used to observe this feature in the 3 case studies included; noting the use of terminology and even jargon that now carried the same meaning and interpretation for all participants (whereby no longer needed clarification or elaboration of the meaning); a shared and agreed understanding of the vulnerabilities of stakeholders and their livelihoods to climate change impacts; a common understanding of what local innovations were and were not in the context of the workshop. Despite a similar trend observed by facilitators in reconciling and complementing forms of knowledge in all 3 cases, the progress in creation of a joint language amongst the participants was observed as being quite different for each. In the case of Burkina Faso, this process was influenced by communities having engaged in similar local development projects and having learnt the CCA language through that process. However, while the terminology may have been present, local communities expressed that it had been previously used by them to mean different things, compared to during the workshop discussions. Subsequently, different knowledge forms supported the process of creation of joint language for the group.

However, the score dropped for Burkina Faso around Day 4. This was not necessarily detrimental to the social learning process, rather the focus shifted from ‘creating’ the joint language to using it for planning. While Chile and Senegal showed a similar trend to that of Burkina Faso for the first half of the workshop (albeit starting from a lower baseline commonality), the creation of joint language continued to progress. In the case of Chile, this was due to the arrival of 3–4 participants who could only join for the latter part of the workshop. The learning process continued to evolve with joint language through integration of the new participants, as observed by the facilitators. In the case of Senegal, new information was introduced by local participants who hosted the field trip, especially for some groups (particular villages) who were not familiar with the local solution being debated. The new information required re-assimilation of new knowledge, which was necessary in the process of joint language creation. However, while not apparent from Fig. 1, as the workshops progressed, facilitators observed that the time required to assimilate the information and construct the joint language reduced considerably compared to the beginning. Nevertheless, it was important to pay attention to the intensity of such a process, which required high levels of concentration, knowledge synthesis and arriving at a common understanding of the group’s ‘language’ and its meaning. This was also confirmed by participants via the end of day feedback. Participants were very honest about the mental exhaustion from the intensity of sharing as well as assimilating the amount and different types of knowledge within such a short period. Some participants expressed feeling very ‘lost’ and frustrated at the beginning of the workshop, including due to the acronyms and technicality of some forms of knowledge.

Therefore, it was very important to ensure that each stakeholder felt empowered to share their knowledge in a form that maintained the credibility of that information yet conveyed the messages using language, which was not too highly technical, being aware of issues such as use of acronyms and scientific terminology.

### Reshaping the Perceptions and Preconceptions of Other Participants

This social learning feature was observed through noticing changing of attitudes of participants in their interactions towards those they may have previously disagreed with, the honesty and openness in answering questions as well as changes in amount of time required to reach consensus, over the workshop course. In Burkina Faso and Chile, this process shows a consistent upward trend until the end of the workshop. Reshaping perceptions and preconceptions were aided through the process of having equal say as experts in their fields, amongst all stakeholders. This was also confirmed via the participant feedback process. Additionally, during feedback sessions, participants in all cases mentioned the value of relaxed or informal atmospheres, including through sharing meals and tea breaks, in making their learning enjoyable and consequently, helping them to build trust and camaraderie. Group energiser games and role plays also created positive and lively spaces within the workshops for participants to interact across the different groups (of scientists, government, organisations and community representatives).

However, in Senegal, while this process was evident through observations on Day 1, the graph shows a downward trend between Day 1 and Day 2. As facilitators observed, this trend resulted from new participants joining from Day 2 onwards. This included local government officers who had previously worked with the communities on similar projects. It became evident during the deliberations that the villagers felt disappointed with the previous projects and associated the officers with those projects. Their frustrations arose from lack of consultation on previous project activities and priorities. While, this preconception could not fully be resolved during the workshop itself, through end of the day participant feedback sessions communities felt reassured that their voices were being heard this time. Facilitators also took an active role in having a side meeting with the local government officers to discuss ways forward that could reassure the communities and support the planning processes. Similarly, the process stagnated around Days 4–5. The absence can be explained through relating this feature to processes of *Creation of Joint Language* and *Transformation of Attitudes and Patterns of Communications*, demonstrating the linkages as well as inter-dependencies amongst the different social learning features. As preconceptions and perceptions were being reshaped, participants facilitators could more easily observe signs of willingness to work together, as seen in the joint language and transformation of attitudes graphs during Days 3 to 4. Similarly, if these perceptions were not being reshaped, it would have been challenging to create joint language or transform attitudes (as demonstrated in Fig. 1 to be horizontal stagnation between Days 2 and 3 for joint language and transformation of attitudes).

### Transformation of Attitudes and Patterns of Communication

Observing constructive (versus criticizing or confrontational) interventions or reactions during discussions, time taken to come to agreements (compared to earlier in the workshop), as well as ability to or ease of jointly identifying and agreeing on potential solutions were interpreted by facilitators as transformation of attitudes and patterns for communication for this research.

Vocal expressions of the importance to come together as a ‘community’ that shares a geographical space, leveraging experiences of the same disasters and agreed articulation of needs to improve the sustainability of natural resource use were also noted by facilitators as changes in attitudes and communications amongst participants. The 3 case studies depicted a very similar and positive trend in the progression of this social learning process (Fig. 1). The non-hierarchical interactions, design of the workshop, whereby lingering issues and lack of clarity from a previous day’s discussion could be revisited at the beginning of each day were some specific positive points mentioned through participant feedback as helpful in this process. Additionally, participants being able to disagree, question and debate each other’s viewpoints aided this process, according to facilitators’ observations. The rate of progress slowed down significantly on Day 2 for all 3 cases. At this point in the workshop process, facilitators had finished their interventions, introductions, scene setting, etc. and focused significantly on shifting the learning to harnessing participant knowledge through discussions, group work, leadership and interactions. As observed by facilitators, initially, certain groups were not as forthcoming, either because they were still getting used to engaging and contributing in a novel way or simply because of individual personalities. It was confirmed through participant feedback comments that during this time some community members felt very shy and appeared to be apprehensive about actively participating. They were expecting the ‘experts’ to teach them about climate change and how to deal with the impacts. According to a farmer in Senegal he “felt smart” during the workshop, unlike previous workshop experiences, because this time he was actively contributing his knowledge as an expert on farming practices and challenges faced on his land versus feeling like he was being taught in a school. As evident from the graph in Fig. 1, participants were able to pick up the momentum once people became comfortable with the social learning approach of the workshop and with self-leading their interventions or contributions more independently. During individual feedback, one participant mentioned that it took her a while to understand (or even believe) that people would be interested in hearing what she had to say about the issues at hand.

Further, along the graph however, there was stagnation in the process at the end. At this point, the group had defined it ways of working together, including patterns of communications (albeit without having resolved all their differences). There was no particular factor that necessarily hindered this process to cause stagnation, rather the defining observations were simply not observed at a significant level, having peaked at a score of 3 the day before.

### **Redefining Roles and Responsibilities of Local and External Actors**

This process was observed at different scales of decision making – during the workshop processes and when finalising the joint action plans at the end of the workshop on what roles and responsibilities during implementation should be for actors. During the workshop, the process of redefining roles and responsibilities amongst local and external actors for the purposes of the workshop was already starting to be apparent. It was observed through noting the ease and willingness with which participants were nominating and agreeing on their own roles during the workshop sessions – such as facilitators, reporting on discussions and delivering summaries of previous day at the beginning of each day. Self-organisation with little dependency on external actors and local workshop facilitators was also observed. However, in the 3 cases these behaviours were observed from Day 2 only, once all actors at the workshop had spent Day 1 together, introducing and getting to know each other (Fig. 1). This social learning process was also aided by facilitators having communicated the pedagogy and

philosophy underpinning the workshop – social learning – which would only be possible with full engagement and ownership of all participants and facilitators. Making this aspect explicit made the participants feel empowered and confident in active participation, as confirmed through the individual participant feedback process. The Chile and Senegal workshops included field trips. The field sites were selected by the participants during the workshops and the trip was led by community representatives, which was viewed as novel and an important opportunity to learn by doing. A participant from Chile commented that this level of engagement by the participants in driving the workshop agenda versus being passive participants brought out creativity, ownership and pride in their local surroundings and ongoing innovations. Due to unforeseen logistics challenges the field trip session in Burkina Faso was transformed into a marketplace where groups of participants went to different stands within the market to discuss and ‘appraise’ the final set of innovations (versus appraising them in a live field site). The stands were occupied by the participants themselves – those who proposed a solution and had knowledge on as experts, helped by others with specific knowledge in areas such as environmental conservation, cultural issues and economic feasibility (Step 2, Table 2).

Days 4 and 5 focused on joint action plans which also included collectively assigning specific roles and responsibilities to all actors as next steps for project implementation. Consequently, this social learning process transpired as part of the planning exercise on how actors would work together in the near future. Therefore, the process was easier to observe more ‘actively’. Innovations were translated into immediate, short and long term actions needed, what capacities and resources existed and what were needed. In Burkina Faso and Senegal, while some actors may have ended up with the most anticipated roles and responsibilities due to their expertise, access to network, political position or leadership qualities, the process of re-defining roles was clearly observed as being led by communities rather than the facilitators. Higher levels of independence in decision-making on who needed to do what as well as innovative suggestions to address resource and capacity gaps were noted in deliberations, and especially in contributions from the communities.

Interestingly, external actors were ‘briefed’ by community facilitators on what could be their possible roles and contributions to the project, at the end of the planning process. However, in Chile, the process did not run as smoothly. As per Fig. 1, the redefining of roles and responsibilities not only stalled, but regressed when the shift from roles and responsibilities for the workshop to roles and responsibilities for the joint action plan occurred. The project site was re-zoned by the Government of Chile few years ago to allow economic activities, resulting in new settlers from different parts of Chile moving in for economic opportunities. Prior to this workshop the settlers, government agencies, researchers and other stakeholders present at the workshop had never convened in such a manner. They had no prior experiences of having worked together on similar sustainability projects. As agreed by all local participants, it was challenging for them to have a clear picture of who was responsible for what, especially as a ‘community’. One suggestion from a participant was to engage the mayor’s office and the mayor, in particular, as the custodian of the project. Furthermore, different levels of dependencies or stakes on natural resources also led to different levels of motivation for engaging with the project, as observed by facilitators. As an example private forest owners were developing their own sustainability activities (such as honey production), whereas eco-tourism related small holder businesses such as skiing lodges were more interested in collective action on avalanches, rock falls and droughts. Yet another point of debate was clear delineation of responsibilities amongst government agencies, private owners and other settlers, proving it challenging to determine who would be best placed to execute the

required actions. Addressing this broader issue related to policies and regulatory frameworks was beyond the scope of the workshop. However, it was added as an action for seeking clarity on such matters, assigned to external actors, both international and those from the capital.

### **Emergence of More Common Values for Development and Interaction**

Three behaviours were observed for, by the facilitators, when determining the progress of this social learning process – level and extent of consensus on vulnerabilities, existing capacities and where external help was needed (i.e. what made them weak, what made them strong enough to respond and where they lacked the knowledge or resources to do so independently); willingness versus reluctance to support activities that would be for ‘common good’, including those that may only provide returns in the longer term or to future generations; and observing for signs of mutual trust and confidence of individuals in the ‘collective’ (through noting factors such as agreeing on redefined roles and responsibilities, distribution of labour and shared project resources and identifying actions such as the need to develop community associations for self-organisation). These observations were compared to what participants had expressed as their expectations from the workshops during the introductions - such as seeking new areas of research, identifying opportunities to implement a certain (new) policy or seeking resources for alternative livelihood activities. In the three case studies, this process progressed well in the first 3 days.

For Burkina Faso, the workshop began with representatives of different communities having had a strong argument over a previous attempt to work together in sharing water resources during a drought, where resources were not shared with equity. All villages appeared to have different versions of what had happened, causing them to blame each other for the failure. Working with community leaders, the facilitators cautiously navigated this process towards discussions on lessons learnt and how to ensure future attempts to work together do not fail. One way of doing so was to help participants realise that many of them had converging values for development and interactions (such as equity, caring for one another and willingness to work together on a common problem), which could be leveraged and even enhanced during the workshop process. For Senegal and Chile, this feature was more apparent once participants collectively defined their joint vision for the future after identifying the most urgent climate related challenges in their landscape. This process brought about a realisation of the urgency of CC issues and even a sense of solidarity for taking action to achieve their joint vision. In the case of Chile, one representative of a local authority initially engaged with the expectation that there would be confrontations from others about a recent action the authority had taken, without consultations and consensus, about forest management. The participant had expressed this concern with one facilitator at the beginning of the workshop. Through the social learning and exchange, the representative’s behaviour and attitude visibly transformed from being highly cautious (and sparing) in his inputs as well as overly critical of the gathering to positive contributions on what the authority could contribute to achieving the common goals. During Day 3, when adaptation innovations were discussed, participants explained, debated and critiqued each other’s proposed innovations. Through this process, it was also apparent that participants wanted to ensure the best and most relevant innovations were chosen by them for this project, indicating emerging common values. At the end of the workshop, due to the uncertainties and disagreements on the joint action plan, it was challenging to observe the continued progress of this feature. Participants were very cautious in agreeing to roles and responsibilities, thus making it challenging to infer if common values had continued to emerge until the end of the workshop.

## Mutual Trust Building

This feature was the most challenging to decipher, as often, people may not necessarily be expressing what they really think or feel in their words or actions. Willingness to ‘trust’ the workshop and this project that things would be done differently this time was an upfront challenge that needed overcoming, in all 3 cases. Trusting each other enough to share knowledge that may not be widely at disposal, ability to self-criticize as individuals or as a representative of an entity (including admitting past mistakes and lessons learnt from them) as well as extent to which a participant was open to listening and learning from another were used as markers for occurrence of a trust building process. In the three cases, there was a steady and positive progress on mutual trust building in the first 3 days, as per Fig. 1. Two enabling factors for this trend were – the scene and tone setting by the facilitators, making it explicit that this process was not going to work without building trust and respect amongst each other and eventually being able to execute the project together, based on this trust. Secondly, the introductory role-play on Day 1, based on conflict and selfishness of two goats during a drought triggered intense discussions on past conflicts. Participants managed to voice their frustrations and disappointments, even directed to each other as particular individuals. This process, however, needed extremely effective facilitation, with the focus being on lessons learnt versus what eventuated. The main cause of conflict from the community representatives in Burkina Faso and Senegal arose from previous disappointing experiences with development and natural resource management projects. Expectations had led to disappointments and abandoned activities following project (s) completion. Additionally, lack of information from project implementers created an impression of lack of transparency from previous external actors towards local actors. In Chile, absence of trust arose from the stakeholders not having had prior interactions or having worked together as a ‘community’ working in, living in or dependent on the surrounding natural resources. Private forest owners and government representatives had interacted bilaterally in the past. Similarly, private forest owners and smallholder business owners had had prior interactions. However, this workshop was the first time for the stakeholders to come together in such a context and for such a purpose. Unfortunately, in all the cases, the scores go back down towards the end of the workshop. Facilitators noted that people were suspecting of each other’s commitments during the process of joint action planning. Participants were also sceptical of who would get the most benefit out of the planned actions and whether the workload would be fairly distributed. Distrust was also observed in the form of questioning intents by referring to previous incidences where people felt ‘cheated’ that agreements were not honoured. This yielded responses of having to reassure each other (especially amongst the different villages) that everyone was committed to working together and sharing knowledge. Furthermore, territorial behaviour on sharing working mandates and resources (for example joint management of the watershed by the local NGO, resident association and researchers who would conduct hydrological studies in Chile), also indicated distrust of each other. This included verbally expressed concerns and discussions that some other party may replicate or take over their work and how could it be assured that instead, they would work together as a team.

## Facilitators’ Feedback

Nine facilitators responded from the three workshops (four for Burkina Faso, three for Chile and two for Senegal) and strongly agree that PLI is a valuable tool establishing the for

recognition and better understanding of the climate change vulnerabilities people face as well as identification and development of climate change adaptation solutions that can be implemented. Common themes emerging from their feedback are presented below.

*Simplicity* - facilitators agree that the tool is very simple to use and can easily be adapted to the local context. They feel it resonates with all stakeholders of the workshop, such as policy makers, scientists and communities. However, three responses highlight the need for a shorter process and less number of sessions since this can be very intensive for the participants. Responses also iterated that it is critical to ensure the facilitators are provided enough time and training to internalise the process before using the tool.

*Interactions* - majority of the facilitators expressed that the tool actively supported interactions amongst different people with different types of knowledge, which enabled them to understand the context better, resulting in feasible and relevant CCA innovations. While, such interactions and exchanges are important in learning from each other, they may not take place, unless actively facilitated. However, conflict management techniques are very important for facilitators to possess or cultivate, in order to effectively use the planning methodology. Bringing such diverse groups together to mobilise joint action requires navigating power imbalances, mis-trust and negative, lingering experiences from past conflicts within a very short and intense period.

*Participation* - all facilitators agree that the tool effectively enables participation with a variety of techniques. One facilitator commented that “although a particular attention was paid to ensure that different groups are included in the discussion (including women, youth and elderly), it was particularly challenging for some of them (especially women) to have a strong voice in the workshop process. In order to overcome this issue, separate group discussions were organized with women and elderly, which was very effective for collecting information on changes in livelihood and environment”.

*Consensus building* was also flagged as a key achievement of the methodology, by five respondents. Through the participatory and inclusive process, as well as through sharing and bringing different types of knowledge to put together the pieces of a puzzle, reaching agreements and compromises became less challenging during prioritisation and decision making. According to one facilitator, “The bottom line from my perspective is to put together a collective project. To build a collective project among the different actors who live, manage or have interests in the territory is progress. Progress on agreements and consensus based on a common diagnosis, constructed in a participatory manner, is one of the challenges that the workshop was able to meet”.

*Ownership of the outcomes* through such a participatory approach also featured in various responses. As one facilitator stated, “in my opinion, the use of the PLI method to establish strategies for climate change adaptation is good, mainly because of the participatory nature of the method which leads to ownership of the actions to be undertaken by the actors”.

*Methodology* - facilitators agreed that the workshops enabled effective and active integration of social learning into a CCA planning process in all three situations. In addition to collectively mapping and analysing their vulnerabilities and capacities to climate change impacts, workshop participants identified locally relevant and owned adaptation responses. The innovations were identified by the participants themselves and based on existing local capacities and knowledge. Evidently, this also empowered the communities to take action by self-organising and motivating each other instead of waiting for external

aid to arrive once climate change impacts have manifested themselves. The facilitators also expressed that the collective learning, reflection and commitment to action through the CREATE process helped the stakeholders of this project to establish partnerships and a strong collaborative spirit within a relatively short period (4.5 to 5 days). This increased the likelihood of the project continuing to be owned and implemented collectively in the longer term.

## Discussion

### Social Learning Processes and Outcomes for CCA Planning – Opportunities and Limitations

In having applied social learning to the three case studies of this research, some emerging themes are discussed, together with the opportunities and limitations for consideration.

#### Leveraging Participation

Form and level of stakeholder participation has been an ongoing debate in literature (Collins and Ison 2009; Pretty 1995). Participation cannot be a normative goal of CCA, rather progression of a collective process that focuses on common learning and transformation of collective behaviour (Collins and Ison 2009). In doing so, the quality of environmental decisions can be enhanced through stakeholder participation and “stakeholder participation needs to be underpinned by a philosophy that emphasizes empowerment, equity, trust and learning” Reed (2008, p2417). Integrating social learning into CCA planning re-defines the meaning of participation, which is critical in enabling communities to become adaptive co-managers rather than powerless spectators, an option which is predicted to cause much financial, social and ecological losses in the case of climate change (Ruth 2010). Adaptive co-management can also transform the role of communities from victims who respond with short term, reactive and unsustainable coping actions such as ecologically unsustainable agricultural practices and forced migration (Fabricius et al. 2007).

Enhancing participation can be enabled through interactive approaches versus conventional style teaching, creation of deliberate learning spaces between facilitator and participant, as well as guided collective problem solving approaches can be considered as enabling tweaks to rural community focused CCA planning tools. Furthermore, considerations such as the form of knowledge desired, whether the issue is contested, stakeholder diversity and interest as well as existing collaborations amongst actors can be useful in informing designing and tailoring participation (Schneider 2018).

As a major emphasis of this research, engagement of participants amongst themselves was equally important to interactions between participants and facilitators. In socially learning about CCA options from each other, the participants were also learning to validate each other’s knowledge and roles. Furthermore, this process can also be instrumental in building trust amongst the different stakeholders and learning to work together (Pahl-Wostl 2007).

As expressed multiple times by participants, the duration, intensity and level of engagement required from each stakeholder can be intense and exhausting. Without being able to visualise and realise the immediate benefits of such an intense engagement, it may be challenging stakeholders to commit to such levels of participation. Highlighting the various benefits of the

process – tangible, intangible (in terms of social capital) as well as immediate and longer-term goals can provide inspiration for engaging on a common cause. Transparency from organisers on communal versus individual benefits as well as the realities and challenges of implementing the outcomes of the learning process can also support commitments from stakeholders to engage.

Nevertheless, a social learning oriented planning process can plant the seeds needed for longer-term interest of groups to engage in social learning in the first place. Especially as, if designed well, participants are highly likely to witness positive outcomes and interactions during the planning process itself, which may cultivate a stronger desire to continue engaging in the initiative.

### Collective Problem Solving

Hong and Page (2004) quantitatively prove that groups of diverse problem solvers could perform much better than groups of high-ability specialised problem solvers. They, therefore, assert that society needs to move beyond fairness and representation to appreciating the benefits of diversity in problem solving. In the three case studies, participants included a diverse range of actors such as community representatives, many of whom were farmers and local business owners, national and local government officials, academics and international facilitators. An expert, solely, may not have been able to come up with the local context, local vulnerabilities and capacities to climate change adaptation as well as local solutions to climate change impacts in such a timeframe (4.5 to 5 days).

The resulting adaptation responses (innovations) identified in the three case studies did not require high levels of external expertise and skills. In some cases, they were already being tried at small scales and in others they were known of from a neighbouring village or they were previously abandoned techniques due to changes in practices. Furthermore, the social learning processes also facilitated a consensus-based approach to establishing desired joint actions to implement the innovations, collectively. Effects such as knowledge exchange, collective learning and trust building enabled the identification of specific activities to be carried out by each party.

As evident from the results (especially Fig. 1), interpretations of progress in the social learning processes in such research undertakings are limited to a point in time. Progress can also regress towards the end of the process, as observed for *emergence of more common values for development and interactions* as well as *mutual trust building*. Social learning, therefore, requires longer term, sustained interactions and efforts for actors to truly benefit from its potential (Measham 2013). Similarly, while the learning process itself can be regarded as a key contribution to adapting to climate change impacts (Folke et al., 2006), such learning needs to be transformed into concrete shared steps for actions for CCA. In such project driven settings as this research, progress on actions may only be monitored for the duration of the project (few years) and often for implementation rates versus social learning related impact assessments such as evolution of relationships amongst stakeholders and change in collective behaviour for sustainable environment management.

### Knowledge Co-Production

Combining different forms of knowledge is very important for successful CCA in rural communities. Improved risk assessments, scenario models and predictions can help inform

communities and catalyse their proactive action to climate change rather than acting only once they are suffering from its negative impacts. However, the need to include ecological understanding, as well as traditional knowledge of communities in problem-solving climate change cannot be overlooked, especially if responses are to be locally relevant and lasting (Boillat and Berkes 2013; Nakashima et al. 2012). Therefore, CCA design and planning must go beyond acknowledging the different forms of knowledge through convening stakeholders to recognising the differences and complementarities of such knowledge, and actively coming up with innovative responses based on the resulting co-produced knowledge (Murti and Mathez-Stiefel 2018). As demonstrated by the three workshops, social learning can provide a constructive space for such exchange and integration of different forms of knowledge without undermining any one form.

Furthermore, this also shifts the emphasis from merely diagnosing the problem to collectively identifying and appraising solutions. Often, local actors participate mainly in the initial project phase (where the aim is to understand the current situation by participatory diagnosis) and in the final phase, when it comes to evaluating proposals developed by external experts (Rist et al., 2009). However, during the design and decision-making (solution finding) phases of a project local knowledge and technologies are not considered. This was evident in prior experiences of local actors at the workshops in Burkina Faso and Senegal. In Senegal, a previous effort to address salinization by external actors saw the establishment of low concrete fencing, which led to the unintended stagnation of water flow and exacerbating the problem of salinization. The vegetative fencing identified in this workshop allows water to slow down but flow through.

It is important to note that the lack of consensus on one definition of social learning itself can limit its use and application (Reed et al. 2010), resulting in it being referred to different things. This ambiguity may make it challenging to, systematically, incorporate social learning approaches for CCA planning. At the least, it is important to differentiate social learning occurrence versus the conditions necessary for it to occur when designing interactive processes based on it. Furthermore, a lack of definition can also make it challenging to measure the impact of social learning, such as its effectiveness in participatory planning and decision making (Muro and Jeffrey 2008). However, literature is evolving in proposing frameworks for implementation and measurement of social learning processes (Scholz et al., 2014).

## **Design Considerations for Social Learning Based CCA Planning**

As observed in the three case studies, social learning can be integrated into CCA planning. However, for the planning to benefit from the social learning process and outcomes, some design considerations can be taken into account, drawing upon the lessons learnt in this research. .

### **Facilitation**

The skills and central role of facilitators cannot be overemphasised. As explained in the methodology section, the authors established teams of facilitators due to the mixed set of knowledge and skills required – facilitators with technical knowledge and expertise on CCA, those with knowledge and sensitivity to local culture and norms as well as facilitators with social learning knowledge and experiences. In bringing such groups of facilitators together, it is important that they have absolute clarity of the methodology and the same understanding of

the desired processes. Such groups of facilitators also need to be prepared to play the role of knowledge brokers and help bridge knowledge boundaries by applying their expertise, understanding or experience to a new situation and supporting the emergence of new meaning of existing information (Sitas et al. 2016). Considering these factors, it is critical for facilitators to come together as a team and prepare well in advance of the event. They need to know who brings what knowledge and skills to the group, especially in anticipation of unforeseen situations or issues that may arise in the course of the social learning process.

Additionally, it is important for sustainability researchers to recognise that they may have simultaneous roles to fulfil while facilitating such interactive knowledge co-production processes. They may act as reflective scientists, intermediary and facilitator, all requiring various approaches to meet multiple expectations, as asserted by Pohl et al. (2010). In this case, the first two authors mostly played the roles of reflective scientists and intermediaries, especially about CCA related scientific issues and clarifications on the process as well as planning methodology. The local facilitator counterparts proved to be valuable facilitators, working with the cultural knowledge and norms to facilitate the communicative and learning processes.

Moreover, during the workshop, it is also important that facilitators are comfortable with situations such of conflict, disagreements and unforeseen or unplanned scenarios. Consequently, they need to be highly adaptable, carry out critical self-reflections and reflections of the process through its duration, think on their feet and draw upon previous experiences to anticipate different scenarios (Pohl et al. 2010). During the workshop process, it is also important that facilitators maintain communications amongst each other, keep each other updated on any important development they may come to know of, especially in side discussions or smaller group discussions. Therefore, constant and clear communication is key to running a smooth and enjoyable learning process amongst them.

### Addressing Power Imbalances

The emphasis on inputs and participatory decision-making also helps to address power disparities amongst stakeholders. Such imbalances can lead to marginalisation of certain stakeholders in decision-making according to Pelling and High (2005), a possibility facilitators need to be well aware of and actively manage during such a learning process. Power imbalances can be made explicit (Pohl et al. 2010), creating ownership amongst all who may be possibly affected to jointly manage the imbalances during such a learning process. Furthermore, facilitators can actively support marginalised stakeholders in them being able to represent themselves. This could be carried out through assigning leading and organisation roles during a learning process (such as organisation of the field trip by local communities in this research). Furthermore, facilitators can ensure the recognition and legitimacy of all forms of knowledge during the learning process rather than experts or scientists ‘imparting’ knowledge (Sitas et al. 2016). Providing informal or unmanaged spaces for interactions, where participants transform their attitudes and communication patterns towards each other can also further support building legitimacy of each other’s knowledge and expertise (Reed et al. 2010).

### Timelines

In order to harness the potential of collective learning and action opportunities generated through social learning based stakeholder convening and interactions, time is an important consideration. Measham (2013) argues that for social learning to transform from understanding to action, 3 years

are required for sustainability programmes. However, such timelines may not be feasible due to project timeframes, policy cycles and availability of stakeholders to engage. The workshops analysed by Rist et al. (2006) were conducted over 21 days while the three workshops in this research were conducted over 4.5 to 5 days only. In the case of Rist et al. (2006) the workshops aimed to enhance social learning processes amongst representatives of rural communities, NGO staff and researchers whereas in this case the three workshops aimed to identify CCA innovations and establish a plan of action. Therefore, for initiatives such as EPIC, where implementation of CCA actions may need to start as soon as possible due to project timelines, 21 days would be unfeasible. As per the feedback from participants and facilitators, the 4.5 to 5 days were already found to be too long for all stakeholders. This feedback was especially pertinent from the local communities, who are not working on their livelihoods while they participate in such planning processes. Therefore, further research and application is needed to identify options for feasible timelines for such planning processes where social learning is not compromised and the planning process benefits from it (Forsyth 2013).

## Conclusion

This research demonstrates that social learning has a critical role to play in supporting local communities to be better represented in adaptation planning processes within internationally led initiatives. While the results of this research are a snapshot in time, they do affirm that social learning has the potential to discourage the situation of ‘experts and scientists’ helping ‘local communities’ and rather, facilitate a group of local and external experts working together to solve a problem using their different forms of knowledge of the same problem. The observations from the learning process, facilitator feedback on the approach as well as the outcomes of social learning demonstrate that harnessing collective expert and experiential learning can greatly inform locally relevant and affordable solutions for adapting to changes from climate. Nevertheless, this research provides a glimpse of an alternative to how CCA can be carried out with the support of social learning. In carrying out small scale and time bound projects, which is the most common way CCA is currently being delivered in rural communities of developing countries, the longer-term adaptation targets will not be achieved. Therefore, if a co-priority is to be learning, especially in the form of social learning, monitoring the impacts and outcomes of social learning needs to become a priority in such projects.

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