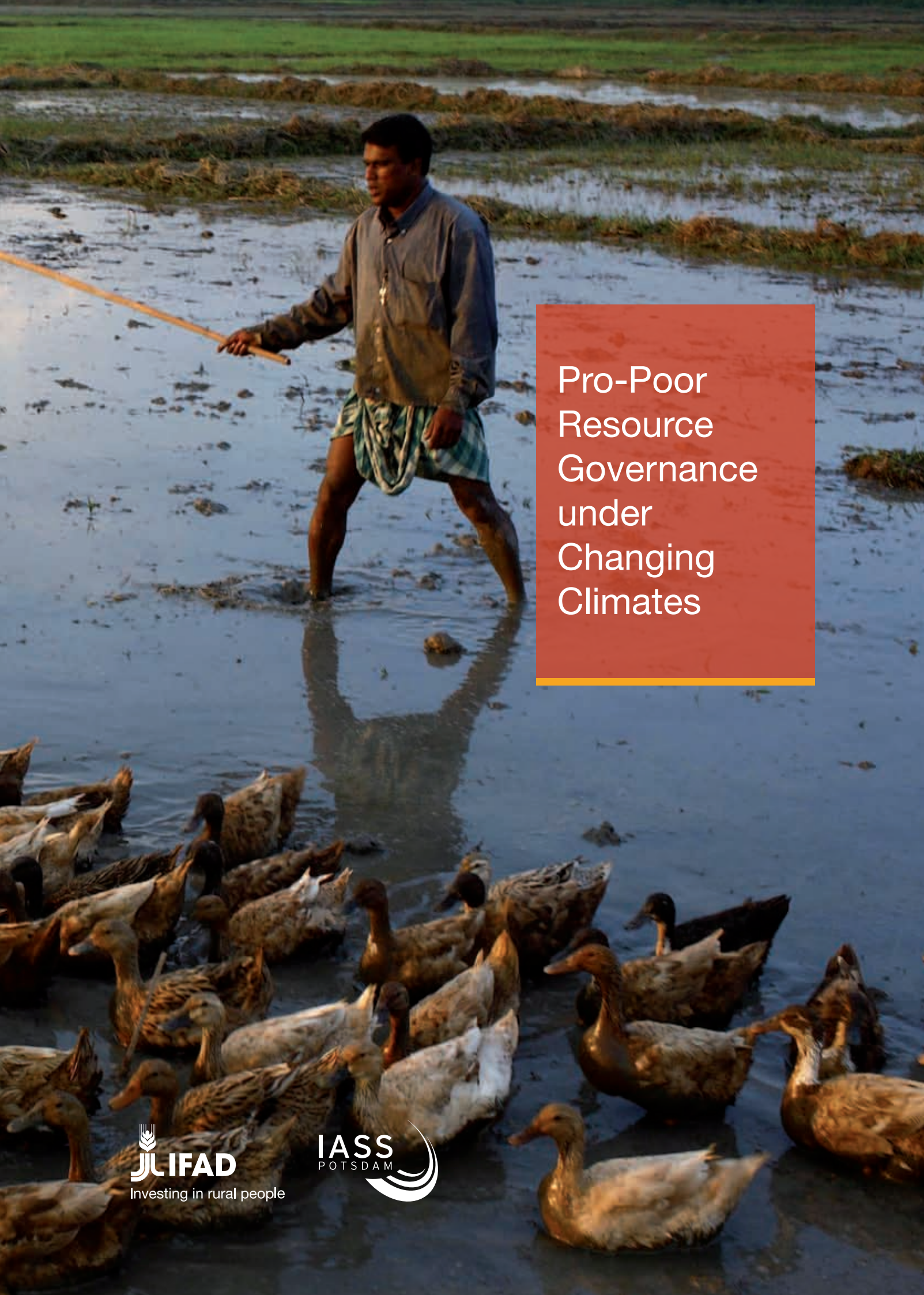

Pro-Poor Resource Governance under Changing Climates

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Executive summary

Natural resources and livelihoods of poor rural people are under increasing pressure from growing demand and continuing climatic changes, and it is becoming increasingly necessary to pursue innovative adaptation strategies. As a result, resource governance, and particularly pro-poor resource governance, has moved to the top of the development agenda.

From 2012 to 2013, the International Fund for Agricultural Development (IFAD) and the Institute for Advanced Sustainability Studies (IASS) began the combined research initiative: "Pro-Poor Resource Governance under Changing Climates" (ProPoorGov). This study had two main objectives:

1. To better understand the relationship between vulnerability and long-standing interrelated social and environmental factors.
2. To strengthen the link between local and higher levels of policymaking.

IFAD and IASS collaborated with local civil society organizations (CSOs) in six countries: Bangladesh, Bolivia, Brazil, Burkina Faso, Ecuador and India. Seven case studies were used to document, analyse and communicate aspects of pro-poor resource governance. These studies address how resource governance can determine some factors that generate livelihood vulnerability, and how institutional changes can make livelihoods vulnerable to external changes resulting from both climatic and non-climatic processes.

ProPoorGov reached four core conclusions:

1. Climate change vulnerability is influenced by environmental and social factors, and by how resources are governed.
2. Although technological solutions for smallholder farming can improve the livelihoods of poor rural people, significant social and political barriers within local governance also hinder such improvement.

3. Recognition of community rights, including common property, is useful in reducing the vulnerability of poor rural populations. However, such measures must be supported with appropriate policy if they are to be an instrument of comprehensive development that ends poverty.
4. Pro-poor adaptation can involve redefining rights to resources, which is a manifestly political process. If they are to reduce vulnerability, resource governance reforms must consider how poor rural groups are represented and involved in decision-making within the political process.

These four core conclusions suggest a number of solutions to improve resource governance through collaboration with local CSOs:

i. Bargaining power of the poor can be reinforced by promoting collective action, which facilitates effective reaction to economic and environmental pressures.
ii. Problematic resource governance can be improved through including multiple actors in a participatory and inclusive decision-making process.
iii. Traditional, tried and tested adaptation measures in communities can be supplemented with such things as technological innovations.
iv. Structural transformations of the type climate change adaptation requires ideally employ a long-term approach and are planned more in terms of generations rather than in short-term project cycles. Such long-term perspectives usually involve continuous political and financial commitments, and might use public funds.
v. Vulnerability has many dimensions and thus requires a comprehensive and integrated approach that builds on favourable existing structures. It can be particularly effective to work with pro-poor CSOs that know the local context and are equipped to remedy hindrances to pro-poor development.

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Introduction: the context of pro-poor resource governance

Natural resources and livelihoods under pressure

It is now widely known that natural resources are under increasing pressure. Recent studies indicate that certain planetary boundaries have already been crossed [1]. Media and society have popularised the overuse and degradation of natural resources, how it has changed the lives of most people, and particularly how it has changed the lives of vulnerable people.

Several tendencies can be identified as sources of this rising pressure on natural resources. The most important of these trends is the increased demand on food, feed, fibre and fuel, due to continued population growth and changing consumption and production patterns [2]. The world food price crisis of 2007-08, and the political and economic turmoil it provoked, demonstrate imbalances in world food systems. Still, although climate change is expected to threaten many social-ecological systems, some changes in climate patterns could generate opportunities to rural people in particular contexts and situations. Such changes are not necessarily hazardous to the natural resource base.

Poor rural people constitute one of the largest groups vulnerable to climate change. While they have always been vulnerable to numerous social and environmental changes, the rising pressure on resources has made rural poor livelihoods significantly more vulnerable. Furthermore, the most profound impacts of climate change are projected for the coming decades, and poor rural communities are largely dependent on natural resources for their livelihoods.

The natural resource base contributes directly to the livelihoods of many rural people, who are smallholder farmers. Smallholder agricultural productivity is heavily dependent on well-functioning ecosystems [3]. Citing examples

from this study, the indigenous community of Lomerío, in eastern Bolivia, relies almost exclusively on forest resource management as a source of income. In coastal areas of Bangladesh, smallholder agriculture is often damaged by natural disasters that disrupt ecosystems and put livelihoods at risk. In north-eastern Brazil, frequent drought cycles damage rainfed smallholder family farming, often causing crop losses that increase food insecurity.

These are but a few examples that illustrate the necessity of developing adaptation strategies for changing environments, particularly for poor rural people. Rural communities have historically adapted their livelihoods to change. To do this, they have, for example, alternated crops according to climate variability, or migrated once the natural resource base degrades significantly. Institutions such as formal and informal societal regulations, rules, norms and cultural practices are key to understanding how communities react to such changes. Rural people can adapt by changing livelihood strategies, and by altering natural resource ownership, tenure and access. This process is often called *institutional change* [4].

The need to develop strategies to adapt to climatic changes has been discussed from many perspectives. Researchers have devised a number of models to examine how countries and regions are exposed to certain climate hazards [5]. Some studies have assessed adaptation through technical solutions, such as improved crop varieties, climate-resilient agricultural practices, and related policies [6, 7]. Others view adaptation as the result of social interactions and analyse how collective action can foster adaptation [8, 9]. Another approach has been to emphasize the role justice plays in mitigating the severe impacts of climate change on poor people. This perspective advocates tackling the fundamental sources of vulnerability, such as unequal access to resources and opportunities [10, 11].

The reports of the International Panel on Climate Change (IPCC) represent an evolving understanding of this issue and this dynamic debate. The Fifth Assessment Report (AR5), recently released by Working Group II, for instance, explains differences in vulnerability as attributable to multidimensional inequalities [12]. In other words, compared to the previous report of 2007, the AR5 is more emphatic that differences in socio-economic status explain the greater vulnerability of some groups, such as poor rural people.

Advancing pro-poor governance

Resource governance has moved to the forefront of the international debate due to rising pressure on natural resources and on the livelihoods of poor rural people. Land tenure, in particular, has regained prominence on the rural development agenda [13, 14]. While land is a resource in and of itself, it is usually associated with other natural resources that form part of a given territory. Land is key because it is usually through land that other natural resources, such as water, forests, pastures and wildlife, are accessed.

This changing context has given rise to a wider debate on the issue of governance [15], specifically what constitutes pro-poor governance and how to achieve it [16, 17]. In this study, pro-poor governance is defined as systems that either directly involve poor people in the governance decision-making processes, or systems that poor people themselves design. Either approach should yield outcomes that favour poor people [18, 19],

Box 1. Pro-poor governance

Governance systems that either directly involve poor people in the governance decision-making processes, or systems that poor people themselves design, and which yield outcomes favouring poor people.

Source: Authors, based on [18, 19].

and that require acknowledging the social relationships that permeate negotiations between poor people and other groups, and the related historical and political perspective.

Several relevant initiatives for pro-poor resource governance have been evolving in recent years at the international, regional and national levels.[1] In Bolivia, for example, long-term power struggles that were influenced by agrarian reform movements and indigenous claims for land have resulted in legislation that aims to secure communal lands and its associated resources [20]. A similar strengthening of communal and indigenous territoriality has recently begun in Ecuador, although progress there has been much slower and involved numerous setbacks [21]. In India, an important law recognizing land rights of forest-dwelling communities was approved in 2006. The Forest Rights Act provides broad recognition of rights and empowers people to manage lands [22]. However, the rights created are often ignored, and implementation has been severely flawed [23].

The Indian example illustrates the common phenomenon that progress in advancing legislation does not necessarily mean that rights are uniformly respected. In fact, many organizations working on land and natural resources have reported rights being violated [24]. The key issue that remains is how to place the new regulations into practice. Institutions influence access to land and securing land tenure, but rules alone do not define who gains this access and tenure. There are constraints on the environment into which rules are put into practice, including government performance, information asymmetries and power imbalances. As a result, there are often gaps between legislation and the ability to apply the law, which raises doubts about the capacity of legislation to change social practice [25]. It seems more appropriate instead to identify those with sufficient bargaining power to change the structure controlling access to resources, and to direct efforts towards establishing institutions for their benefit.

1. At the international level, some very relevant examples are the *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security* – the VGGTs – and the *Principles for Responsible Investment in Agriculture and Food Systems* – the CFS-RAI Principles – both endorsed by the Committee on World Food Security (CFS). At the regional level, one example is the *Framework and Guideline (F&G) on Land Policy in Africa*, developed under the leadership of the African Union Commission (AUC), the African Development Bank (AfDB) and the UN Economic Commission for Africa (UNECA).

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The Study: Pro-Poor Resource Governance under Changing Climates

Acknowledging the pressure on resources and livelihoods, and developments in pro-poor governance, the International Fund for Agricultural Development (IFAD) and the Institute for Advanced Sustainability Studies (IASS) from 2012 to 2013 committed to the research initiative "Pro-Poor Resource Governance under Changing Climates" (ProPoorGov).

This initiative had two main objectives:

1. From a content perspective, it aimed to better understand how vulnerability arises from historically interrelated social and environmental factors. It approached this subject from a governance perspective, and focused on institutions and structural factors that determine how people view, access, manage and use natural resources. In some cases, emphasis was given to analysing coping and adaptation options, and the structures that impede their implementation. Acknowledging the heterogeneity of poor rural groups, the study described and analysed the different power relations in social settings of the cases examined.
2. From a policy perspective, it aimed to strengthen the link between local and higher levels of policymaking.

To this end, IFAD and IASS collaborated with local civil society organizations (CSOs) in six countries: Bangladesh, Bolivia, Brazil, Burkina

Box 2. Further reading

The open-source e-book "Pro-Poor Resource Governance under Changing Climates" is intended to be used with the present publication. The e-book includes individual case study chapters from Bangladesh, Bolivia, Brazil, Burkina Faso, Ecuador and India. It was written jointly by CSOs and researchers from IASS and other organizations, and contains a summary conclusion grounded in institutional theories.

Faso, Ecuador and India. Seven case studies were jointly elaborated to document, analyse and communicate cases of pro-poor resource governance. These case studies address how resource governance determines some of the factors that generate livelihood vulnerability. They also examined the extent to which changed institutions affect livelihoods and make them vulnerable to external changes due to climatic and non-climatic processes. Non-climatic processes include social, political, economic and other environmental changes.

The following sub-sections present: the reasons for working with CSOs; main implementation steps and methods; and the goal that links various levels of policymaking.

Collaborating with local civil society organizations

Engaging local and international organizations in partnerships that are as horizontal as possible can provide better understanding of processes that generate vulnerability and strategies to counter such vulnerability. This approach of co-producing knowledge with local CSOs is based on three assumptions:

Assumption 1

Part of the implementation gap for pro-poor resource policies is attributable to disconnect between the local and global actors and the scales of governance. Improving this gap requires greater understanding of the role bargaining power plays in determining which rules are followed and which ones are disregarded at the local level. Yet, even when this dynamic is understood, the challenge remains of incorporating it into decision-making at either the national or the international level [26, 27].

Assumption 2

Local CSOs have tried various strategies to advance pro-poor governance. By working closely with poor rural groups, local CSOs are well-placed to understand the local context and background that might restrict or divert implementation of pro-poor policies [28, 29]. CSOs know local actors, their organizations, and the formal and informal

Table 1. Project Partners: local civil society organizations

Country	Name	Description
Bangladesh	BRAC	A development organization dedicated to alleviating poverty through empowering the poor.
Bolivia 1	Fundación Tierra	An NGO dedicated to developing and advocating proposals for the rural sustainable development of indigenous and peasant groups.
Bolivia 2	CDE, Faculty of Agronomy/UMSA and Fundación PIAF-El Ceibo	CDE is an interdisciplinary research centre at the University of Bern, Switzerland, and it has been collaborating with the Bolivian Faculty of Agronomy of Universidad Mayor San Andrés and Fundación Piaf, a non-profit organization serving the needs of local cocoa farmers and their families.
Brazil	PATAC	A CSO promoting sustainable rural development through the strengthening of family farming in the Brazilian Semiarid Region.
Burkina Faso	GRAF	A non-profit organization and network working on the governance of natural resources, with particular attention to land issues.
Ecuador	SIPAE	An action-research network working on agrarian policies, food sovereignty and collective economic, social, cultural and labour rights.
India	Seva Mandir	An NGO working with the rural, predominantly tribal population in Southern Rajasthan, focusing on collective action.

Source: Field data from the authors and organization websites. A more detailed description of Project Partners is reproduced as Annex 1.

institutions. Even more importantly, by pursuing a local political agenda and actively engaging in political processes, CSOs have first-hand experience in power disputes, and this allows them to understand the bargaining power of different groups.

Assumption 3

Local CSOs are therefore in an advantageous position to link the different levels of policymaking. Disconnect between legislation and enforcement is due to local dynamics that impede implementation, and to policies that do not fully incorporate local views. The local nature of CSOs affords better comprehension of the context than external observers might have. It also gives CSOs better understanding of how to operate in these contexts. CSOs also generally have a long-term perspective, rather than being involved in short-term projects. In other words, CSOs are more likely to know why pro-poor policies are not implemented, and to have solid ideas on how to resolve this situation. Therefore, building bridges of knowledge between the grass-roots level and the international arena can be extremely useful in advancing better resource governance.

Methods: co-producing knowledge through transdisciplinarity

The contribution of disciplinary science to the comprehensive challenges involved in understanding vulnerability has limitations [30]. Therefore, in recent years, scientific methodology has increasingly considered the role of science *in* society, rather than the role of science *for* society. This idea has been elaborated in transdisciplinarity [31]. In this study, the term refers to the problem-solving approach of combining scientific knowledge with practical knowledge. Thus, it unites partners from science, society and policy from the early stages of research, when such things as research questions and methods are determined. The goal of this approach is to generate knowledge relevant to the challenges of sustainable development [32].

Documenting the knowledge that CSOs hold is certainly not a new approach. Researchers frequently collaborate with CSOs and analyse their work, and these efforts have yielded valuable insight. Frequently, however, researchers document cases alone and only consult CSOs, rather than involving them in the research process. While this approach has some advantages, it might result in research questions that are predefined by a certain agenda or theory. This could lead to findings that do not accurately reflect the local context and perceptions. To avoid this, ProPoorGov engaged CSOs in all steps of the research process, from problem identification, to data collection, analysis and discussion [33].

Project implementation can be broadly subdivided into seven phases.[2] With the exception of the first phase, identifying partner CSOs, each was performed in close collaboration with the CSOs:

i. Identify partner organizations
ii. Identify cases
iii. Formulate case-specific research questions and case boundaries
iv. Choose the analytical framework
v. Collect data
vi. Analyse (seven case studies and synthesis analysis)
vii. Discuss and disseminate results

Box 3. Transdisciplinary research

Transdisciplinary refers to the problem-solving approach of combining scientific knowledge with practical knowledge. It unites partners from science, society, and policy from the early stages of research, and it aims to generate knowledge related to the challenges of sustainable development.

Source: Authors, based on [31, 32].

2. For details of the implementation steps, see the e-book "Pro-Poor Resource under Changing Climates" and [33].

Box 4. Case study topical issues

i. What are **current resource use patterns**?
ii. What are **perceptions of the influence resource use patterns** have **on livelihoods**? How do these **change across groups**?
iii. Which **natural resource governance regime underpins resource use patterns**? How has this **evolved in recent years**?
iv. What **capacity do poor rural people have to adapt their livelihoods to environments** changing due to **socio-economic and physical** changes (**including climate**)? Does adaptation occur **through changes in resource governance regimes or other strategies**?

Phase ii), identify cases, and phase iii), formulate case-specific research questions and case boundaries, were key activities for this research collaboration. Research staff met with the CSOs in their localities and jointly visited the case study areas. They spoke several times with each organization to agree on research questions. Given the plurality of contexts, a set of four topical issues to be covered were devised to facilitate case comparison.

The analytical framework in phase iv used two tools: an adapted Institutional Change Framework based on the New Institutionalism of social anthropology [25, 26]; combined with elements of the Sustainable Livelihoods Framework (SLF) [27, 28]. The Institutional Change Framework emphasizes changes people face from historical, power and tenure perspectives. The SLF balances this by deepening the analysis of individual livelihood strategies.

It was jointly decided that both researchers and CSOs would participate in data collection (phase v). In all six countries, a combination of quantitative and qualitative approaches to data collection was used, collected from both primary and secondary sources, as reproduced in Table 2. Additionally, climate scientists generated reports on regional climate change projections for South America, West Africa and South Asia for their respective regions [34-36].

The analysis (phase vi) was also a joint exercise for CSOs and IASS researchers, performed in combination with two key activities of communication and discussion (phase vii): (sub-) regional and/or national workshops, and a final workshop at IFAD headquarters with all CSOs and other invited stakeholders present.

Strengthening local CSOs capacity through linking it to policy

As mentioned above, one specific goal of ProPoorGov was to link local experiences to policy, thus empowering CSO partners. This was achieved using several tactics. First, the project provided financial resources that allowed the CSOs to systematically document and analyse their experiences. This increased their knowledge base, which can be useful in such areas as advocacy work in the future. Second, the project increased CSO visibility, for example using media coverage of project events, such as the national workshops. Third, these workshops also contributed to a perception of improved reputation among political decision makers. These decision makers mentioned in several cases that they found the study highly useful, and acknowledged the role of CSOs in policy design. Some also acknowledged a changing perception of the role of CSOs, from rather disturbing organisations to real contributors to public policy design. Fourth, particularly during the concluding workshop, CSOs could establish links with the other organizations involved in similar issues or conditions, and with IFAD staff. On the basis of these contacts, they generated plans for future collaborations, such as involvement of local organizations involved in IFAD-funded projects, or joint research projects. Lastly, the project included capacity-building, since several young CSO and IASS researchers were involved in the study. In sum, CSOs improved their access to the decision-making process, and improved their standing in the eyes of local and national political decision-makers and IFAD.

Table 2. Data collection procedures

Country	Study sites	Data and methods
Bangladesh	7 char lands of Noakhali District	Collection of climate records and household data, interviews, focus group discussions and participatory observation.
Bolivia, Lomerío	6 communities of Lomerío territory	Collection of climate records and household data, interviews, focus group discussions, participatory observation and participatory mapping.
Bolivia, Alto Beni	2 municipalities	Collection of climate records and household data, interviews, focus group discussions and participatory observation.
Brazil	2 communities in the territories of Cariri, Seridó and Curimataú, 1 local network of family farmers	Collection of climate records and household data, interviews, focus group discussions and participatory observation.
Burkina Faso	16 villages and hamlets in and around the pastoral zone of Samorogouan	Collection of regional socio-economic data, focus group discussions and interviews.
Ecuador	3 communities in the Andean region of the Imbabura province	Collection of climate records and household data, interviews, focus group discussions, participatory observation and participatory mapping.
India	8 villages in southern Rajasthan	Collection of household data, land records and legal documents, interviews, focus group discussions and participatory mapping.

Source: Authors and case study reports. A more detailed description of the data collection is reproduced as Annex 2.

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Core results

Seven case studies were prepared within the context of the ProPoorGov project: two in Bolivia (Alto Beni and Lomerío) and one each in Bangladesh, Brazil, Burkina Faso, Ecuador and India. Each case study generated results and conclusions applicable to its particular context. Furthermore, a cross-analysis of all cases traced significant findings, which are presented in this section as four core results. They discuss evidence and draw conclusions related to the causes of vulnerability and how it affects the livelihood security of poor rural people. Also addressed are which strategies poor rural people apply to react to environmental and socio-economic changes, and how pro-poor resource governance can be promoted.

Social and environmental dimensions of vulnerability

1st Core result

Climate change vulnerability is influenced by environmental and social factors, and by how resources are governed.

Vulnerability is increasingly recognized as the result of interplay between social and environmental factors. Vulnerability is normally defined in terms of exposure, sensitivity and adaptive capacity[3] [37, 38]. Adopting this understanding, the recent IPCC AR5 assessed the sources of vulnerability and stated that they arise from "multidimensional inequalities often produced by uneven development processes" [12]. Earlier

3. Exposure is generally understood as "the degree, duration and/or extent to which the system is in contact with or subject to a disturbance". Sensitivity is viewed as an internal property of the system in question, and "the degree to which a system is likely to be affected by an internal or external disturbance". Response capacity is generally seen in the context of reaction to a present disturbance. Thus, it is defined as the "system's ability to respond to or cope with the disturbance" [38]. Finally, adaptive capacity predicts response capacity to future disturbances.

contributions similarly explored such concepts as resilience and adaptation, and attempted to link academic communities studying natural hazards and climate change. They brought the concept of "multiple stressors" to the forefront of the debate [39, 40], and indicated that vulnerability originates from different, yet related sources that have environmental and social dimensions. Other scholars have suggested that interpretations of vulnerability have often focused on either the environmental or the social dimension, and show different analysis and context for the problem of climate change. These scholars say that bridging these different views might not be simple and straightforward [41]. Those who argue for more emphasis on the social factors that cause vulnerability have a strong argument. They say that poor people continue to be disproportionately vulnerable when change occurs, and that the vulnerability of poor, marginalized and underrepresented people remains widespread [10]. Thus, ideally analysis of this type will examine the social factors that determine vulnerability of poor rural groups.

The cases demonstrated that many of these social factors are related to how natural resources are governed. Social factors define the social positions of those involved, and their degree of marginalization. The social position of poor rural people also limits such things as resource access, tenure security, income, and the possibility they might have to benefit from rents that resources generate. **These limitations work together to restrict livelihood options for rural poor people. Given the high dependency poor rural people have on natural resources, these limitations also hamper adaptive capacity and the ability to access alternatives, particularly during times of extreme stress**. Therefore, considering only one dimension of vulnerability – be it the environmental or the social dimension – restricts the comprehensive understanding of its fundamental, interrelated causes, and of the bargaining power for those affected, which can be used to reverse this situation.

Support for this argument was evident in the case studies of Bangladesh, Brazil, India and Ecuador. For greater detail, the case of the *char* lands in Bangladesh is explored below.

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Vulnerability in the *char* lands of coastal Bangladesh

The *char* lands in coastal Eastern Bangladesh are an example of extreme vulnerability to environmental hazards and climate change, combined with social vulnerability of the poorest and most marginalized groups in a society. This case demonstrates how effective governance of natural resources in an extreme environment requires comprehensive and long-term support from Government, NGOs and international organizations.

In the Bay of Bengal, the continuous shifting and depositing of sediment in rivers and coastal zones creates new land, called *chars*. The natural environment in this region is characterized by: the continuous erosion and accretion of land; the threat of cyclones, storm surges and tidal flooding; drainage congestion and water logging; drought; and salinity intrusion. Climate change and climate variability exacerbate these threats. The people in this region often come from marginal positions in society and face the threat of losing their land to this massive bank erosion. As a result, the region experiences recurrent population displacement and migration.

Those who lose land to erosion mostly move to the *chars* in an effort to acquire new land. The *chars* are exposed to rapid river bank erosion, are poorly connected with the mainland, and are: i) not suited for agriculture because of salinity and flooding; ii) vulnerable to cyclones and storms; iii) harsh for living because they lack fresh water and fuel, and iv) lacking in communication and public services. Being vulnerable, the migrating landless peasants are exploited by different groups who illegally assume power over *char* areas (*Bahini*) and maintain power using violence. These illegal leaders are politically connected and determine conditions for migrant settlement. The settlement pattern establishes a patron-client relationship and involves forced labour. It also entails arbitrary land

purchase, continuous threats and occasions of physical violence [42].

In some parts of this region, the Government has carried out the Chars Development and Settlement Project (CDSP), co-funded by IFAD. The project involves such actions as expelling the *Bahini* with military force. It institutes a formal process of land allocation to the settlers. It also provides infrastructure that resists damage from the elements, and various livelihood support measures. The data collected through interviews, focus groups and observations shows that where it operates, the CDSP could end the *Bahini* regime.

Government and local people apply different adaptation strategies in this environment: The Government reacts by implementing a comprehensive development project. The typical reaction of the people is to maintain and rebuild their livelihoods in these hostile surroundings, and this involves adapting to the *char* environment and natural hazards, and to the long-term environmental changes, such as climate change. In the *chars*, climate change impacts already evident include increased temperature and changes in rainfall patterns, which causes such problems as soil salinity, floods, higher frequency of tidal waves and reduced agricultural production [43]. This case clearly shows the interplay of environmental and social factors that cause livelihood vulnerability and low resilience to climate change.

Technological solutions in the social context

2nd Core result

Although technological solutions for smallholder farming can improve the livelihoods of poor rural people, significant social and political barriers within local governance also hinder such improvement.

Technological solutions are often applied to adapt livelihoods to change of the sort posed by climate change [7]. Water-harvesting technologies, for instance, are a possible remedy for farmers located in drought-prone areas [44]. Agroforestry systems can be used to adapt agricultural systems to climatic variability trends, such as a prolonged dry season [45]. Indeed, many technologies are used in different rural contexts and are often adapted for smallholder farmers to provide promising alternatives [6].

Even though climate-smart technological solutions can be useful, their availability is limited in most rural areas. Thus, the key question to ask is what barriers exist, and how they might be circumvented, so that such technological solutions can become mainstream.

For climate-smart technological solutions to be more commonly used, it is best to consider their political nature, which prevents straightforward replication from one setting to another. Technologies are deeply embedded in context, and context is a product of the interaction between such factors as history, social relationships and power structures. Attempting to scale-up technological solutions without considering context-specific social factors carries a risk of failure, and might, for example, limit their adoption or allow them to be controlled by wealthier and more powerful local groups.

The social context also prevents certain workable technologies from being widely adopted. Examples of this can be seen in the Bolivia-Alto Beni case, where the lack of local incentives (or the existence of disincentives) inhibited action among proponents of certain technologies. In Brazil, asymmetric local power structures that depend on such practices as patronage and rural clientelism hamper adoption of alternative and locally designed technologies. However, even under these circumstances, in Brazil family farmer organizations were able to circumvent local government structures and affect policymaking at the national and regional levels to scale-up locally designed technologies.

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Coexistence with the Brazilian Semiarid

The Brazilian Semiarid region experiences periodic, prolonged drought, known locally as *estiagens* or *secas*. Climate change projections expect these droughts to become more frequent and prolonged [34]. In a region where livelihoods depend on rainfed farming, for the majority of rural families these climatic events are often concurrent with periods of severe livelihood drawbacks, migration and cyclical poverty. Droughts and associated poverty have contributed to the perception of the Brazilian Semiarid as a lost region, particularly in other parts of the country.

After approximately a decade of sufficient rainfall, from 2011 to early 2014 this region suffered one of the worst droughts in its history. However, rural populations were significantly less hard-hit by this drought than they were by other, less severe droughts that occurred in prior years. Droughts in the Brazilian Semiarid typically increase undernourishment rates temporarily, and cause a massive outflow of mostly male migrants to the more affluent regions of Brazil, usually southern urban centres. In this recent drought, the food security status of the region was not affected and there was no massive migration [46]. Instead, the declining mid-term regional trend of food insecurity reduction continued with no major

changes. This suggests that some measures were effective in reducing vulnerability and making livelihoods more secure.

Much evidence indicates that a combination of *coexistence with the Semiarid*[4] *strategies* [47] has made the livelihoods of family farmers more climate resilient. These strategies include the construction and use of community-based, small-scale technologies, such as water harvesting cisterns. The Brazilian case study demonstrates that effective strategies that reduce livelihood vulnerability, such as small-scale harvesting technologies, involve technology and consider the long-term struggle to empower marginalized families. Civil society organizations have used participatory methods to promote technologies adapted to the environment, such as water harvesting cisterns, community seed banks, community micro-credit, and local seed varieties and animal breeds. They have used participatory methods to promote these technologies, rather than decoupling the diffusion of technology from the social dimension of enhancing local capacities.

There is little doubt that alternative development practices – particularly those inspired by coexistence with the Semiarid and agroecological-based family farming – support diffusion and uptake of the technologies. This shows that such practices were not imposed externally and did not emerge disconnected from local social and economic realities. In fact, these technologies were found to be strongly rooted in the history of the region. Moreover, they represent particular acts of resistance, and present counter-proposals to the predominant development models that favour large-scale farming. They do so with technologies mostly alien to the context, and which are unsuccessful in bringing sustainable and inclusive rural development to the region.

The whole of successful family farmer experiences and supporting initiatives is gradually inspiring public policy design and implementation, at a varying pace. Federal officials and some regional policymakers seem to be more open to such approaches of late. Other local agents continue to be reluctant and foster development models based on standard agricultural modernization, at the expense of investing in alternatives brought by coexistence with the Semiarid. This can be partially explained by barriers found at the local governance level, due to persistent patronage and clientelism between local politicians and rural populations. Since they subsist on rural social inequalities, local rural elites have little incentive to foster the adoption of technologies adapted for smallholder farmers. In response to this, family farmer organizations have managed to reach broader policymaking arenas. The current challenge involves scaling-up coexistence to the Semiarid and the agroecological transition without losing its principles, approaches and methods, and without devaluing local capacities. In other words, using government funds and structures found at the top to benefit approaches that originated at the bottom.

4. *Coexistence with the Semiarid* is a local development paradigm conceptualized to oppose the modernization paradigm, *Combating the Drought*. The latter can be characterized by three dimensions: i) emphasis on economic development over more comprehensive dimensions of sustainable development; ii) a technical and fragmented approach towards the promotion of this economic development; and iii) an alliance between the regional economic and political elite. Silva defines *Coexistence with the Semiarid* as "a cultural perspective oriented towards the promotion of sustainable development in the Brazilian Semiarid, which aims to improve living conditions, and to promote citizenship through appropriated and locally designed socioeconomic and technological initiatives, that are compatible with the preservation and restoration of natural resources" [47, translation by authors].

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Agroforestry and sustainable development in Alto Beni, Bolivia

In the biodiversity hotspot of the mountainous rainforests of the Bolivian Yungas, the most common land-use system is slash-and-burn-based shifting cultivation. Here, the agricultural frontier moves consistently into the remaining rainforests. Most agricultural practices are not well-adapted to the ecosystem. Monocultures and soils are left bare, causing soil erosion and increasing land degradation. The agriculture and forestry-based livelihoods are regarded in the Alto Benian as under threat, since internal and external factors continuously increase short- and long-term risks that degrade the natural resources people depend on. Changes in climate patterns might, in the long term, increase these risks. Still, up to this point, locals interviewed in the area perceive this impact as low in comparison with other, more pressing threats [34].

In this context, researchers and development agencies in Alto Beni from the 1980s onwards have promoted and implemented agroforestry systems by elevating their importance to higher than experimental status in the region. Farmers have widely used agroforestry techniques for many years, mostly in the context of cooperatives. Agroforestry has proved its ability to reduce vulnerability to exogenous changes, such as those brought by the shorter and less predictable rainy season of climate change projections. This was achieved through such benefits as providing additional income sources, improving soil fertility and increasing shade protection for crops.

Even though long-term benefits are widely acknowledged, agroforestry adoption remains relatively low in the region, despite higher adoption rates compared to other regions of the world. Thus, when addressing vulnerability sources in the context of Alto Beni, the question

is no longer whether agroforestry can serve as an adaptation option. Rather, it involves creating incentives and reducing barriers that inhibit its widespread adoption. A common reason is the short-term cost of shifting to these systems, which is generally too high for farmers as compared to mid- and long-term benefits.

Nevertheless, the study from Alto Beni identified other impeding factors for mainstreaming agroforestry and other diversified agricultural production systems, which can be addressed at the local governance level. The lack of concerted action between the different supportive organizations was mentioned as one such impeding factor. Dealing with different organizations and projects results in higher transaction costs for farmers, since they have to interact and spend time and efforts with different agents when receiving support or implementing a project. It also inhibits the creation of synergies between different public interventions.

In this regard, people from the region indicated the necessity of "integrative support", or support consolidated into a comprehensive strategy that includes the development of whole value chains, rather than ad hoc interventions through small projects. This would require a much higher degree of coordination between the public and private bodies that support developing an agroforestry system. Given that each organization responds to a particular mandate and has its own funding sources and target groups, it seems unlikely that greater coordination would emerge automatically. Rather, this approach would require redefining their role in the local context. With respect to agriculture, this refers to sustainable cultivation, and to such activities as processing, transport and commercialization of agricultural products.

A second option identified in the interviews with local organizations involves creating more financial incentives, or establishing disincentives for less sustainable farming methods. Once again, incentives seem to be key, but rather difficult to implement given the local governance dynamics. While some farmer groups have suggested using carbon credits to finance payments for ecosystem services, this method would face significant resistance in the Bolivian context from the many groups in favour of more comprehensive and holistic values regarding nature, and against the commercialization of nature.

Environmental subsidies and market development for agroforestry products could be an alternative means to support agroforestry systems, through incentivizing sustainable resource use systems or promoting awareness among consumers. They could finance the initial implementation phase, which is more costly, until the system is established and returns become more evenly distributed. The study concludes that a better understanding of the institutional settings, the organizations, and the political economy of incentives and disincentives could shed light on how to develop the integrative support farmers say is necessary to change fundamentally the Alto Beni landscape, local people´s vulnerabilities and their future.

The role of commons in reducing vulnerability

3rd Core result

Recognition of community rights, including common property institutions, is useful in reducing the vulnerability of poor rural populations. However, such measures must be supported with appropriate policy if they are to be an instrument of comprehensive development that ends poverty.

Fuelled by skepticism about the possibility that local communities can sustainably manage common pool resources (CPR), Elinor Ostrom and many other scholars have dedicated their work to demonstrate that natural resources can be, and are being, sustainably managed by communities through the design of use, access and other rules reducing transaction costs. Adherents of this school of thought put securing community land rights at the forefront of land governance debates. Community land rights are thought to "strengthen the internal governance institutions that enable lands and resources to be managed in an equitable and accountable manner" [48]. Community rights movements are prominent and influential in many national and international debates, and promote efforts to scale-up the amount of land under communal tenure.

In fact, the quest of many local communities for tenure rights can be a historical struggle. In recent years, this struggle often has yielded rapid successes, particularly in Latin America and Asia, with less success in Africa. However, the implementation of these new laws is often incomplete. One example from India is the so-called Forest Rights Act, which in 2006 acknowledged community tenure rights over forests but has severe implementation flaws.

The case studies from India and Bolivia (Lomerío) demonstrate that, even where communities dispose of secure land rights, the pressure on resources does not necessarily end. This strategy alone might not initiate comprehensive development processes that end poverty.

In southern Rajasthan, India, tribal communities are often marginalized, extremely dependent on natural resources for their livelihoods, and lack livelihood alternatives. This study shows that communities still have limited opportunities for livelihood options even where community rights are secured, and supportive measures such as land rehabilitation and the negotiation of resource use rules are in place. The households involved can obtain larger amounts of resources, such as fodder and fuel wood, from common lands. However, given the strong population pressures, the benefits have a limited effect in lifting them out of chronic poverty.

The case of Lomerío, in Bolivia, complements this conclusion. Land titling was an important achievement of the indigenous populations of Lomerío in recent years. It was a significant achievement for justice and distributional equity, and for regaining control over resources of a territory that communities have been living in for generations. The establishment of an indigenous territory also supported countering the expansion of an advancing agricultural frontier in the margins of their land. However, given the region's economic orientation, and internal and external economic pressures, titling alone has not been sufficient to stop unsustainable resource exploitation inside the territory.

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Re-establishment of common property institutions in southern Rajasthan, India

In southern Rajasthan, most people live on less than INR 20 (US$0.35) per day, and more than 90 per cent of the population relies on subsistence agriculture that is often combined with animal husbandry. These livelihoods are highly vulnerable to the region's water scarcity, recurrent droughts and decreasing agricultural production due to land degradation. Climate change projections include increasing temperature, which may lead to reduced soil moisture and increased water stress that will likely affect agricultural yields [49]. According to the perceptions of the local communities, the onset, duration and distribution of monsoons, which has always been variable, has become highly unpredictable and erratic.

A vast majority of the rural population, especially the poorest, depends on Common Pool Resources (CPR) for their livelihoods. The very high share of common lands in the region (73 per cent) provides several direct and indirect benefits to local communities, such as access to fodder, grazing space for livestock, source of fuel wood and Non-Timber Forest Products (NTFPs).

In spite of the vast share of common land, the availability of natural resources from commons is more and more limited due to two main processes. First, Rajasthan has witnessed a decadal increase of 21.4 per cent of its population from 2001-2011, and the population continues to grow. The rising human and livestock populations overuse and degrade the land. Second, common lands are massively encroached upon, with the increasing population causing further fragmentation and miniaturization of land holdings by descent. Thus, it has become necessary to cultivate more land for food crops, which, in turn, has led to a decrease in privately owned pastures. As a consequence, most of the land that was formerly held as commons was taken under contested ownership. Individuals illegally encroached on this land, mostly for agricultural use (81 per cent) and for pasture land (74 per cent). Affected commons include forests

and revenue lands, and village pasture lands under government ownership that constitute de facto common pool resources.

Today, nearly 70 per cent of the common land is de facto privatized. This is especially problematic for the poorest individuals, since encroachment was a key factor in reducing the resource base for livestock sustenance, and constrained the access of marginal farmers. Thus, the poorest lack access and are deprived of important livelihood assets. Higher levels of encroachment are usually seen among the powerful and influential people within the community. Since their position in society is higher, they often hold official positions in village councils and have links to local politicians, and they are more likely to bribe officials. The occupation of more land increases their power and influence. The weaker families also encroach upon common lands but do so with considerably smaller plots.

Evidence gathered for this study shows that efforts NGOs supported to re-establish CPR sites benefit the community, and mostly benefit poor people in the short and long term. Due to accompanying measures to reverse land degradation and the negotiation of resource use rules and benefit-sharing mechanisms, the productivity of the re-established CPR sites improved substantially and provided access to fodder and other products. The vast majority of the households involved in the study stated that there are wider economic, social, political and institutional gains. Besides fuel wood and Non-Timber Forest Products, the substantial amounts of fodder harvested from community lands (400-500 kg on average per household per year) plays an important role in feeding livestock and in reducing household spending and women´s workload. Thus, community resilience increased in the face of climate change.

Forest policies, in particular, have shifted significantly, and more recently brought recognition of community rights and empowered people to manage lands. Given their alienation from the forests by law, tribal communities and activists for over three decades campaigned for recognition of bona fide and usufruct rights for communities. In 2006, a historic decision of the National Parliament passed the Forest Rights Act (FRA). The FRA aimed to correct historic injustice towards tribal and other forest-dwelling communities, and to redress the traditional rights of individuals and the right to collective forest management. This was a major policy shift from traditional, centralized forest management towards decentralized reform. It granted forest land rights to the individuals who occupied it on a fixed date, pursuant to an established claims procedure. However, these established rights have been largely ignored, and their implementation has been severely flawed.

When community rights are eventually put into practice, they present an avenue for reducing the vulnerability of poor rural populations. Communities can register land and manage it communally. With the support of local organizations, the community jointly decides to clear encroached lands, demarcate it, apply land rehabilitation measures, and negotiate access rules and benefit-sharing mechanisms. In this way, they are able to increase their livelihood assets, and more precisely to harvest fodder and other products from the sites.

It is significant to note that even when the above-mentioned conditions are met, the recognition of community rights may not be sufficient to initiate development processes that end poverty. Households can obtain larger amounts of resources, such as fodder and fuel wood from community lands, making their livelihoods more resilient. Still, these resources cannot replace the requisite livelihood options that alleviate chronic poverty. In this regard, community land rights are significant to sustain and improve community livelihoods, but do not provide complete solutions. To achieve more comprehensive development that ends poverty, additional measures would be required. First, changing this situation would require more long-term support of organizations for the complex process of altering the local power structure. Second, alternatives should be introduced that allow local people to diversify their livelihoods towards more sustainable and dynamic development.

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Control of natural resources in the indigenous territory of Lomerío, Bolivia

Lomerío is located in the lowlands of eastern Bolivia and has been inhabited by diverse indigenous groups, or *Chiquitanos*, for many centuries. Political and economic processes that marked the different historical contexts of the country preceded the forced integration of indigenous groups into institutions, first by the Spaniards and later the Bolivian State. Thus, throughout the eighteenth, nineteenth and early twentieth centuries, there were repeated attempts to colonize these populations: from Jesuitical missions, to semi-slavery integration into large farms and forced labour for rubber extraction. It was only from the 1960s forward that a more autonomous and unified indigenous-based political platform began to take shape.

After the 1960s, the *Chiquitanos* developed structured and formal organizations to resist non-indigenous outsiders with an interest in their resources. This was supported by the increasing prominence of national indigenous movements, and an indigenous political agenda in Bolivia. The greatest threat, according to the inhabitants of Lomerío, was illegal logging inside what they considered their territory. Their mobilization became a struggle to gain greater control of their territory and resources, and encompassed a strategy for protecting these resources from external forces.

Changes in the Bolivian legislation in favour of the recognition of community rights in 1996 made it possible for the *Chiquitanos* of Lomerío to file a claim for the establishment of a territory. After the long 10-year titling process, the Bolivian State recognized the Indigenous Territory of Lomerío (TCO), which consisted of almost 260,000 hectares. This achievement was the first part of a greater success story, since within a few years, the *Chiquitanos* achieved both the legal recognition of

their territory and the control of local government structures by winning local elections.

The recognition of communal land rights supported numerous processes that reduced the structural vulnerability of the *Chiquitano* population. First, it fostered social organization and political mobilization, and increased access to decision-making at both local and regional levels. Second, it facilitated developing and implementing forest management plans that benefited the 29 communities that form part of the territory. Furthermore, through gaining control over these resources, the *Chiquitanos* were able to re-establish and, in some cases, to formalize rules of practices for indigenous roots involving more comprehensive cultural values for natural elements, and imposing more restrictive limits for resource exploitation. In a region where more erratic rainfall is expected under climate change projections [34], this will mean better preparedness and less vulnerability. Finally, as satellite images demonstrate, establishing this territory countered the expansion of the advancing agricultural frontier along the margins of their land.

Despite several advances in terms of institutional change, the economic transformation is still very limited. The economic orientation of the region as a whole continues to be fully dependent on exploiting natural resources through mining, logging and agriculture. In this context, the recognition of community rights and accompanying social processes are not sufficient to inhibit resource-depleting and unsustainable extractive industries inside the territory. Even though the expansion of the agricultural frontier has been stopped, a growing commercial external and internal interest in forest products and mining is increasing the risk that resources will continue to be degraded, without generating social and economic benefits for the communities.

Redefinition of rights over resources as a political process

4th Core result

Pro-poor adaptation can involve redefining rights to resources, which is a manifestly political process. If they are to reduce vulnerability, resource governance reforms must consider how poor rural groups are represented and involved in decision-making within the political process.

As discussed in core result 1, vulnerability results from the complex interaction of environmental and social factors. Moreover, many social determinants of vulnerability are strongly related to how resources are owned and accessed, particularly for poor rural groups dependent on natural resources for their livelihoods.

As a result, reforming resource governance must occur in a manner that directly involves poor rural groups in the decision-making process. If this is done, outcomes are in favour of poor rural groups, and this is a meaningful step towards reducing vulnerability. Furthermore, it must be recognized that governance reform is a political process involving power disputes. This process involves such actions as the renegotiation of rules and the redefinition of property and access, all of which require that political groups articulate opinions and engage in political debate, which cannot be avoided. Ignoring the inherent political nature of resource governance (reform) or trying to circumvent this process might yield well-designed rules that are not feasible in practice. Since poor people are often politically marginalized, changing structural restrictions can provide an opportunity to reform governance systems and make them more pro-poor oriented.

This is the most significant result of this study, and evidence supporting the above is found in all the case studies. The examples of Ecuador and Burkina Faso are explained in more detail below.

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Political action, marginalization and governance of natural resources in Imbabura, Ecuador

In Ecuador, as in other Andean countries, control over land and natural resources has always been central to history and shaped societal and political relationships, production methods and the focus of the national economy. Despite substantial changes over the years, some structural characteristics and the governing control of natural resources remain relatively stable. For instance, rural populations of indigenous origin are more likely to be affected by poverty and marginalization, despite continued community and national efforts to improve the vulnerability of their social structure.

Climate change is impacting natural resources more and highlighting the importance of effective resource governance. The observations of local populations are consistent with data from climate stations and show increasing temperatures that shift the cultivation range of certain crops. Data also show that the distribution of precipitation has become more skewed. The greatest climate threat to the livelihoods of local populations is the water cycle in higher areas, particularly where there is progressive reduction, and sometimes extinction of Andean tropical glaciers. Also troublesome is the degradation of *páramos*, a type of highland tundra ecosystem with great importance for water absorption and regulation [50, 51].

The study from Ecuador investigated three cases of resource governance shaping the vulnerability of poor rural populations. It also demonstrates how political action ended structural marginalization. Yuracruz is a marginalized community, where most families have insecure livelihoods, due to very limited access to fertile land, and restricted income-earning options. Problems providing water substantially aggravate this situation, as does the inability to mobilize the political pressure needed to change the disputed situation of the upper páramo. This community was

already powerless when the former owner of the upstream páramo farm negotiated a limited land redistribution in the 1960s to maintain control over the area. Since then, the distribution of power has not changed significantly to favour the Yuracruz community. Although there have been many attempts to change this situation, public agents are reluctant, even using legal means, to become involved in the open conflict over the páramo. There are several provisions under the new constitution that could challenge this approach, however, the required legal and political support would be too costly for the community.

The cases of El Batán and Morochos demonstrate that communities can be better prepared and in a more favourable position to confront the common regional stressor of surging land acquisition by foreigners. In Morochos, different historical developments have allowed indigenous groups to regain control over nearly all the territory that they consider ancestral. Once this was done, community efforts to define their own rules for land transfers became easier. However, the El Batán community failed to control the majority of its territory, and, as a result, was unable to mobilize to profit from the influx of foreigners. They also have lost control of decision-making. This influences internal community dynamics and has already generated conflicts, which are worsened through communication and cultural differences with the foreigners. Foreigners reported receiving no advice on the community or culture from the companies that manage the land and housing market. They were essentially dragged into the middle of a long-standing feud between the indigenous community and former farm owners.

The most significant lesson from this study is the importance of acknowledging that redefining resource rights is a political process, with winners and losers, and in which power plays a decisive role. A pro-poor approach would involve acknowledging the imbalance of power and influencing the political process to favour those who are more vulnerable. In Yuracruz, for example, this would require that state officials understand that the economic benefit of a single, more affluent household cannot be exchanged for increased vulnerability in a community of 1,300 people.

Another lesson from this study is that increased land access and tenure security can be a means of reducing vulnerability. However, for the indigenous communities of Ecuador, the decisive factor is communities regaining control over their entire territory, rather than over only a few disconnected parcels of land. Regaining control over the entire territory strengthened community ties and the communal institutions that favour sustainable land and water management. It was the strengthening of this "indigenous governance system" that facilitated the ability of the Morochos community to adapt to increasing land prices, and to better manage water catchment zones. Finally, the study demonstrates that political organizations based on ethnic configurations are key to facilitating dialogue and increasing access to local political decisions.

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Resource use conflicts in the pastoral zone of Samorogouan, Burkina Faso

The case of the pastoral zone of Samorogouan in south-western Burkina Faso is an example of concurrent massive dependency on, and growing degradation of, natural resources. In Samorogouan, this situation is worsened by poverty, weak institutions, increasing conflicts and the lack of alternative livelihoods.

Major institutional changes have occurred since the 1970s. After the severe Sahel droughts of the 1970s, the pastoral zone was created as an externally financed project aiming at the sedentarisation of pastoralists, and to intensify breeding in a comparatively favourable environment. Political changes caused the withdrawal of the external funder, which resulted in financial shortfall and incomplete implementation.

Even today, the demarcation and status of the zone is unclear. In subsequent years, there was strong population growth in the region, coupled with an afflux of migrants who were forced to move by climatic stress and overpopulation in parts of the country. There was also a war in the neighbouring Ivory Coast. The arrival of migrants and the state policy of promoting cotton production led to changes in agricultural practices, livelihoods and land use. Under the influence of the agricultural migrants, the pastoralists started practicing agriculture, mainly commercial cotton production, and became agro-pastoralists. Resident and newly arrived farmers adopted breeding, along with farming. This caused the accelerated degradation

of natural resources. While the pastoral zone initially was covered with dense woody savannahs and plentiful animal species, an estimated 80-95 per cent of the pastoral zone has been transformed into agricultural fields.

These developments, along with an unclear tenure situation, triggered social conflicts, mainly between indigenous groups and migrants (or pastoralists and farmers). In this context, the inconsistent and conflicting policies of the State played a crucial role in creating a situation the local residents labelled as "anarchic". The situation is expected to be aggravated by future effects of climate change, since it is predicted that the Samorogouan climate will become hotter and drier and experience more droughts [36]. The local population of the pastoral zone does not perceive the changing climate as a problem so far, and does not consider it a key concern. Under this situation of poverty and de facto open access to resources, different groups use different adaptation strategies for these changes.

This case demonstrates that resource governance at its core is a social issue involving access and tenure rights, transparent laws, and managing conflicts. In Samorogouan, all stakeholders perceived the need to define the boundaries and the pastoral zone, and to negotiate new tenure and access rights. This process is highly political. During data collection, interviewees reported and substantiated the varying bargaining power that groups have to voice their perception, needs and demands. For example, they make use of their ethnicity to access political power, or make reference to being "autochthon" (indigenous) as a claimed source of legitimacy. They feel the State should lead reform of resource governance in the pastoral zone.

The question remains whether the reform of land governance would be sufficient to ensure resilient livelihoods and sustainable development in the region. Similar to the cases of India and Bolivia (Lomerío), more long-term solutions for sustainable and resilient livelihoods are restricted. Lack of access to education and income opportunities, and high dependency on environmentally and socially precarious cotton production, imply that the people of Samorogouan do not have much possibility to adapt to the different processes of change. The development of resilient livelihoods would require a shift towards alternative and more diversified livelihood options that compensate for the projected effects of climate change.

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Conclusion

ProPoorGov has two main objectives: i) from a content point of view, to better understand how vulnerability stems from historically interrelated social and environmental factors; and ii) from a policy point of view, to strengthen the link between different levels of policymaking in natural resource governance. This section presents the conclusions, starting with the second objective.

Strengthening the link between different levels of policymaking

This objective is directly related to the assumptions that were initially designed for ProPoorGov regarding collaboration with local CSOs. The first assumption stated that the implementation gap of pro-poor policies can be partially explained by discontinuities among scales of governance. In other words, more knowledge is needed to understand the role bargaining power plays in limiting certain rules to be followed. When this knowledge exists, it is only with difficulty taken into consideration when decisions are made. The second assumption stated that local CSOs have been trying different strategies to cope with these discontinuities, which situates them well to understand the local context and background that might inhibit implementation of pro-poor policies. Finally, the third assumption states that building bridges of knowledge between the grass-roots level and the international arena can be extremely useful in advancing resource governance. It was not the intention of ProPoorGov to extensively examine these assumptions with the evidence found in the cases. Nevertheless, after implementing the project, some points directly emerge, particularly regarding the third assumption and the importance of strengthening the link between different levels of policymaking in resource governance.

Evidence from three cases exemplifies how resource governance can be improved through establishing stronger links between higher decision-making levels and local CSOs. In Burkina Faso, ProPoorGov triggered the responsible Ministry to begin negotiating new resource use

rules in the pastoral zone, with the support of partner organization GRAF. The Government and local populations perceived this organization as a legitimate and capable actor because of the expertise it demonstrated in this study, and its successful record in mediating similar negotiations in other parts of the country. In Ecuador, an ongoing process to establish new rules and policy for land acquisition in the Imbabura province was started following political pressure from local indigenous groups that local partner SIPAE supported. The municipality of Cotacachi invited SIPAE to contribute to the design of these new rules. SIPAE's knowledge was crucial for advancing a mediated solution that both indigenous groups and local government could accept. In Lomerío (Bolivia), local indigenous groups and its partner organization used ProPoorGov to lobby for a more effective regional response to the intrusion of miners and loggers into the territory. Rather than merely exercising political pressure, Fundación Tierra's expertise in these and in many other land conflicts in the country allowed them to make substantial constructive contributions to stopping external miners and loggers. As acknowledged by national government representatives participating in ProPoorGov workshops, local CSOs can make meaningful contributions to policy design. They can go beyond the role of watchdog to which they are often limited. Similarly, international organizations could profit from local CSO knowledge and experience through working closer with them.

Addressing vulnerability through pro-poor resource governance

In addition to the specific conclusions drawn for each case study, the ProPoorGov reached four main core results with potential applicability for areas beyond their specific localities. These suggest that vulnerability has to be understood as being caused by multidimensional environmental and social factors in order to adequately address the complexities of adaptation. In other words, vulnerability to climate change is not a result of climate change alone (core result 1). Furthermore, it is important to acknowledge that how resources are institutionally governed to a great extent defines how poor rural groups can overcome their structural marginalization and effectively increase their bargaining power to adapt to new situations and increase their resilience (core result 3). Addressing these challenges requires more than merely technical or legal measures focusing on land tenure (core result 2). Rather, this process requires more participatory and multilayered institution building (core result 4) [26].

As the cases demonstrate, rural poor people are often vulnerable while trying to maintain their livelihood strategies when there is pressure on the natural resources they depend on and because of environmental changes such as climate change. This mostly results from inferior bargaining power and limited influence in shaping the direction of institutional change. It is in this already complex and dynamic setting that climate change is happening, so changes in climate patterns interact with the existing socio-environmental setting. In some cases, it was possible to identify that new sources of vulnerability could be attributed to recent changes in climate patterns, rather than solely to climate variability. In others, as climate change projections suggest, climate change might pose additional threats in the future, but for the moment it is seen only in minor factors that influence the vulnerability of poor rural groups.

These cases demonstrate a variety of adaptation options to address vulnerability. However, we have to distinguish the short-term and ad hoc measures (coping) from the more long-term solutions that involve structural transformation (adaptation). In fact, in most of the cases studied, this distinction is blurred. In examining vulnerability, we find that even measures considered to be adaptation do not necessarily decrease vulnerability sufficiently to make livelihoods more sustainable. To give an example from the study, in Rajasthan (India), with

the help of the partner organization, communities established land restoration and water harvesting structures on common property resource (CPR) sites – an adaptation measure. Households can, in fact, obtain larger amounts of resources from community lands, which better positions them to sustain their livelihoods, including coping with droughts and climate variability. Nevertheless, they remain highly vulnerable, and these resources cannot replace the needed livelihood options that would allow them to escape chronic poverty.

Possible policy reactions for promoting pro-poor resource governance could include measures such as:

i. Reinforcing the bargaining power of poorer groups through promoting **collective action** capabilities to better react to economic and environmental pressure. Communities may sometimes benefit from the support that comes from establishing collective action. The study shows that community organizations, such as water or rangeland user associations, are not simple managerial entities. To a great extent, these associations mobilize and unify marginalized groups with the aim of empowering them, and often reduce local power asymmetries. Governments can provide institutional security or a platform to develop these measures. CSOs can also provide legal platforms and serve as hubs for collective action. Other organizations, such as development agencies, can financially support and collaborate with CSOs, making them more pivotal players.

ii. In some problematic cases of resource governance that entail extensive conflicts and complexity, the best approach might be to involve multiple actors in a participatory and inclusive **deliberative process**. This approach works best for good prospects, only in cases where a shared common interest of the stakeholders exists that is strong enough to build on, and where power asymmetries in communities do not impede trust building. One possible building block is participatory planning at the community level that is based on climate risks and the natural resource asset base, particularly for the development pathways available for communities.

iii. Several measures that are being proposed for adaptation build on "traditional" practices that communities have used for generations to manage climate risks. However, since the challenges many communities face are increasing in magnitude and frequency, smallholder farmer ability to adapt is being compromised. Often, the tried and tested **"traditional" measures can be supplemented**, for example, through such technological innovations as using improved species and varieties that increase the adaptive capacity of farmers.

iv. Structural transformations of the type that climate change adaptation requires calls for long-term approaches (i.e. thinking in terms of generations rather than short-term project cycles). A long-term perspective usually involves continuous political and financial commitments, which might use **public funds**, either from national sources or development cooperation funds. These can be used to support the approaches identified in the study. Some examples of this are: covering transaction and initial costs to adopt a specific technology; or using a variety of approaches that already work and that are designed at the grass-roots level. This acknowledges that rural people actually manage landscapes through their

activities, and are both victims and agents in adapting to climate change.

v. Altogether, the study shows that the multidimensionality of vulnerability requires a **comprehensive and integrated approach**. Governing resources in a manner that includes and benefits poor populations is a meaningful step in reducing the vulnerability of rural poor groups. Nevertheless, in settings of chronic poverty and marginalization, simply improving resource governance might be insufficient to overcome poverty. Thus, integrated approaches would consider the existing multitude of local actors, account for the existing governance structures, and, most importantly, build on those favourable structures that already exist. Some such existing structures are the local pro-poor CSOs that have been working on behalf of, and along with, poor groups over the long term, and know the local context and how to address the hindrances to pro-poor development.

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Annex 1. Project Partners: civil society organizations

Bangladesh	BRAC	BRAC is a development organization dedicated to alleviating poverty through empowering the poor. After foundation in Bangladesh in 1972, BRAC activities now cover the whole county. Its program includes, among others, agriculture and food security, microfinance, education, health, legal empowerment and social enterprises. More concretely, the case study has been carried out in collaboration with the BRAC's Research and Evaluation Division (RED), an independent research unit within the framework of the organization. The division has been playing an important role in designing BRAC`s development interventions, monitoring progress, documenting achievements and undertaking impact assessment studies. www.brac.net
Bolivia 1	Fundación Tierra	Fundación Tierra is a Bolivian non-governmental organization (NGO) dedicated to discussing ideas and developing proposals for the rural sustainable development of indigenous, natives and peasant groups. With more than 20 years of experience, Fundación Tierra works through action research and aims to influence policymaking in Bolivia in favour of marginalized and excluded rural populations. It supports indigenous, natives and peasant groups by building capacities in management, negotiation, participation and policy incidence. Fundación Tierra research areas includes agrarian issues, food security, indigenous rights, democracy and local governance, and the applied action research methodologies favours strong involvement of communities at the local level. www.ftierra.org
Bolivia 2	CDE Faculty of Agronomy/UMSA La Paz and Fundación PIAF-El Ceibo	The Centre for Development and Environment (CDE) is an interdisciplinary research centre of the University of Bern, Switzerland. CDE's overarching goal is to produce and share knowledge for sustainable development cooperation with partners in the global North and South. Under the scope of this research, CDE has collaborated with the Faculty of Agronomy of the Universidad Mayor de San Andrés (UMSA), situated in La Paz, and with Fundación PIAF-El Ceibo. www.cde.unibe.ch Fundación PIAF was created by the Central of Cooperatives El Ceibo as a non-profit organization serving the needs of local cocoa farmers and their families. One of its main activities consists of providing technical assistance and fostering knowledge sharing among cocoa producers of Alto Beni. The foundation is also responsible of monitoring compliance with organic agriculture standards, for providing micro-credit and for managing social support programs, such as health, education and retirement programs. www.elceibo.org
Brazil	PATAC	PATAC (*Programa de Aplicação de Tecnologias Apropriadas às Comunidades*) is a civil society organization with more than 40 years of history aimed towards the strengthening of family farming in Brazilian semiarid. In direct cooperation with local family farming organizations, PATAC promotes sustainable rural development in the State of Paraíba, Brazilian Northeast, through the dissemination of agroecological practices and the usage of participative and bottom-up processes. PATAC supports the usage of local and original biodiversity, adapted to the conditions of the environment, and supports small-scale, low-cost technologies to conserve and store water, forage and native needs. PATAC´s intervention methods favour reinforcement of local knowledge and community-driven sustainable development. http://patacparaiba.blogspot.de/p/patac.html

Burkina Faso	GRAF	GRAF (*Groupe de Recherche et d'Action sur le Foncier*) is a non-profit organization founded in 1999 and a member of LandNet West Africa. GRAF is a network of persons interested in land issues such as conflicts and acquisitions, decentralization, and governance of natural resources. The organization focuses on research, capitalization, publication and advocacy. GRAF aims at conducting research on land issues at the local level, at implying all stakeholders in a genuine national debate on the political and legal options regarding land, and at acknowledging and using the local expertise. Striving for the diversification of perspectives, analyses and proposals, GRAF gathers researchers, practitioners and decision makers. In the past years, GRAF has received significant attention and has been involved in governmental processes. www.graf-bf.org
Ecuador	SIPAE	SIPAE (*Sistema de Investigación de la Problemática Agraria en el Ecuador*) is a research network working on agrarian policies at the local and national level. It operates a platform for action-research development, fostering social dialogues, elaborating political proposals, and connecting scientific investigation with social movements dealing with rural and agrarian problems. SIPAE's mission includes the support of a socially and environmentally sustainable agriculture, in defence of food sovereignty and collective economic, social, cultural and labour rights. It aims to contribute to the different research efforts, articulating and complementing new knowledge in rural and agrarian topics. www.sipae.com
India	Seva Mandir	Seva Mandir is an Indian non-profit organization founded in 1968 that has been working for 40 years with the rural, predominantly, tribal population in Udaipur district of Southern Rajasthan. Seva Mandir's work centres on efforts to strengthen the sense of collectivity and cooperation among communities with the goal of improving social equity and increasing resilience to climate change. The organization carries out activities in 626 villages and 56 urban settlements. Seva Mandir supports communities in the (re-)establishment of common lands through negotiations that are often prolonged to free it from privatisation, develop and protect the degraded lands, and put equitable benefit-sharing mechanisms in place. www.sevamandir.org

Source: Authors´ field data and organizations' websites.

Annex 2. Data collection procedures

Country	Study sites and selection criteria	Data collection			Workshops
		Type	Methods used	Period	
Bangladesh	7 char lands of Noakhali District, selected from CDSP intervention areas as well as from non-intervention areas with different histories of migration and settlement.	**Quantitative**: Climate records and household data, collected from secondary as well as primary sources. **Qualitative**: Transcripts of interviews and focus group discussions.	In-depth interviews, focus group discussions with selected groups (women and men separately in different localities), key informant interviews, and participatory observation.	From December 2012 to June 2013. Several visits of several days by IASS and BRAC researchers.	**National Workshop in Dhaka in May 2013:** Participation of representatives from different ministries, CDSP, BRAC, Dhaka University, journalists.
Bolivia, Lomerío	6 communities of Lomerío territory, selected on the basis of main economic activities and their historical level of engagement with the territory recognition process.	**Quantitative**: Climate records, collected from secondary sources, and household data. **Qualitative**: Transcripts of interviews, focus group discussions, legal and historical documentation. Extensive secondary data was used from previous Fundación Tierra research activities in Lomerío (since 2001).	In-depth interviews, focus group discussions with selected groups (local leaders and communities), key informant interviews, participatory observation and participatory mapping (social mapping and GIS-based).	From December 2012 to July 2013. 2 field excursions by IASS researchers, several field excursions by Fundación Tierra researchers. Fundación Tierra has supported the main indigenous' organizations in Lomerío since 2001 and thus has been in the field in numerous occasions collecting data.	**Regional Workshop in Santa Cruz de la Tierra, August 2013:** Participation of indigenous organizations, representatives from 8 municipalities and several public and private support organizations (foundations, aid agencies, NGOs, journalists and academy).
Bolivia, Alto Beni	Municipalities of Palos Blancos and Alto Beni. Stakeholder analysis at regional scale.	**Quantitative**: Climate records, collected from secondary sources, and household data. **Qualitative**: Transcripts of interviews, focus group discussions, legal and historical documentation. Extensive secondary data was used from previous CDE research activities in the region (since 2009).	In-depth interviews, focus group discussions with selected groups (local leaders and communities), key informant interviews, participatory observation.	From December 2012 to July 2013, several field excursions by UMSA researchers. CDE has researched agroecology in Alto Beni extensively in the past years.	
Brazil	2 communities in the territory of Cariri, Seridó and Curimataú, selected on the basis of their different level of involvement with local organizations and farmers networks and different asset basis (land and water resources). 1 local network of family farmers (Regional Collective) was also studied.	**Quantitative:** Climate records and household data, collected from secondary sources. **Qualitative:** Transcripts of interviews, focus group discussions.	In-depth interviews, focus group discussions with local organizations and communities, participatory observation (in the field and during organizations' activities).	From December 2012 to August 2013, 2 field excursions of IASS researchers, several excursions of PATAC consultant.	**Local Workshop in Campina Grande, December 2012:** Participation of approximately 80 farmers and representatives from NGOs and academy.

Country	Study sites and selection criteria	Data collection			Workshops
		Type	Methods used	Period	
Burkina Faso	16 villages and hamlets in and around the pastoral zone, administrative and spontaneous villages, selected according to their location in different parts of the zone (4 ranches), administrative status, role they played in the history of the pastoral zone, predominant livelihood activity of inhabitants, land pressure, occupation of zones of water access and livestock retreat.	**Quantitative**: Regional socio-economic data, collected from secondary sources. **Qualitative**: Secondary data (legal, political and historical documents), recorded interviews.	Focus group discussions with selected groups (youth, women, elders in different localities) and interviews with locals, heads of peasant organizations, involved NGOs and public officers in several selected villages and with additionally selected groups and persons.	From December 2012 to June 2013, 2 field excursions of GRAF and IASS researchers, main data collection in a 3-weeks-stay in February and March 2013.	**Local Workshop in Samorogouan, May 2013:** Participation of inhabitants from the pastoral zone and adjacent villages, representatives from NGOs, local and federal government. **National Workshop in Ouagadougou in June 2013:** Participation from representatives of different stakeholders from the pastoral zone of Samorogouan and other pastoral zones, representatives of all concerned government agencies, NGOs, journalists.
Ecuador	3 communities in the Andean region of Imbabura province, selected on the basis of their different asset basis and social organization.	**Quantitative:** Climate records and household data, collected from secondary sources. **Qualitative:** Transcripts of interviews and focus group discussions, legal and historical documents, maps.	In-depth interviews, focus group discussions with selected groups (local leaders and communities), key informant interviews, participatory observation and participatory mapping (social mapping and GIS-based).	From December 2012 to May 2013, 2 field excursions by IASS, several field excursions by SIPAE researchers. Main data collection in a 5-weeks-stay in April and May 2013.	**Local Workshop in Cotacachi, Imbabura, July 2013:** Participation of inhabitants from rural communities, representatives from NGOs, local organizations and local government. **National Workshop in Quito, August 2013:** Participation of national government agencies, NGOs, IFAD, aid agencies and academia.
India	8 villages in southern Rajasthan, selected on the basis of their history of how they manage CPR: four villages where the (re-)establishment of common land has been successful and sustained, three villages where the attempt failed in the long run, and one village that did not engage in such kind of intervention.	**Quantitative:** Primary data (215 household surveys; selected according to stratified random sampling) and secondary data (land records and legal documents from Government departments). **Qualitative**: Interviews.	Interviews, 25 focus group discussions and 16 social mapping using Participatory Rural Appraisal techniques.	December 2012 – September 2013, several excursions of Seva Mandir and IASS researchers. Additionally, 8 Seva Mandir case study authors involved who are deeply familiar with the respective villages.	**Regional Workshop in Udaipur, September 2013:** Participation of different NGOs, IFAD, research institutes, universities and government agencies.

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