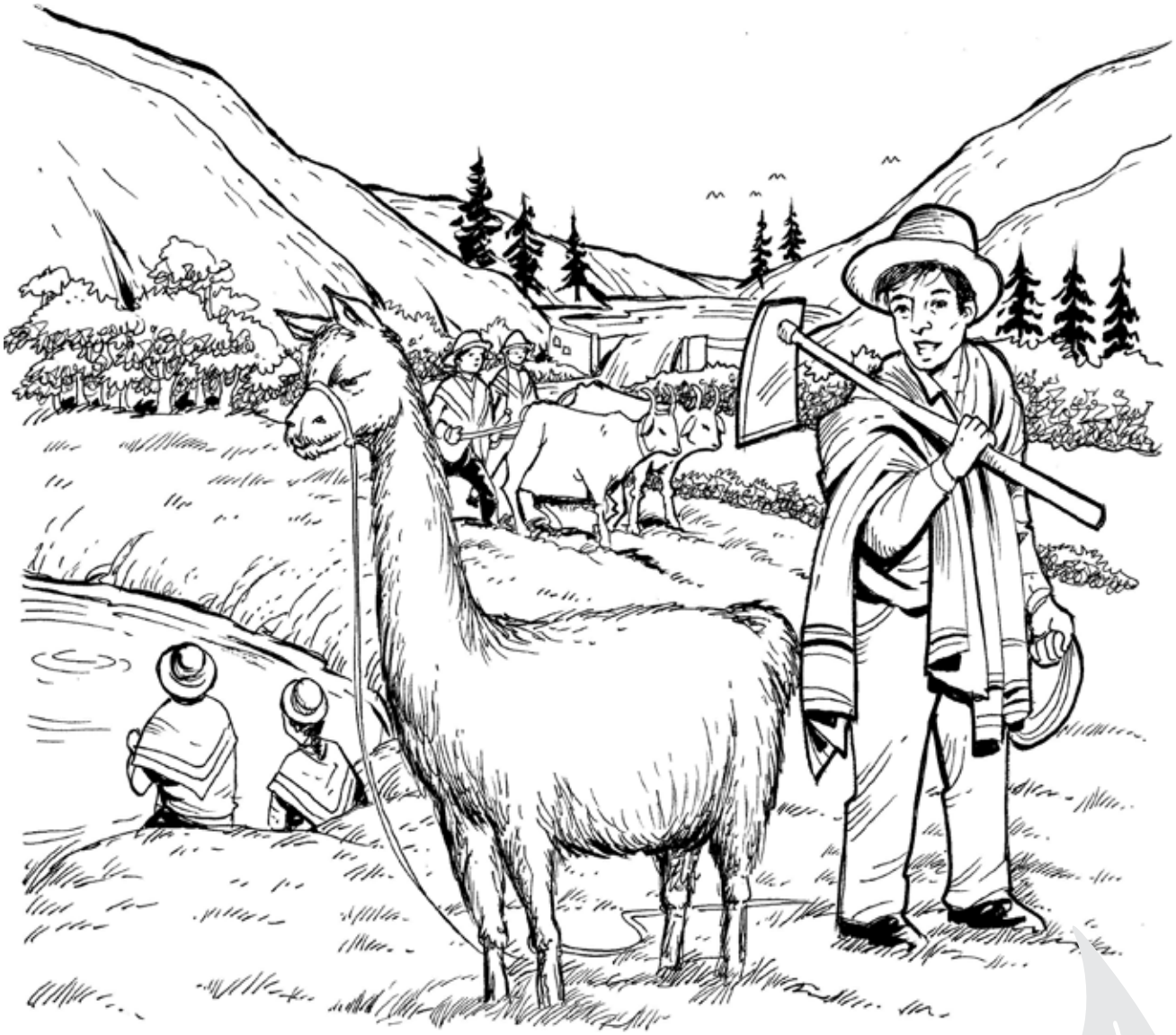
Enhancing Locally-led Learning and Innovation



For rural communities, access to water and their capacity to manage it are essential to mobilizing biological resources, achieving food security and securing livelihoods. Technical barriers to localize access to water do exist, but in the semi-arid regions of the highland Andes (as exemplified by rural Ecuador and Bolivia), obstacles to innovations in water for food production were largely both conceptual and social in nature.

People and communities produce explanations of local experience and build 'truths'—explanations that may go unquestioned and become embedded in local culture. Over time, collections of such truths

produce higher order explanations, leading to coherent bodies of knowledge—essentially a local science or 'people's science'. People's science or local knowledge production continues to be expressed in everyday life and emerges as diverse forms of localized change or endogenous development. It is richly expressed through the practice of agriculture. Life experiences and emergent myths in the semi-arid regions of the Andes had produced a *cultura de secano* (a dryland culture) that had effectively "blinded" the people to the water around them.

This CGIAR Challenge Program on Water and Food (CPWF) project, "Katalysis: Enabling endogenous potential for improved management and conservation of water resources in semi-arid Andean ecosystems," was undertaken in Rio Mira and Ambuqui watersheds, Chota Valley, Ecuador, and in two microwatersheds in Rio San Pedro, North Potosí, Bolivia, in South America.

The project goal was to develop effective modes for identifying local knowledge or endogenous potentials on water management as a means to improve the livelihoods of the rural people in the semi-arid Andes. It specifically aimed to

- develop farmer-led experimentation in technology development for improved water management;
- promote social learning and organization around water management concerns as a means to institutional and political advocacy for improved rural livelihoods; and
- systematize and document experiences and lessons learned as a means of influencing how farmer movements, local governments and other development agencies address water management concerns in rural Bolivia and Ecuador.

In Ecuador, the project worked with a network of farmers from the communities of La Playa, Lavanderos, San Clemente and Ambuqui, Province of Imbabura. This area is semi-arid with an average annual rainfall of 495 mm and altitudes between 1,600 and 2,400 m asl. The community-based organization EcoAmbuqui coordinated much of the local activity.

Additionally, due to interest from communities, the project conducted complementary activities in the communities of Ugsha and Rinconada in Otavalo. This area is relatively humid, with average annual rainfall of between 1,000 and 1,500 mm and altitudes between 2,700 and 3,100 m asl.

In Bolivia, the project conducted activities in the communities of Wallquiri, Logheto, Janqvillque, Wingaylla, Nununmasyani and Arampampa, which lie between the municipalities of Sacaca and San Pedro de Buenavista. The community-based organization PRODINPO supported much of the local activity. The region is very mountainous with highly variable climatic regimes. Generally, yearly rainfall averages between 300 and 600 mm and elevations are between 2,000 (near the town of San Pedro) and 4,000 m asl in the highland puna range (near the town of Sacaca).

Bringing forth water and food production

Katalysis is based on the premise that, for rural people, access to water and their individual and collective capacities to manage it are essential to mobilizing biological resources and achieving food security and livelihood ends. While certainly there are important knowledge and technical barriers to localized access to water, we hypothesize that, in semi-arid regions of the highland Andes, the central obstacles to innovation with water for food production were largely conceptual and social in nature.

In the process of socio-technical production, networks of people and communities organize to produce explanations of local experience in ways that bring forth certain realities, as they hide and conceal others (see, for example, Long and Long 1992). In such processes of 'myth construction', communities build 'truths'—explanations that may go unquestioned and become embedded in local culture. Over time, collections of such truths produce higher order explanations, leading to coherent bodies of knowledge, essentially a local science. Local knowledge production—what we refer to here as 'people's science', which is to be distinguished from more external and thus abstract forms of 'expert science' (see table below)—is continually expressed in the practice of everyday life and emerges as diverse forms of localized change or endogenous development. People's science is richly expressed through the practice of agriculture.

Comparison of Mode 1 (expert-led) and Mode 2 (laymen- or people-led) knowledge production (based on the ideas of Gibbons* et al. *2000)

Criterion	Mode 1: Knowledge produced in the context of abstraction	Mode 2: Knowledge produced in the context of application
Nature of knowledge production	Theoretical – produced from within a disciplinary community	Practical – produced from within a problem context
Bias – rules that govern conduct	Disciplinary and multi-disciplinary – single or multiple system of rules governing conduct	Transdisciplinary – dynamic, multiple systems of rules collide and collude
Problem-solving – experience and skills employed	Homogeneous – focused, well defined experience and skill set	Heterogeneous – diverse experiences and skills involved
Organization structures	Centralized and hierarchical – well-established; graded and top-down	Diverse and heterarchical – loose, flexible, and fluid structures; mixed and dissimilar constituents
Negotiation and consensus – resolution of differences	Closed and static – conditioned by pre-established norms and rules	Open and transient – conditioned by context of application and evolves with it.
Nature of knowledge	Generalizeable and cumulative	Context-specific and dependent on locality
Social accountability and reflexivity	Low – Offer-oriented, exclusive and low sensitivity to impact of outcomes; preoccupied with internal criteria and priorities	High – demand-oriented, inclusive and high sensitivity to impact of outcomes; preoccupied with relevance
Quality control – enforcement of 'good science'	Self referential – 'peer review' judgments; peers selected based on past compliance with norms; emphasizes individual creativity from within disciplinary bounds	Broadly based – composite and multidimensional, dependent on social composition of review system, emphasizes 'group think', socially extensive and accommodating
Theory of knowledge spread	Spontaneous diffusion based on merit	Repeated processes of generation

Similarly, agricultural scientists and development practitioners can be seen as members of myth-producing networks, favoring certain realities and suppressing others. For example, the science and development industry has put forward the existence of 'best practices' and the notion that 'seeing is believing.' In the process, they organize to overtake local cultures. The problem is that externally based knowledge and technology, by definition, do not 'fit' local socio-environmental circumstances, despite sometimes tremendous efforts to make them fit through 'participatory approaches'. Thus, externally based knowledge and technology tend to be rejected by local ecologies, be they social or environmental, leading to the creation of new and sometimes worse conditions (e.g., pest outbreaks or soil degradation as a result of agrochemicals) or the eventual abandonment of technologies (the famous 'white elephants' that now populate the countryside of the developing world).

Scientists and development practitioners have claimed, through their proposals and projects, that single best practices exist, and furthermore as licensed, informed and knowledgeable, they are capable of determining or devising them. They then argue that, through exposing people to best practices, for example, through demonstrations at research stations or in farmers' fields, individuals will find the 'light' and become 'developed.' Although simplistic and inconsistent with the critical literature on development, such manufactured truths nonetheless dominate the thinking of modern-day interventions.

After five decades of systematic failures in getting the rural poor to believe in externally based knowledge and technology, we committed our organization's resources to strengthening people's science and enabling community-led responses as complements to more conventional expert knowledge and technology as a means to development. Nevertheless, for farmers and development professionals alike, it is difficult to transition and see through one's mental paradigms, precisely because a paradigm defines how one sees. Agricultural practice that may seem irrational or specious to an outsider who grew up participating in a distant culture of explanation can be perfectly logical to a person emerged in a local belief system. While we may publicly question the practice of others as illogical or 'unscientific', from a social perspective, no particular science (i.e., body of explanation) is more valid than another. People's practice, be it expressed through practice of agriculture or the science and development industry, emerges from a logic embedded in culture and context.

We propose that to help rural people in semi-arid regions break through the barriers they have constructed for themselves, in this case as articulated in the *cultura de secano*, one must work from within the intimacy of the local context to co-produce new culture and knowledge, in this case around the existence of water and its utilization. In other words, we must avoid the introduction of externally based knowledge and technology and enable people and their communities to continually bring forth their own water and food production.

Key elements

To develop the project strategy, partners took a reflective "step back" to examine the deeper issues associated with socio-environmental decline in the Andes. The result of this conversation is more succinctly described in a problem tree produced during the impact pathway analysis that took place at the International Center for Tropical Agriculture (CIAT) (Figure 1). At the most general level, the project strategy centered on a "slowing down of

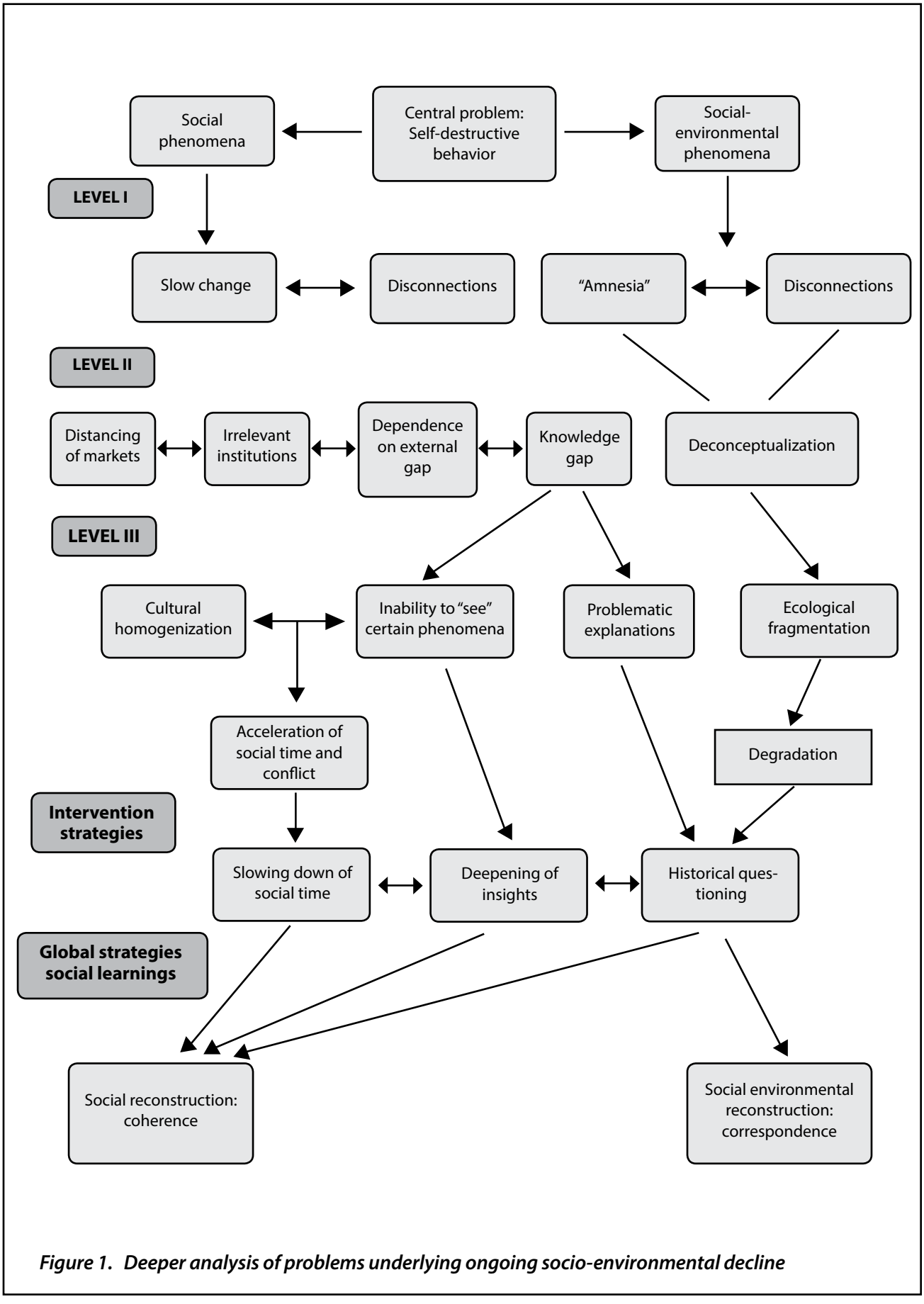


Figure 1. Deeper analysis of problems underlying ongoing socio-environmental decline

time," which involved taking people out of context so that they could begin to challenge assumptions made over water resources and food production. We generally achieved this through strategic field trips and discovery-based learning activities. This was coupled with a "deepening of insights" achieved through conceptual training on water and food closely linked with concerted action—both individual and collective—to change the situation. Drawing on the ideas of Janice Jiggins and Niels Röling (see, for example, the Social Learning for the Integrated Water Management (SLIM) website: sites.google.com/site/slimsociallearningforiwm), we describe inter-community reconstruction as a search for "coherence," in this case to stabilize and increase food production. We describe the human-environmental interface as the search for sustainability or "correspondence." The interaction between coherence and correspondence is described as "social learning." We searched for greater social learning at different levels of aggregation but, most generally, at community (i.e., geographically embedded organization, such as settlements in the micro-catchments in Chota and San Pedro) and institutional levels (broader social spaces of interaction among actors). How did these concepts translate into project activity?

Local community-level activity – The goals at this level were to break down cultural blinders and to deepen insights. We applied a social perspective to helping resource-poor farmers from semi-arid environments to overcome the conceptual and technical barriers that they had constructed for themselves around scarcity of water and limited productive potential of their land. Through helping farmers to challenge popular explanations complemented by systematic farmer-led experimentation and exchange, we sought to enable families to bring more water to bear on their agriculture and livelihoods. To achieve this, we broadly exposed farmers to new experience through field trips and then conducted future scenario workshops that led to "maps of dreams." This was followed up with capacity-building activities to enable farmers to deepen their insights on local priorities associated with water (weather patterns, rainfall, plant-water interactions). Capacity building was then organized around *mingas* (collective work parties) to help design and install individual water systems, in particular, collection tanks. Most families installed their own distribution system, though neighbors often participated in initial activities as part of capacity building. We then invested in farmer-led research on different technologies, as per local priorities (capture systems, costs of tanks, water holding under green manure, irrigation technologies). The details of this strategy are outlined in the curriculum of the generalized farmer field school curriculum that subsequently has been applied by other organizations outside the project area.

Broader institution-level activity – The goals at this level were a socialization of water harvesting and endogenous development. We aspired to insert these concepts as part of the common discourse of development actors. Drawing on the literature from socio-technical change, strategic niche management and evolutionary economics, our intention was not to create single large initiatives but rather to create multiple insertion points. The project sought to advocate for water harvesting and endogenous designs among diverse individual and organizational actors engaged in rural development at different levels of aggregation—local, national and regional levels. Rather than create new organizations, we strategically sought to insert themes and processes into multiple existing networks of actors and their initiatives, often through the strengthening of ongoing events or the creation of complementary activities to increase the profile of water harvesting and endogenous design. Once on-the-ground results were obtained,

we supported continual field trips to project sites of decision-makers from farmer organizations, local governments, universities, NGOs and donor agencies. We linked the theme of water and endogenous design to the diverse agenda of partner agencies and networks. Subsequently, we documented success stories that were broadly shared through information channels, such as the CONDESAN InfoAndina (www.infoandina.org) and the different agroecology listserves and events.

Lessons learned

- **Successful examples on endogenous potential as applied to water harvesting** – Through creative utilization of new water resources combined with biological potential, project participants were able to achieve new levels of production and wealth. In the process of increasing production by factors of two to five, families supplanted a previous sense of helplessness with new hope and prosperity. One example is the story of Alfonso and Olga Juma from Lavanderos, Ambuqui, Ecuador (previously submitted to CPWF), but the project has identified another dozen outstanding cases, such as that of Don Reynaldo in Ambuqui and Teófilio in San Pedro. We are closely watching such examples and writing up brief descriptions for broader sharing (including among the CPWF community). The very process of concise story telling has caught on with World Neighbors (WN) and its partners, and we plan to update those stories over the coming years. These will include families that visited the project and later entered their own process of on-farm innovation with water harvesting and food production -- e.g., in and

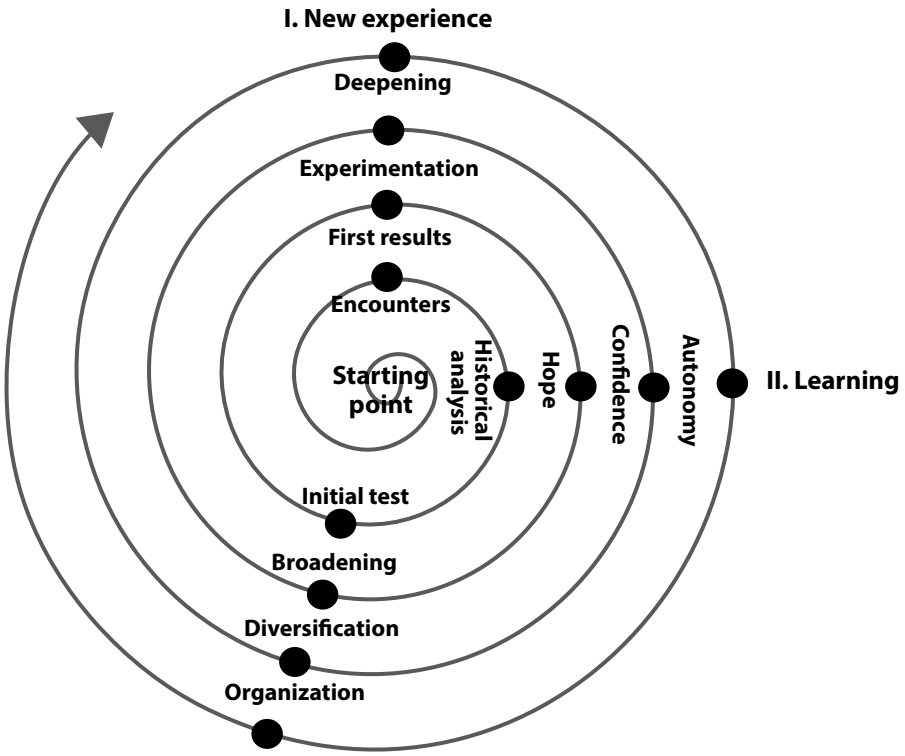


Figure 2. Stylized description of the Katalysis approach to engaging smallholder farmers in discovery learning and action on water harvesting and food production

around the Randi-Randi INNOVEG project in Ilalo in Pichincha, with little to no CPWF or WN resources. These stories include specific technological innovations, for example, with different sprinkler systems in North Potosi and alternatives to geo-membrane-lined holding tanks in Tola Chica, Ilalo. The successes and the stories they generate are a product used by farmers, their communities, development agencies and local governments to reveal other possible futures.

- **Conceptual framework for breaking through the barriers of the *cultura de secano*** – As described earlier, often, rural communities more or less know what is happening to their watershed, but they are not inspired to take action. Recently, there was some research for development experience working with farmers in interactive ways to expose the root causes of soil erosion and pest management. We did not know of any similar experience applied to water harvesting and its integration with the potential biological resources as a means to transforming the farm as a food-producing enterprise. Applying the principles of people-centered development, we engaged the network of farmer experimenters in Ambuqui in a discovery learning process, followed by systematic experimentation. After the first year, we described the emergent "Katalysis" approach based on guided experience, learning and concerted action (Figure 2). This approach included the creation of a local savings and credit scheme to help finance investments. We are now further testing and revising this approach and plan to write up results in 2008.

- **Discovery-based learning exercises and farmer field school (FFS) curriculum** – Central to the earlier mentioned methodology was the employment of new 'learning tools' or discovery-based learning exercises on water harvesting in the context of the micro-watershed of semi-arid environments. Through a process of trial and revision, over time, the project participants conceived of a large number of promising exercises. We held three 'writeshops' involving partner organizations to document these activities and expose them to the scrutiny of the broader groups through processes of presentations and critical feedback. Around 30 activities on farm, community, watershed, and broader advocacy have been tested and are being incorporated into the framework of an FFS curriculum. MACRENA and the Randi-Randi INNOVEG project tested the approach. The activities and the FFS curriculum were revised and cases were published with a description of the Katalysis approach.

- **Technical water and crop production curriculum and resource** – Early on in the project, we learned that *técnicos* (university-trained extensionists and researchers) have very limited technical skills in water. We developed and taught a 10-module course on water harvesting and crop production (available in Powerpoint presentations). We did not find a solid technical resource that was practical and accessible to these professionals in Spanish. So, in collaboration with Wageningen University and Research Centre, we translated and adapted their time-tested "AGRODOC" resource on water harvesting and soil management. Presently, partners in Meso-America are further revising the guide, and we plan to co-publish a Latin American-wide version in 2008.

- **Popularization of water harvesting and endogenous designs** – Different from those in arid and semi-arid regions of Africa and South Asia, the actors involved in agricultural development in the Andes rarely, if ever, spoke of rainwater harvesting and micro-irrigation

or the use of conservation agriculture as a means to harvesting water. While countries such as Ecuador have considerable micro-irrigation experience, in large part thanks to the flower industry, this experience has made very limited contributions to resource-poor smallholder farmers. Meanwhile, the dominant development models continued to rely on questionable 'technology transfer' schemes. Through this project, we aimed to insert the themes of rainwater harvesting and endogenous development into the common discourses of rural development. Contributions perhaps were strongest in Ecuador, in large part due to the strength of the MACRENA network and close linkages with the national agroecology movement. Meanwhile, the contributions in Bolivia were limited to the municipalities and local farmer organizations in the region of North Potosi.

Summary note

Through our involvement in regional programs, such as the national agroecology movements, CCRP Community of Practice, and the Program for Local Innovation in Sustainable Agriculture and Natural Resource Management (PROLINNOVA), we found multiple opportunities to promote Katalysis. We are confident that the themes and process have been inserted as a novelty into the regional development discourse. While beyond the capabilities of an 18-month project, based on the merits of the approach and a growing concern over climate change, we feel that Katalysis could continue to grow and diversify to a point where it begins to influence how people think, organize and do with regard to rural development in the semi-arid Andean highlands.

Contact Person

Stephen Sherwood (ssherwood@ekorural.org)

Partner Organizations

Asociacion de Productores Agroecologicos EcoAmbuqui
Fundacion para Agroecologica y Turismo (AGRECO)
Pontificado Universidad Catolica de Ibarra (PUCE-Ibarra), Ecuador
Programa de Desarrollo del Norte de Potosi (PRODINPO), Bolivia
Red para el Manejo Comunitario de los Recursos Naturales (MACRENA)
World Neighbors

Key Reference

Sherwood, S. 2007. *Katalysis: enabling endogenous potential for improved management and conservation of water resources in semi-arid Andean ecosystems.* CPWF Small Grants Final Report. Colombo, Sri Lanka: CGIAR Challenge Program on Water and Food.

Tags: SG505; Improved Management and Conservation of Water Resources

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