

# KYOTO WATER PRIZE

## **Title of the Local Action**

Katalysis: surviving climate variability and enabling agricultural potential through water harvesting and the mobilization of biological resources

## **Description of the Problem and Activity**

The most recent report from the Intergovernmental Panel on Climate Change (IPCC) paints a bleak picture for agriculture in the Andes. Predictions of glacial disappearance in the northern Andes have dropped from 30 to 15 years; the resulting loss of glacial water (the primary source of fresh water in the region) and a reduction in stream flow are likely to become major obstacles for highland farmers. Additionally, the IPCC report and other studies point to increased droughts and flooding, more wind and cyclone events, outbreaks of disease and pests, and accelerating soil erosion and consumption of soil organic matter, all of which will lead to increases in the areas experiencing water stress and crop failure.

Over 28 million highland Andean farmers eke out a living in highly vulnerable, degraded environments. Unless something is done, this population will bear a disproportionate burden of climate change. While this project will focus on just 200 farmers from eight communities in northern Ecuador, the project area is geographically and culturally diverse and highly representative of the semi-arid Andes. As a result, the approaches developed here will contribute to grassroots climate change initiatives elsewhere.

To date, most of the attention to climate change has been placed on Africa, where scientists have proposed solutions that center on improved climatic modeling and forecasting systems, drought-tolerant crops and varieties, and strategies for getting ‘farmers on board’ with needed change. Nevertheless, a recent conference organized by the McKnight Foundation found that it was highly unlikely that such proposals would make a difference in the highland Andes.

Climate is inherently hard to predict in the Andes because of the region’s highly diverse vegetation, wind patterns, and temperature and rainfall regimes. Additionally, the preoccupation of developing drought-tolerant varieties, while useful in specific circumstance, generally will not enable farmers to address system-level production challenges. Therefore, in mountainous regions such as the Andes, where climatic variations are characteristically localized and where precipitation is a priority, resilience-based management strategies must be prioritized.

Over the last three years, World Neighbors has been developing “Katalysis” with small groups of farmers in Ecuador and Bolivia as a discovery-based methodology and social learning to help individuals and communities to fundamentally change their perspectives on water. Through guided learning on “the water that surrounds us”, farmers can come to see new sources of water, which, through technological development, they can bring to bear on their agriculture and livelihoods. For example, through discovery-learning on water holding capacity of soil organic

matter (SOM), farmers found that by increasing SOM by 1% across a hectare, they could harvest approximately 100,000 liters of water each rainfall. Through such methods, Katalysis has encouraged farmers to adopt the use of cover crops, which can both increase production and decrease labor – a win-win alternative.

We have tested Katalysis in northern Ecuador with promising results, though our application has been limited in scale and scope. Before attempting to go to scale, we propose both a deeper and wider application of Katalysis in diverse social and geographic settings of northern Ecuador in order to more carefully document experiences and refine the approach and its emergent technologies. We are particularly interested in strengthening Katalysis through the utilization of locally managed investment funds and Community-Supported Agriculture (CSAs) as self-financing mechanisms.

### **Description of divides that were bridged**

We based Katalysis on the premise that for rural people access to water and their individual and collective capacities to manage it were essential to mobilizing biological resources and advancing food security and livelihood ends. While certainly there were important knowledge and technical barriers to localized access to water, we hypothesized 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. Essentially, the life experiences and emergent myths in these regions had produced a *cultura de secano* (literally, a dryland culture) that effectively blinded people to the water surrounded them.

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’ – 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.

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 circumstance, 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., such as 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 the 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 have committed our organizational resources to strengthening people's science and enabling community-led responses as complements to more conventional expert knowledge and technology as 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 in 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, 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.

### **Impact of Implemented Activity**

The project will develop Katalysis as a people-centered approach capable of inspiring and enabling smallholder farmers living in semi-arid, mountain areas of the Andes to advance their food security during an era of increasing climate uncertainty.

Katalysis can catalyze both increased stability and longevity of agriculture, thereby enabling participants to secure and increase food production. To improve the efficiency of water utilization, participants will be encouraged to couple water harvesting with conservation agriculture (largely in-situ water harvesting) and micro-irrigation technology (which, in effect, increases water holding capacity through increasing efficiencies at the end of water distribution to plants). We are especially interested in how innovation enables individuals to mitigate rainfall variations during the wet season, in particular dry spells between rainfall events, as well as to effectively extend crop production into the dry season.

As a result of their involvement in the project, participants will generate three specific outcomes:

1. At least 200 households will develop and adopt new water harvesting technologies.
2. As a result of this technological innovation, at least 200 households will sustainably increase incomes by at least 30%.
3. At least 1,000 farmers will visit the project and at least 10 peer agencies (NGOs, GOs, or networks) will employ the Katalysis approach as a means of enabling marginalized smallholder Andean farmers to effectively adapt to climate change.

Moreover, though the project is limited in scope at this point, because of its effectiveness and low external inputs, within five years we expect it to be scaled up to benefit at least 14,000 vulnerable families living in 660 marginalized rural communities in the Andean highlands. Also, the experiences and technologies generated through this initiative will also be used to inform similar initiatives in other arid and semiarid regions, including West Africa, where World Neighbors works.

To capture potential project contributions, we will employ a participatory monitoring and evaluation system in which participants establish ex-ante and ex-post evaluations of individual farm production economies. Additionally, each participant will produce a before and after map of their farm, carefully noting innovations in water technology, complementary practices, and cropping systems. We will also geo-reference farms, photograph provocative innovations and results, and work with participants to conduct seasonal “food security” assessments, focusing on moments of chronic food and economic scarcity. Participants will register financial investments in technologies, and we will conduct cost-benefit analysis. Finally, the project will maintain a registry of visiting farmers and organizations and, at the end of the project, we will visit individual organizations to document the degree to which Katalysis had been appropriated by peer agencies, in particular through their project-based activities.

### **Stakeholder Participation / Consultation**

The actors involved in the project are not seen as operating in a social vacuum, but rather they are understood as endlessly linked to other actors and social networks. Viewing water harvesting as an insertion point, the project will seek to insert Katalysis as a strategic, people-centered response to the on-going threat of climate change, within the context of diverse on-going initiatives to improve natural resource management and sustainable agricultural production in northern Ecuador, as well as elsewhere in the Andes. Farmers will learn about our work through participation in Farmer Field Schools (FFSs) and field days, as per our well-established farmer-to-farmer methodology. We will involve local officials and decision-makers from GOs, NGOs, and donor agencies in continual site visits and learning journeys. Project participants will present their experiences in public forums. Additionally, we will document and publish a series of bulletins for farmers and technical papers for development practitioners and donor agencies on specific technologies and success stories.

World Neighbors is part of a number of social networks that provide fertile ground for a viable communication with a broad array of stakeholders. In Ecuador, strategic partners include the 17 members of the MACRENA network, which includes the NGOs EcoAmbuqui and AGRECO, the Provincial Governments of Carchi and Imbabura and second tier community-based organization UNORCAC (National Syndicate of Cotacachi Indigenous and Farmer

Organizations) and CUC (Cooperative of Cochabamba). These actors are directly tied into the national *Colectivo de Agroecología* (CEA), composed of networks (*Coordinadora Ecuatoriana de Agroecología*, SeedSaver Groups, UTOPIA, *Canastas Comunitarias*).

Through the CEA as well as linkages with World Neighbors programs in the Central Highlands of Ecuador, like-minded farmer organizations throughout the highlands will learn about the project and visit its activities. Meanwhile, at the regional level, the project will be inserted into World Neighbors' multi-country activities in the region, including the Community of Practice of the McKnight Foundation (seven collaborative projects in Ecuador, Peru, and Bolivia involving national research institutes, universities, CBOs, and NGOs, including MACRENA and World Neighbors), the Program for Local Innovation in Sustainable Agriculture and Natural Resource Management (PROLINNOVA-Andes), and the Consortium for Sustainable Development in the Andes (CONDESAN). Additionally, through CPWF, the project will less directly feed into on-going sustainable agriculture and conservation projects in Central and South America, East and West Africa, as well as Asia and Southeast Asia.

## **Sustainability**

The project was designed based on the assumption that agricultural techniques and methodologies requiring high levels of external material inputs are not sustainable in ecologically fragile conditions. Therefore, World Neighbors is focusing on igniting local innovation and building local organizational capacities to sustain project activities once the project ends.

Rather than give away money or provide subsidies, both of which can stifle local initiative, we seek to place resources in the hands of participants and challenge them to create revolving innovation funds. We have tested this approach in Chota Valley, Ecuador. Once communities appropriate the funds, we find that they manage them with much more care. They also are willing to go to extraordinary means to capitalize funds so that a greater number of people may benefit from loans. To date, we have established a dozen such funds, 90% of which continue and several of which have grown significantly. The great advantage of linking such funds with water technology is the high return of water in our context of operation. In multiple cases, after water access is obtained in smallholder systems through cheap technologies, we have seen families increase on-farm production by many folds, enabling them to pay off loans in less than one year.

Initially, World Neighbors technical trainers will assist project participants with the management of two Water Technology Investment Funds made possible by the project, but it is expected that participants will manage them on their own within a year. Then they will collectively manage the distribution and capitalization of investment funds to assure financial sustainability of the project.

Additionally, it is important to point out that the project employs an overall intervention design that assures local accountability and relevance of outcomes in ways that nurture and strengthen local capacities. More specifically, it will incorporate the following operational elements of success:

1. Broad mobilization of resources – Modalities of multi-actor and multi-institutional collaboration in the design and implementation of interventions, as well as increasing co-investment of initiatives and activities.
2. Multiplier effect – Avoidance of dependency and a capacity for self-spreading without dependence on external resources so that an increasing number of people may benefit from technical and organizational changes.
3. Starting small and diversification of intervention agenda – Over time, growing community technical and organizational capacities will be applied to resolving increasingly complex problems, usually from farm/household level concerns to community and multi-community matters.
4. Continual innovation – Continual application of learning processes and the development of increasingly mature organizational capacities so that participants have more understanding and control over their resources and livelihoods.

World Neighbors' *razón de ser* is the strengthening of local individual and collective capacities. By design, the project relies on available local resources and their mobilization through increasing efficiencies (water capture and distribution) and effectiveness (utilization of biological resources for “greening” farms). The establishment of innovation funds and their subsequent capitalization tied to the returns of innovation will assure financial viability and the continuation of the project at the local level. Since water quickly provides positive financial returns, we have seen that farmers can pay back investments in a relatively brief period of time – six to ten months, thereby increasing local organizations' capacity to respond to local demands and to provide a degree of financial sustainability.

Also, World Neighbors will employ its time-proven approaches to multiplication. Rather than externally based knowledge and technology, this project will mobilize local knowledge, creativity and initiative for innovation. The project will employ technologies in ways that facilitate multiplication (i.e., spontaneous spread) of efforts. This involves limiting technologies at the outset and introducing them through small-scale experimentation that enables farmers to understand and manage alternatives before scaling-up to larger populations through farmer-to-farmer processes of divulgation. At the heart of the project will be knowledge-intensive capacity building for the purpose of strengthening problem-solving and organizational skills among intended beneficiaries and their communities. The project relies on renewable local resources – rainwater and biological resources. The demonstrated results of Katalysis will enable a degree of spontaneous spread among farmer groups and organizations as well as via our broader social networks in the region.

## **Commitment**

We intend to implement a wider project across different ecological floors of the Rio Mira and Ambuqui watersheds, Chota Valley, Ecuador. This would permit us to expose Katalysis to a highly diverse transect of environments (from 1,600 to 4,000 meters above sea level) and cultures, including the agricultural systems of Afroecuatorial, Latino, and indigenous

populations that are distributed across the propose project area. More specifically, the project will work with an emerging network of over 200 farmers from both sides of the Chota River, including the communities of San Vicente de Pusir, El Tambo, Tumbatu, La Concepción, La Playa, Lavanderos, San Clemente, and Ambuqui.

The people of the Chota Valley are among the most resource poor and marginalized in the world. The vast majority of land in these areas is semi-arid, deforested, and only slightly productive on account of seasonal water deficits and a depleting natural resource base. The area is typified by dry and semi-humid mesothermic climates. The driest areas receive an average annual rainfall of less than 400 mm, while their annual evaporation rates exceed 1,900 mm.

Both the dry and semi-humid areas experience significant drops in rainfall, from two to four times less than normal, from June through August. This fragile condition has been further aggravated by recent climate trends; farmers have begun to report changes of distribution of rainfall towards fewer, more severe events. During dry periods, agricultural production in Chota is virtually impossible for most farmers, and ongoing forest, soil, and water resource degradation are endangering rural livelihoods altogether.

A small sub-group of the proposed population has worked with us on initial discovery-based exercises and technology development. As per the methodology, local leaders will further develop Katalysis, taking charge of continued experimentation, educating others, and promoting change in their communities through innovation with water harvesting and biological resources. Participants will collectively manage the distribution and capitalization of investment funds, as well as explorations with CSAs to assure financial sustainability.

As a result of our ties to a broad network of researchers and development agents in the region, the geography of the project should quickly expand to include other parts of Ecuador and the Andes where farmers are confronting water scarcity.

In terms of financial sustainability, in addition to the funding provided by the Kyoto World Water Prize, the Katalysis project will be implemented with monies invested by World Neighbors, as well as \$20,000 (\$10,000 per year) in funding from a four-year grant awarded to World Neighbors and MACRENA by the McKnight Foundation's Collaborative Crop Research Program.

## **Originality and Innovative Ideas**

The notion that increased access to water can improve farm production is well-established and many of the technologies we employ -- soil conservation, water capture and micro-irrigation technologies -- have already proven their effectiveness. The project's innovation is in its approach to enabling endogenous potential to overcome centuries of self-imposed limitations born from ingrained dry land culture (*cultura de secano*) to effectively respond to the perils of climate change.

Despite extensive expert knowledge on water management, it is still unclear how social learning around rainwater harvesting can spark rural innovation in areas where history has essentially

taught people that water is scarce. We have seen that farmers who face similar challenges spontaneously innovate in ways that can be mutually useful. The diversity of social and environmental contexts in rural areas produces an equally rich diversity of novelties, i.e., opportunities or 'seeds' of change that have the potential to catalyze transitions towards new ways of managing water for food and economy and which can inform greater scales of social activity, in this case basin and cross-basin experience.

A number of organizations champion water projects in the Andes and elsewhere. In contrast to our people-centered approach, most are technology-centered and tend to deny or neglect human and social factors in learning and innovation. As a result, people do not appropriate technology and innovation is limited to external pressures. Once a donor agency pulls out, practices are not maintained. For example, recently we visited an impressive one million-liter geomembrane tank in Northern Potosí, Bolivia that had been abandoned, while the surrounding crops wilted from lack of water. When we asked the community leader about the tank, he responded that it belonged to the donor -- a European development agency, which had not returned for several years. Apparently, its technicians had installed the tank, no doubt under time constraints without careful attention to local involvement, co-investment, and appropriation.

### **Intended use of the funds if you win the prize**

The next phase of the Katalysis project will be implemented over a period of 24 months, and the prize money would be used to fund the first 12 months of this work. Building on an initial exploratory initiative (the CPWF-funded Katalysis pilot), the overarching goal of the proposed project is to enable the target communities to mobilize endogenous potential around water management as means of rehabilitating the natural resources in an era of climatic uncertainty. This will be achieved through four interactive learning-action strategies:

- Design and implementation of Farmer Field Schools (FFS) on climate change and water management as a mechanism for discovery-based learning and breaking through the *cultura de secano*;
- Developing farmer-led experimentation as a modality of intensive technology development for improved water management;
- Promoting social learning and organization around water management concerns as a means of institutional and political advocacy for improved rural livelihoods; and
- Systematizing and documenting experiences and lessons learned for broader learning, in particular for influencing how farmer movements, local governments, and other development agencies address climate change concerns in Ecuador and elsewhere in the Andes.

### **Any other details**

While this project seeks to enable smallholder farmers to better manage the risks associated with climate change, the project is not immune to risks of its own. Since Katalysis is based on endogenous design, it is inherently dependent on local initiative. Nevertheless, our past experience has taught us that water scarcity is a priority for the participants, so we are highly confident of the local relevance and importance of this initiative.

The project's mitigation strategy is built into its design. Rather than rely on single crop or technology, the project seeks to build local innovative capacity, which in fact may be fueled by adversity. We hope that this will enable farmers to more effectively respond to externally based threats, such as conflict and high oil prices. As part of its advocacy efforts, MACRENA and World Neighbors will seek to establish linkages with local governments and donors so that they are informed of the projects unique designs. We hope that this will enable us to establish a protected space for project intervention, so that large, infrastructure projects do not interfere with the proposed processes of learning an action. Additionally, through linkages with our other on-going initiatives, namely the *Canastas Comunitarias* (essentially, Community-Supported Agriculture), we hope to enable farmer groups to gain more direct ties to urban-based consumer groups and thus more stable markets that encourage diversified production.