

KATALYSIS: ENABLING ANDEAN FARMERS TO WEATHER CLIMATE CHANGE

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I. Introduction

Over centuries, Andean farmers, such as Alejandrina (**photo1**), developed sophisticated knowledge that enabled them to forecast climate and co-adapt planting schemes and cultural practices with the environment. They learned to 'read' weather patterns through monitoring the flowering of certain species, the brightness of stars, and the behaviour of animals. They domesticated robust species of plants and animals – e.g., potato, lupine beans, quinoa, and llamas -- for the harsh conditions of upland environments. As a result of changing weather patterns, however, such time-proven practices are now becoming less useful and even obsolete, and farmers everywhere are beginning to suffer increased crop failure.



Photo 1: Alejandrina, President of her community's Water Committee, Wapage, Potosí, Bolivia

II. The growing climate challenge

Recently, predictions for the disappearance of glaciers in much of the Andes changed from 30 to 15 years. Loss of glacial water will disrupt microclimates and stream flow, posing a major challenge for rural people who rely on these sources of water for food production and livelihoods. Further studies in the Andes point to fewer, more intense rainfalls (producing both droughts and flooding), more wind and cyclones, outbreaks of disease and pests, and acceleration of soil erosion and soil organic matter (SOM) consumption. The latter is of particular concern due to the importance of soils in capturing and filtering water in highland environments. In sum, climate change is increasing the uncertainty of rural life.

III. Katalysis: discovering the water that surrounds

To date, the institutional response to climate change has centred on externally based solutions, in particular forecasting models that are of limited use in highly variable mountain environments. In contrast, we went to rural villages in search of ideas. Over the last three years, the Network for Community-Based Natural Resource Management (MACRENA) and World Neighbors, with a small grant from the Challenge Programme on Water and Food (CPWF), have been working with groups of farmers in remote Ecuador and Bolivia to develop localized responses. The result has been an interactive learning-action process we call "Katalysis" (**figure 1**).

Farmers told us that access to water represented their greatest opportunity for surviving climate change. We developed a series of discovery-based learning exercises that could help them find 'hidden' sources of water and creatively utilize plants and animals in ways that could bring new wealth to farms. Early exercises included studies on precipitation. For example, we measured the runoff of rooftops, which commonly summed to thousands of litres per rainfall for a single household. Then, we valued it, applying the local market price for bottled water. Through this exercise, farmers learned that effectively, they gave away tens of thousands of dollars each year!

Since many participants wanted to invest in expensive water storage tanks, we decided to introduce them to the holding capacity of soil organic matter. By weighing socks filled with organic matter before and after immersing them in a bucket of water, participants discovered that their fields held millions of litres of water and that increasing SOM by one percent across a hectare could capture an additional 100,000 litres each rainfall. They determined that the best way to increase on-farm water holding capacity was through SOM and covercrops, in particular because soils stored water where it was needed: in the fields (**photo 2**). Further studies on water-use efficiency, for example the comparison of canal irrigation with sprinklers and drip tapes, allowed farmers to gain new appreciation for seemingly expensive micro-irrigation alternatives, which in fact were 20 times more efficient than sprinklers. Such learning enabled farmers not merely to survive climate change, but to *catalyze* return on investments – ergo the name of our approach.



Photo 3: Jose shows how covercrops capture water in fields, Chota Valley, Ecuador



Figure 1. Katalysis involves groups in self-directed learning and problem solving on water and climate. Through an interactive process of experiential learning and concerted action, the thematic agenda progresses from field-level to increasingly complex watershed-level concerns.

IV. Transforming the desert into an oasis

The words of Afonso Juma, a farmer from the semi-arid Chota Valley of Northern Ecuador (**photo 3**), reveal Katalysis' potential:

"Once I learned where the water was, I could grow that small plot of alfalfa. With the alfalfa, I could have *cuy* [Kichwa for guinea pig]. The *cuy* produced manure for my soil. We still have a long way to go, but with just the *cuyes*, we have already paid back our \$200 investment in materials. When I started we had no *cuy*. Today we have 300 *cuyes* that are worth about \$5.00 each or \$1,500 in all. That is much more than I used to earn in the city. Now I can stay home with my family. With the manure, I've planted 75 mango and avocado trees. My farm has become an oasis. Every year it will grow greener and greener. My farm used to be barren of plants. My biggest problem today is that I've run out of land to plant."



Photo 3: Alfonso tells how Olga and he transformed their farm, Chota Valley, Ecuador

Through a handful of discovery-learning experiments, relatively small investments in tubing, a filter, drip tape, and the creative utilisation of plants and animals, Katalysis helped Alfonso and his wife Olga to unleash the biotic potential of their farm. In just 18 months, they transformed a desert into an oasis.

V. Plans for the future

Katalysis does not depend on large external investments, but rather knowledge and new experience that can expose farmers to new realities and opportunities. We have begun to invest in a number of support mechanisms, including farmer-led experimentation, farmer-to-farmer exchanges (**photo 4**), and locally managed "water investment funds". In addition, we are working with national and regional partners, such as the Program for Local Innovation in the Andes (PROLINOVA-Andes), the McKnight Foundation's Community of Practice, and the CPWF, to further develop Katalysis. We invite others to join us in helping farmers learn how to weather climate change.



Photo 4: Benedicto explains how his community harvests "millions of dollars" of water, Wapage, Potosí, Bolivia