

Synopsis: Measuring Farmers' Agroecological Resistance to Hurricane Mitch in Central America

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In October of 1998, Hurricane Mitch, one of the Caribbean's five most powerful hurricanes of the twentieth century, slammed into Central America causing US\$ 6.7 billion dollars in damage to infrastructure and industry (primarily agriculture)... an amount approximately equal to 13.3% of Central America's GNP. Mudslides and landslides washed away crops, animals, buildings, roads and bridges. Topsoil, lost from hillside farms, silted rivers that overflowed their banks, flooding fields and urban areas. Over 10,000 people died and 3 million were displaced or left homeless. The environmental damages were incalculable. Countries hardest hit were Honduras, Nicaragua and Guatemala. Most observers agree the unprecedented magnitude of the disaster is the consequence of decades of deforestation, non-sustainable agricultural practices and other forms of environmental degradation that left the region exceptionally vulnerable to an erosive event.

While first reports regarding agricultural damage simply indicated that the levels of destruction were massive, subsequent on-site observations began to reveal a more subtle, differentiated pattern. Farms using what are commonly understood to be "sustainable" practices appeared to have suffered less damage than their "conventional" neighbors. These farms belonged to smallholders working within a multi-institutional, regional movement for sustainable agriculture known in Central America as Campesino a Campesino (Farmer to Farmer). The farming practices commonly encountered in Campesino a Campesino included a wide range of soil conservation and sustainable cultivation methods, tested and promoted by smallholders for nearly thirty years. Some of the most common sustainable practices included soil and water conservation methods, reduced or discontinued use of chemical inputs, cover crops, agroforestry, intensive, in-row tillage, organic fertilizer and pesticides, and different forms of Integrated Pest Management.

In general, these sustainable farms exist as islands and archipelagos within a greater, conventional "sea." Therefore, while often localized and geographically fragmented, they provided an excellent opportunity to compare agroecological resistance to the hurricane of sustainable and conventional farms. The presence of Campesino a Campesino, made up of farmers and technicians experienced in farm experimentation and farmer to farmer training, also provided the opportunity to carry out an extensive, participatory, action research project in the low, medium and high impact areas of Hurricane Mitch. Several researchers with years of experience working in the Campesino a Campesino Movement designed a study and wrote a proposal. World Neighbors, an NGO working in the region, agreed to sponsor the project, helped to find funding (Ford, Summit, Rockefeller and Inter-American Foundations), and provided administrative support.

From February through May of 1999, 40 different NGOs with sustainable agricultural research and development (SARD) projects trained and mobilized 100 farmer-technician teams and 1,743 farmers to carry out paired observations of specific agroecological indicators on 1,804 neighboring, sustainable and conventional farms. The study spanned 360 communities and 24 departments in Nicaragua, Honduras and Guatemala. The primary motivations for participating in the study were threefold: First, farmer-promoters and NGOs in the Campesino a Campesino Movement were eager to compare their farms to conventional farms because demonstrating a higher level of agroecological resistance would imply a higher level of sustainability. After years of being told that sustainable agriculture was not "viable" or "economical", they were anxious to dispel doubts about the importance and effectiveness of their practices. Secondly, NGOs were very interested in evaluating the effectiveness of years of support for farmer to farmer SARD. Commonly, these projects are evaluated on the basis of the level of implementation (number of workshops, participants, terraces, compost heaps, etc.) However, the study gave them an opportunity to evaluate the level of their agroecological impact. Finally, all participants were interested in influencing the agenda for agricultural reconstruction after the hurricane. If farmers could show that sustainable farms were more resistant than conventional farms, then a strong argument could be made for a participatory, sustainable agricultural reconstruction strategy.

An intensive period of organizing, training, data collection and field monitoring began in February of 1999. It was crucial that field data be collected before the rainy season began in late April. Each team had one technician and two farmer-promoters. They carried out observations on the ten best examples of sustainable farms and on the ten neighboring, conventional farms. Paired observations had to be located in close proximity, in the same position and cardinal orientation in the watershed, have the same general slope and similar environmental surroundings (fields, trees, infrastructure, etc.) Agroecological indicators included topsoil depth, rill and gully erosion, percent vegetation,

crop losses and structural damage. Each team member specialized in specific steps and measurements of the field procedure to reduce and standardize observational errors. The owners of both farms in the paired observations accompanied the team on both sustainable and conventional plots, then signed off on the field sheet indicating measurements and observations had been free of bias. Technicians interviewed farmers regarding their observations of the hurricane, the damage patterns, and the different reasons for any agroecosystem failures. National research coordinators in each country held periodic sessions with teams for feedback, troubleshooting and the correction of field errors.

The field data from the farmer-technician teams was entered into an interactive ACCESS database for each country. Initial results (averages) were processed for distribution among participants. While there was some local variation, overall the results indicated an overwhelming trend of higher agroecological resistance on the sustainable farms. Sustainable plots had 20% to 40% more topsoil, greater soil moisture, less erosion and experienced lower economic losses than their conventional neighbors. Statistical tests later showed that some of these differences were highly significant (only a 0.0001 probability that these differences were due to chance) and most were acceptably significant (0.02 to 0.05).

Fifteen different workshops were held in the countryside to share the results of the field research with participants and key local and municipal actors. Farmers, promoters, technicians and project coordinators collectively analyzed the results and gave feedback. Many placed different monetary values on the topsoil conserved (109 T/ha to 258 T/ha). Others valued the importance in times of drought of retaining from 1,500 to 9,000 liters/ha more water. Sustainable farms had fewer and smaller gullies and areas of rill erosion. All of these indicators were seen as contributing to both productivity and to the conservation of the watershed. Further, because of crop diversification, sustainable farms averaged lower economic losses, and in Nicaragua even showed profits, despite the hurricane. (However, when correlated to steep slopes (>50%), high storm intensity and other extreme environmental factors, some of the differences between sustainable and conventional farms "collapsed", indicating that these techniques have thresholds of effectiveness.)

Finally, participants themselves indicated what may be the most impressive result of all: over 90% of conventional farmers participating in the study indicated their desire to adopt their neighbor's sustainable practices. Participants enthusiastically claimed that the study had been highly successful learning experience, and had established new bonds of trust between farmers, promoters and technicians. For most farmers, it was their first experience with research, and for others, the first time the results of on-farm research had been returned and shared with them.

With the aid of drawings, clay models and skits prepared by the participants, farmers then described how their fields and villages should look in three, five and ten years if agricultural reconstruction was implemented using farmer to farmer, SARD techniques. Then farmers analyzed the obstacles to the scaling up and scaling out of SARD, and suggested projects and policy ideas for participatory, sustainable agricultural recovery. In general, technology and training methodologies were not seen as limiting to SARD. After all, farmer experimentation, cross visits and farmer to farmer training are the pillars of the Campesino a Campesino Movement. However, it was strongly felt that national credit, market, agrarian and research policies favored Green Revolution technologies rather than SARD. While NGOs had been instrumental in establishing SARD alternatives, if SARD was to scale out nationally, and scale up institutionally, proactive national policies were required to push it beyond the NGOs' local, "micro-project" sphere of influence.

The findings from these workshops were synthesized and presented by the participants at national meetings in the capital cities of Honduras, Guatemala and Nicaragua. Key actors in government, relief, development and research institutions were invited. Farmers and technicians presented their findings; the national research coordinators, the methodologist and the principal investigator gave their reports. In- country researchers in agricultural economics and disaster prevention gave topical presentations. Notable figures such as Nobel Prize winner Rigoberta Menchu, several government ministers, and representatives from the United Nations gave keynote addresses. A video of the research project was shown and distributed.

The Campesino a Campesino Movement in Central America has demonstrated the social, environmental and agricultural advantages not only of SARD, but of farmer-led approaches to sustainable agriculture. The study itself also demonstrates the tremendous potential for research and development within farmers' movements. While farmer-promoters within the Campesino a Campesino Movement have carried out on-farm experiments and have shared their knowledge across borders for thirty years, this was the first time farmers had ever collaborated on a regional research project. Participants have expressed their desire to establish national and regional farmer research networks to continue their agroecological research.

Will the results from the study have an influence on national policies for recovery and reconstruction? Much depends on the ability of the institutions within Central American civil society, e.g., NGOs, municipal associations and agricultural producers unions, to give voice to the farmers who have successfully demonstrated how to reduce the regions' vulnerability and improve its sustainability.