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ADAPTATION STRATEGIES TO CLIMATE CHANGE IN TWO RURAL COMMUNITIES IN MEXICO AND EL SALVADOR

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In the face of the impacts of climate change and variability, various adaptation strategies are emerging from the local scale. The fundamental difference between climate change and climate variability is that climate change includes long-term changes at the global scale, while climate variability refers to short-term fluctuations and associated weather conditions of each region. In this paper, we will refer to climate change and variability simultaneously, focusing our interest on the analysis of the responses by local people in two regions of developing countries.

Developing countries are more vulnerable to climatic changes than developed countries because extreme weather conditions and their associated impacts tend to exacerbate the existing social and economic challenges. Taking into account the importance of climate change, knowing if the most vulnerable groups respond and adapt successfully to these new climate scenarios becomes urgent.

In this context, adaptive capacity is understood as the set of adjustments of the social system in response to climatic stimuli that reduce the impact severity and enhance local adaptation opportunities. Therefore, in this work, local strategies designed for facing disruptions related to climate change in two rural areas of Mexico and El Salvador are analyzed. The communities living in these two rural areas share features such as a subsistence economy based on rain-fed-agriculture (maize); social organization systems which are dominant in land management, in management forms and in the generation of responses to address environmental challenges; both are undergoing to major structural changes (globalization and neoliberal policies); and are located in one of the most vulnerable region of Latin America (hurricane belt and low-lying coastal areas).

The main objective of this paper is to identify responses, strategies and measures to adapt to environmental challenges which are emerging at the local scale in the two study areas, and discuss the intersection between local responses and institutional initiatives and policies that arise at supra-local level. To do this, two main tools of qualitative analysis have been applied: focus groups and semi-structured interviews with key informants, which were carried out between January and July of 2011 simultaneously in both places. Once the problems associated with climate change were exposed, the actions and strategies that the population has developed were identified. Then initiatives were classified according if these have been promoted at the personal or collective level or channeled through governmental and non-governmental organizations or institutions. Finally, repercussions at different scales of the main identified risks and the local impact of programs and policies that were developed in each area were identified.

THE CASE OF THE EJIDO ICHAMIO, MICHOACÁN (MÉXICO)

The municipality of La Huacana, where the Ejido Ichamio is located, is an area with high marginality, a high out-migration level, a strong dispersion of the population, low productive use of land and lack of irrigation systems, despite most of the population are engaged in agriculture. In this area, the main risk for production is drought. At the same time is a region with a high ecological value, which main pressure is forest fragmentation because of livestock production. People's main concerns about climate change focus on agri-environmental issues such as: water resource management, soil fertility and erosion and prevention of deforestation.

Among the identified local strategies can be highlighted those aimed to overcome climate variability uncertainty and ensure agricultural production and food security. Thus, the growing maize season has been delayed to adjust to changes in the rainy season. In addition, producers are worried about using less chemicals, stimulating soil fertility through crop rotation techniques. In the same way, forage grasses more resistant to drought have been introduced.

Regarding to government policies and programs, there is a growing concern for forest conservation. In 2007, the community participated in the definition of the biosphere reserve to preserve the natural heritage, which includes a big proportion of their territory, and still participate in a set of measures for its preservation. Furthermore, farmers have shown interested in national policies and programs for agricultural and forestry development, and despite the many deficiencies, they highlighting two programs: the ProÁrbol program designed to subsidize owners of forest areas according to the number of trees planted, and the Payment for Environmental Services Program (PES), which provides financial incentives for forest landowners to encourage conservation practices avoiding land use change.

Interviews allowed to identify the main issues that may affect the development of local adaptive capacity to climate change in the ejido Ichamio: i) week operation of some government programs, ii) environmental projects that do not point out to the real needs of the community, iii) adaptive management restrictions in some policies, iv) lack of monitoring to ensure the adequacy of forestry practices employed v) overlapping and contradiction

between policies and programs, and vi) lack of continuity, planning and coordination among different government agencies.

THE CASE OF THE NATURAL PROTECTED AREA OF CINQUERA (EL SALVADOR)

This area corresponds to one of the areas with the highest concentration of poverty in El Salvador. A 75% of the natural area is located within the municipalities of Cinquera and Tenancingo. Its population is mostly engaged in subsistence agriculture. The 15% of the forest is managed collectively, through the local organization «Asociación para la Reconstrucción y Desarrollo Municipal» (ARDM), through which collective agreements have been reached to protect the forest. Main problems associated with climate change in the area are the highest occurrence of extreme hydro-meteorological events (EHE), variations in rainfall and reduced flows during the dry season.

Among the identified adaptation strategies, people mentioned variations of planting date of maize, which has been delayed in the last years in order to adjust to the changing rainy season. Some production units focus their efforts to diversify cropping of maize and beans by introducing vegetables or fruit in order to cover possible losses because of drought or heavy rains. There are actions that promote organic agriculture, avoiding the use of chemicals and recovering native seeds. In the case of forest protection, collective strategies are supported by legal instruments at the local scale.

In recent years have emerged government policies and programs that tend to strengthen the resilience of the population. For instance, the Family Agriculture Program (FAP) has been the most mentioned by informants, this program aims to contribute to food security through the distribution of inputs including certified seeds and fertilizers. But, according with the local organization, this program is hindering efforts to promote organic farming and use of native seeds.

Existence of gaps and apparent lack of coordination between the policies of the various institutions of the public sector have been perceived as the main problems for the proper implementation of adaptation measures to climate change in Cinquera, being the most important: i) regulatory restrictions and contradictory approaches between institutions, ii) week continuity of programs iii) overlapping between programs, iv) lack of research about local rural realities v) solutions in the short term *versus* solutions in the middle and long term, vi) lack of incentives for conservation for small-scale farmers, and vii) lack of goals aimed at strengthening local organization and capacities.

DISCUSSION: LOCAL STRATEGIES AND RURAL DEVELOPMENT POLICIES, ARE THESE ORIENTED TO INCREASE THE ADAPTIVE CAPACITY TO CLIMATE CHANGE?

In the both case studies local efforts to mitigate impacts have been developed. However, despite the existence of numerous tools related to the implementation of adaptive decisions to climate change, the linkage between these instruments and their effectiveness is weak and thus their territorial expression, especially locally, is diffuse. The application of solutions arises at the short term, and general solutions, which do not respond to local reality, have been the rule more than the exception. Agricultural development policies have opted for

increasing production and yields in the short term, compared to low production in long-term yields. The use of agrochemicals and improved seeds has been intensified. Moreover, the increase and opening of new agricultural land at the expense of forested areas, has been intensified.

Thus, to achieve simultaneously goals as diverse as economic growth, equitable distribution, social development and environmental sustainability, has been a very complex task which requires and demand a coordinated effort. The importance of highlighting the need for a multidisciplinary and comprehensive effort between different sectors is that many policies and decisions promoted can positively or negatively influence in strengthening adaptive capacities. In the case studies presented, it can be considered that policy interventions are not helping to strengthen local capacities to adapt to climate change, as there is a lag and lack of coordination that affects all areas where government interventions take place, so there is a risk of loss of credibility for these policies.

In the case of Mexico the collective level strategies do not arise spontaneously, but function as an interface of strategies promoted from individuals, the community and institutions. In the case of El Salvador, international cooperation is playing a key role through the implementation of projects, which without being coordinated with government policies and programs can have a major impact at the local scale. In both cases, however, it is essential to improve the mechanisms to access to the benefits of policies and programs in order to make them more operational.

Nevertheless, at the local level people is already acting and developing adaptation strategies to face negative effects of climate change, which has arisen as an immediate response to changes and impacts related to climate variability. Since adaptation is a matter primarily local, its effectiveness depends on the network of institutions and policies through which can be feasible to structure long-term responses. Thus, policies that facilitate economic diversification processes without undermining the viability of agricultural production, helping families to cope with environmental uncertainties and give them the necessary financial security, become an urgent issue.

CONCLUSION

In this paper have been identified and explored: i) local adaptation initiatives that are shared in different geographical contexts, ii) weaknesses in the implementation and operation of plans/programs and policies at the local level, iii) the potential of certain approaches and policies which have a diffuse territorial expression, and iv) the urgency of improving the speed of response to face climate risks and challenges.

In both case studies, many of the measures undertaken are linked directly to solve problems related to climate change, although his first intention directly relates to solve problems of forest conservation, production, or local development.

This article has emphasized in adaptation to climate change, since the conditions of vulnerability in rural areas of developing countries such as Mexico and El Salvador becomes a priority task. It is evident that the interest from various sectors to improve adaptive capacity to climate change opens important new spaces for the articulation of rural development initiatives.