Gobierno de Reconciliación
y Unidad Nacional
El Pueblo, Presidente!
MARENA
Ministerio del Ambiente
y los Recursos Naturales

Costs and Benefits of adaptation options to climate change
Country: Nicaragua
Case study: Investment in watershed management highly vulnerable to climate change

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1. General considerations

Nicaragua is a country with a high vulnerability to climate change due to a set of factors as its geographical position, status of poor country, with production systems that depend on natural resources and with little capability of investment in technologies, mechanisms of defense against natural hazards infrastructure and clean production capacity.

Studies show that Nicaragua has a greenhouse gases emission of 2.64 ton/per capita (MARENA 2000). With this result Nicaragua has an average level lower than Latin America and the Caribbean countries (2.80 ton/per capita) and well below emissions from high income countries (15.9 ton/capita). In Nicaragua the 76 percent of the GHG emissions from CO_2 is due to land use changes, so it is important for the country to make investments in land administration, watershed management and improve the income of the poorest communities poorest for the adaptation to change climate.

2. Case study

One of the key elements in the process of adaptation to climate change in Nicaragua is to ensure the water to the population and species; for this issue the country is working for water storage and harvesting to improve ecosystem function, soil and water management. Nicaragua is a highly agricultural country, it is important to improve alternative incomes of poor farmers and good production practices friendly with the environment to ensure management of ecosystems.

In the period 2002-2007, Nicaragua implemented a social, environmental and forestry national program (POSAF) with an investment of 340, 40 million of dollar in 687 hectares (2.6 per cent of the national territory), with funds from lending by the Interamerican Development Bank (IDB) and with national counterparts as the Government, national producers and a contribution from the Nordic Cooperation.

The main objective of POSAF was to improve the living conditions of populations in 5 basins prioritized and vulnerable to climate change. This program worked in 3 areas: a) promote sustainable management of natural resources and basins (64.1% of the total

investment); b) works for the prevention and mitigation of natural disasters (11.2%) c) strengthening of institutional environmental management and administrative costs (24.7%).

Socio - economic Impact

The more positive effect of the POSAF was the poverty reduction of the producer attended and also improve the value of their lands, reducing the vulnerability of the populations from the low and medium parts of the basins and the strengthening of municipal environmental management. The baseline showed that 69% of the producers were poor and at the end of the project this indicator was reduced to 32.9%.

The POSAF showed that investments were economically viable with a net present value of USD 34,909,200 to an interest rate of 12%, with an internal rate of return of the 46.7% and a positive benefit-cost rate (1.48) with a payment of 6 years return period.

Environmental impact and reduction of vulnerability to climate change

The POSAF benefited to 14,355 producers with investment in the implementation practices wooded pasture, bananas, improved stoves, green coffee certification, citrus, fences alive (firewood and posts), which increased impacts and net revenue in the short and medium term. Production systems for soil and water conservation were established in 9,497.69 hectares of agro-forestry system. Forest plantations, natural resource management will have impact on net income in the long term.

Environmental services such as the infiltration of water, carbon sequestration, soil retention and production of nutrients cause direct impacts on crops productive unit, which are checked with the increase in revenue per hectare.

The municipal works for the prevention and mitigation of natural disasters implemented 7 types of physical works that correspond to stabilization of slopes in channels, channels and paths, retaining for unstable slopes, streams and rivers, torrents, protection of slopes and unstable slopes plantations, wall structures sewer, stone for protection of road ramp structures.

The works were executed based in 27 studies municipal risk in the area of influence of the POSAF. The influence area of the program presented a total of 580 vulnerable site. The main threats are 43,586.12 has slips, 25,416.03 has flood, 1,056 epicenters of earthquakes that occurred between 1975 and 2002. A total of 1, 965 sites of superficial landslides and 278 collapse sites are also identified.