



Investigating competing uses of unevenly distributed resources in Nicaragua applying the Climate, Land Use (Food), Energy and Water strategies framework

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The distribution of resources in Nicaragua is not even, as it is the case in many countries in the world. However, in the particular case of water resources, commonly used by different sectors and essential to basic human activities, their availability differs along the main drainage basins and is often mismatched with sectoral demands. For example, the population is distributed unevenly, with 80% being located in water scarce areas of the Pacific and Central region of Nicaragua. Agricultural activities also take place in regions where water resources are vulnerable. The spatial distribution of water and energy resources, population and land use in Nicaragua allowed for the identification of three target regions for the analysis: the Pacific coast, the Dry Corridor zone, and the Atlantic region. Each of these zones has different challenges on which the CLEWs assessment focused on.

Water sources in the Pacific coast are mostly groundwater, and uncertainty exists related to the long-term availability of such source. This is also the region where most of the sugarcane, an important source of revenue for Nicaragua, is produced. As sugarcane needs to be irrigated, this increases the pressure on water resources.

The Dry Corridor is an arid stretch in Central America cyclically affected by droughts that have a severe impact on the households whose economy and subsistence depends on agriculture of grains and coffee beans. It is expected that climate change will exacerbate further the food security problem. When water is lacking, also population experiences limited access to water for drinking and cooking. In addition, two major hydropower plants are located in this zone. Water resources are available both from surface and groundwater sources, however, due to their intensive use and vulnerability to climate, their availability can affect severely different sectors, presenting risks to food, water and energy security.

Hydropower potential is foreseen to be exploited in the Matagalpa and Escondido River Basins draining to the Atlantic Ocean. Although competition for water resources is not as acute as in other regions due to abundant surface water and lower population density, climate change and the use of land for grazing could present risks to the exploitation of the renewable energy potential. This could have an impact on medium and long-term energy planning and the ambition of decreasing fuel imports for electricity generation and increase electricity access.

To assess the potential implications of the previous challenges and provide insights on solutions where conflicts are more stringent, in line with sustainable development priorities, the CLEWs framework was used to perform the integration of resource systems models. WEAP was used for the representation of the water and land use systems, and then soft-linked with the energy systems model for Nicaragua, developed using the long-term energy planning tool OSeMOSYS. Hydropower expansion, the development of the electricity system, water availability for crop production, water allocation across sectors, sugarcane cultivation and bi-products use in electricity generation, and potential impacts of climate change, are amongst the issues investigated with the region-specific scenarios defined for the study.