Regional Climate Change Scenarios for Mexico and Potential Impacts on Rainfed Maize Agriculture.

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Regional climate change scenarios that were used to assess the potential impacts on different sectors in Mexico are presented, with an application of those scenarios for the agricultural sector.

The results of that research were delivered to the Mexican government for the development of the Mexican Fourth National Communication, which will be presented to the United Nations Framework Convention on Climate Change (UNFCCC).

To generate regional climate change scenarios the models and criteria suggested by the Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report (4AR) were applied. Those criteria are: Consistency with global projections, Physical plausibility, Applicability in impact assessments, Representative of the potential range of changes in the future, Accessibility for the users of impacts assessments.

The regional scenarios that were generated focus mainly on the applicability and accessibility criteria. A kick-off meeting was held at the beginning of the research work for the Fourth National Communication, to ensure that those criteria were fulfilled.

Specifically, a set of climate change scenarios was generated using the outputs for temperature and precipitation of three General Circulation Models (GCMs): ECHAM5, HADGEM1 y GFDL CM2.0, for the horizons 2030 and 2050, and for the emission scenarios A1B, A2, B2 y B1. Those scenarios can be found in our web page in a low spatial resolution (2.5 ° x 2.5º), and with high resolution (5' x 5').

To assess the potential impacts on rainfed maize agriculture, the changes of the suitability of different regions in the country were evaluated, considering maize temperature and precipitation requirements at its different stages of development. Four categories of suitability (high, moderated, marginal, and no suitable) were characterized for current and future climatic conditions.

Using the A2 and B2 emission scenarios, the three GCMs and the horizon 2050, results showed that around 67% of the national surface has some degree of suitability for maize production. However, only 12% of that surface is currently suitable, and 55% presents moderated or marginal conditions for maize cultivation. The most vulnerable regions under climate change scenarios are the more suitable areas, decreasing from 3% (HADGEM1, B2) to 4.3% (ECHAM5, A2) shifting mostly to marginal suitability, which will cover a surface of more than 43%. These results project adverse conditions for maize production in the country, which might endanger food security for the rural population. Adaptation measure are discussed using a study case in the central region of the country, considering changes in planting dates, changes in maize varieties, and changes in crop management, such as increasing fertilizer application.