



The role of climate change and erosion processes in desertification process in a sub-Saharan peri-urban area (Ouagadougou, Burkina Faso)

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Desertification affects about two-thirds of the countries of the world, and one-third of the earth's surface, namely one-fifth of the world population. The seriousness of desertification depends on various factors, including climate (temperature, precipitation, wind, humidity), geomorphological and geological condition, vegetation cover, water and wind erosion, soil nutrient status and salinization, land use and land management, biodiversity, etc.

Even the climate changes can contribute to the advance of desertification. Indeed hotter and drier conditions would extend the area prone to desertification to encompass areas currently not at risk. In addition, the rate of desertification would increase due to increases in erosion leading to an irreversible status of desertification process. This study was carried out within the FP7-ENV-2010 CLUVA project (CLimate change and Urban Vulnerability in Africa), and aimed to estimate the effects of climate change on sensitivity to desertification in the area of Ouagadougou (Burkina Faso) providing a prediction tool useful for optimization of land management.

The approach was based on the implementation and adaptation to the local conditions of the Environmentally Sensitive Areas Index (ESAI), developed within the MEDALUS project (Mediterranean Desertification and Land Use). A noteworthy advantage of this methodology is the flexibility, that allows to take into account several indices (climate, soil, vegetation cover, land management) operationally defined through the inclusion or exclusion of parameters scored on the basis of their impact on sensitivity to desertification. Therefore, an upgrade of the original method was developed adding a further index (Erosion Quality Index) for the evaluation of the cumulative impact of water and wind erosion in desertification process, by the RUSLE equation and the WEQ method, respectively.

Climate simulations over the time period 2010-2050 were provided by the CMCC (Centro Euro-Mediterraneo sui Cambiamenti Climatici). The climate projections were performed following the IPCC (Intergovernmental Panel on Climate Change) 20C3M protocol for the 20th Century, using the RCP4.5 and RCP8.5 radiative forcing scenarios developed in the framework of the 5th Coupled Model and characterized by vertical resolutions of 8 km. In particular, projection data (e.g. daily rainfall, temperature, wind speed and direction data) entry in the ESAI model through the parameters related to climate and erosion indices allowed the assessment of climate change impact on sensitivity to desertification in the studied area. The comparison between the different maps identifying the Environmentally Sensitive Areas (ESAs) produced on the basis of the historical climatic data and projection data, highlighted the areas where a more efficient land management and effective policies of desertification prevention would help to reduce the effects of negative climatic conditions.