Global Food Production threatened by Land Degradation: Need for better Understanding of Climate Resources

Land degradation leading ultimately to desertification is most visible in arid and semi-arid regions where the poorest and most marginalized people live from livestock and rain-fed agriculture. However, "drought, land degradation and desertification are global problems" said Dr Michel Jarraud, Secretary General of the World Meteorological Organization, WMO. The fight against drought and desertification receives a high priority in WMO's Strategic Plan.

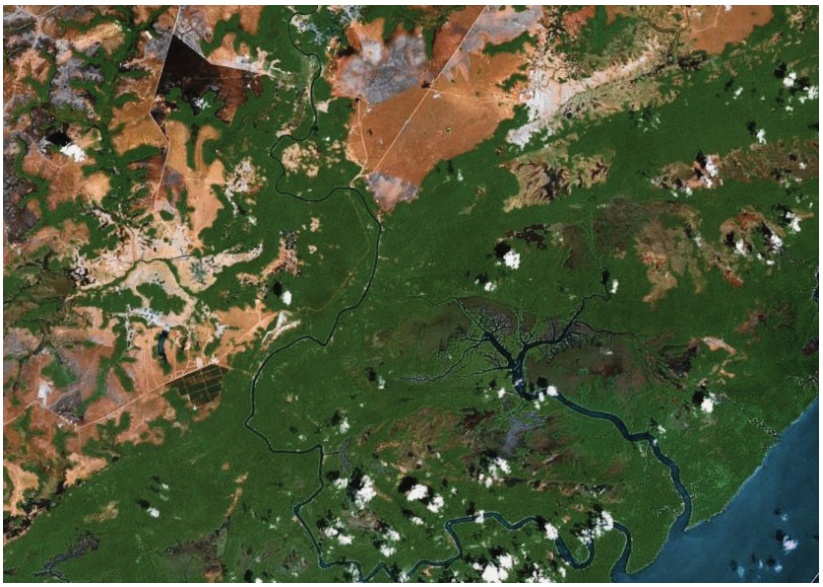
About 250 million people are affected by land degradation. In addition, some one billion people in over hundred countries are at risk.

"Land degradation is an issue for the world's food security when one considers that only about 11% of the global land surface can be considered as prime (or Class I) land, and this must feed the 6.3 billion people on the planet today and the 8.2 billion expected in the year 2020" said Dr Sivakumar, WMO scientist at the World Climate Programme and editor of the compendium on 'Climate and Land Degradation' published recently by Springer.

The long-lasting drought seen in the year 2007 in parts of southern Africa have led to a reduction in maize production of about 40 to 60% in Lesotho, Swaziland and Zimbabwe. In other parts of the world, agricultural and pastoral food production has seriously been threatened by floods after torrential rain such as in West and East Africa in July and August 2007, respectively.

Land degradation and desertification are closely linked to both climate and human activities. The United Nations Convention to Combat Desertification (UNCCD) defines desertification as land degradation in the arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Land degradation, in turn, is defined as a reduction or loss of biological or economic productivity resulting from land uses which are often related to human activities. The consequences are soil erosion caused by wind and water, the deterioration of the physical, chemical and biological or economic properties of soil and the long-term loss of natural vegetation.

Despite the major importance assigned by the UNCCD definition to climatic factors contribution to land degradation there is no concerted effort at the global level to systematically monitor the impacts of different climate factors on land degradation in different regions and for different classes of land degradation.



Deforestation - like here in the Amazon river basin - can modify the characteristics of the regional atmospheric circulation and the large-scale moisture fluxes and hence, has a profound influence on the Earth's climate. Image source: Google Earth.

"There is an urgent need to monitor

the interactions between climate and land degradation and to then develop recommendations on sustainable land management practices" said Dr Sivakumar, adding: "A first step was to invite world experts working on land degradation to share their knowledge on the status and trends of land degradation on global, regional and national levels and to then assess the current use (and best-practice use) of weather and climate data and information to reduce land degradation. And this is exactly what we did at the WMO/UNCCD International Workshop on 'Climate and Land Degradation' held from 11 to 15 December 2006 in Arusha, Tanzania!"

The expert's reviews and publications have just been compiled to a 623-page strong book edited by Dr Sivakumar and Dr Ndiang'ui from the UNCCD Committee on Science and Technology. The workshop, hosted by the Tanzania Meteorological Agency, was co-sponsored by the Organization of the Petroleum Exporting Countries (OPEC) Fund for International Development (OFID), the United Nations Development Programme (UNDP) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). The workshop marked the end of the International Year on Deserts and Desertification (IYDD).

A global assessment of the extent and rate of land degradation is difficult to obtain. According to the United Nations Environment Programme (UNEP) the areas of the world vulnerable to land degradation cover about 33% of the global land surface. Africa is particularly threatened because the land degradation processes affect about 46% of Africa of which 43% are classified extreme deserts. The region that has the highest propensity to devastate is located along the desert margins and occupies about 5% of the landmass. In total, about 485 million people live in regions classified as 'low, moderate and high vulnerable to desertification'. In Sub-Saharan Africa, the rate of land degradation is highest. Estimated losses in productivity of cropping land are in the order of 0.5 to 1% annually – suggesting a cumulative loss of at least 20% over the last 40 years.

Yet, the different factors that contribute to land degradation around the world are not well understood. In particular, the interactions between climate and land degradation are complex. Changes of vegetation type can modify the characteristics of the regional atmospheric circulation and the large-scale external moisture fluxes. Changes in surface energy budgets resulting from land surface change can have a profound influence on the Earth's climate. Following deforestation, surface evapotranspiration and sensible heat flux are related to the dynamic structure of the low-level atmosphere. These changes in fluxes within the atmospheric column could influence the regional, and potentially, global-scale atmospheric circulation. For example, studies have shown that changes in forest cover in the Amazon basin affect the flux of moisture to the atmosphere, regional convection and hence regional rainfall. These changes in forest cover have consequences far beyond the Amazon basin. Land use and land cover also influence carbon fluxes and greenhouse gas emissions. Land degradation aggravates carbon dioxide-induced climate change through the release of CO_2 from cleared and dead vegetation and through the reduction of the carbon sequestration potential of degraded land.

WMO contributes to understanding the interactions between climate and land degradation through dedicated observations of the climate system; through improvements in the application of agrometeorological methods and the proper assessment and management of water resources; through advances in climate science and prediction; and the promotion of capacity building in the application of meteorological and hydrological data and information in drought preparedness and management.

According to Dr Sivakumar, "climatic situations vary greatly from place to place. There is a need to understand and conserve available resources". The development and adoption of sustainable land management practices are among the major solutions adopted to combat land degradation over drylands, but to accurately assess sustainable land management

practices, the climatic resources and the risk of climate-related or climate-induced natural disasters must be well known for a given region.

Expert reviews in Dr Sivakumar's book address, amongst many other topics, global, regional and national trends in land degradation; assessments of the current use and recommendations on the more effective use of weather and climate data and information; feasibility studies of restoring degraded and desertified lands and examples of successful measures to manage land use in support of sustainable land management practices. UNCCD national action programmes to combat desertification are already in place in many countries worldwide but need focussed attention to succeed in their implementation. These programmes include all relevant stakeholders on national and international levels to take appropriate action in addressing the problems of desertification for achieving sustainable development. A list of recommendations adopted by the workshop is also included with the book. *[c arndt]*

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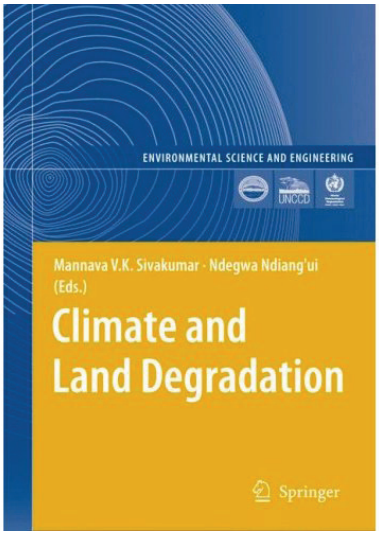

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