

## **Climate change and its impacts on African drylands**

Frank Berninger, Viiki Tropical Resource Institute and Department of Forest Ecology, University, POBOX 27, University of Helsinki, Finland, [Frank.Berninger@Helsinki.fi](mailto:Frank.Berninger@Helsinki.fi)

### ***Climatic trends and their implications***

From the sixties droughts in Sub-Saharan Africa have been severe and increasing. Rainfall has been lower than in the earlier climatic records. Climatologically, the drought has been connected to the El-Niño-Southern Oscillation (ENSO) index, an indicator of circulation patterns in the Southern hemisphere.

It is not clear though, to what extent the current drought in the Sahelian zone is part of the natural variation of climate and to what extent it is a consequence of global warming. Reconstructions of the ENSO indicate a large degree of variation over the past few 100 years, but during recent years the amplitude and variation of the index have increased.

Another explanation for the increasing drought in Sub-Saharan Africa has been increasing deforestation: Deforestation decreases surface roughness and atmospheric mixing, as well as possibly the emission of aerosols by vegetation. Modelling studies have shown that all these factors may lead to decreases in precipitation on a local or regional scale.

However, water balance has two elements: input (or precipitation) and output (i.e. evaporation or runoff). Climate warming should in principle increase evaporation from vegetation, i.e. aggravate the effects of possible reductions of precipitation. However, recent studies have shown that this has not happened (Roderick and Farquhar 2002, Science 298:1410 ) but pan evaporation from most stations has been reduced. The reasons are probably that relative humidity has increased and the diurnal temperature range decreased (the so called night-time warming).

Predictions of climate change models for rainfall in Sub-Saharan Africa are poorly defined. Current predictions indicate that rainfall in Southern Africa and some of the Mahgreb might decrease, rainfall in eastern Africa would increase and models do not agree on possible rainfall changes in the Sahel. Changes in evaporation are somehow large, but agreement between different climate models is not very good (IPCC, Climate change 2001, <http://www.grida.no./climate/ipcc.tar/wg2/index.htm>).

### **Questions:**

- 1) To what extent do you see interactions between rainfall and deforestation?
- 2) To what extent do you see that recent climate trends agree with long term predictions from GCM models
- 3) What would you expect from the climatologists to increase the use of predictions of climate change for your work.