

Cohen Ariel

Ben Gurion University, Geography Department
Be'er Sheva, Israel
arieleco@yahoo.com

STSM title: Interaction between soil erosion, hydrology and nutrient cycling in a dryland environment

STSM Host scientist: Prof. G. Govers, Geography Department of KU Leuven, Belgium

Five Keywords: soil erosion, climate change, gully, sustainable agriculture, semi-arid environments

Topic summary: The research focuses on the contribution of gully erosion to overall soil loss and sediment production at various temporal and spatial scales and under different climatic and land use conditions. This topic forms the basis of my PhD thesis and thus I wished to be exposed to the latest field, lab and modeling techniques to help me prepare my scientific research program. Understanding the processes and mechanisms of erosion allows one to assess erosion process as well as the rate of recovery following a restoration intervention.

The visit workplan was:

1. Discuss my research focus with Prof. Govers and Prof. Poesen and other colleagues in the Geography Department.
2. Learn about the latest techniques and methodologies related to rain-soil-runoff relations, especially the use of tracers in soil erosion research.
3. Visit their experimental labs and field plots to provide me with an advanced background on how best to set-up field experiments, monitoring, measurements, and modelling of data.
4. Use of GIS as a tool to assess large areas beyond the catchment scale.
5. Models of soil erosion and especially gully development models.
6. How to include the potential impact of climate change on soil erosion and runoff regimes in a dryland environment.

Methods summary: Many aspects of the lab instrumentation and experimental field set-ups do not exist in Israel. Accordingly, during my STSM I took advantage of this opportunity to be exposed to the latest methods and approaches in soil erosion and conservation. I had several discussions with Prof. Govers on erosion processes and erosion balance in European and Mediterranean catchments. Quantifying human impacts on catchment sediment yield is complicated and probably overestimated. There are several indicators from a few new studies that human impact is mainly controlled by catchment scale and land use. The sediment yield at the catchments outlets is higher at hillslopes scales, while in large catchments the sediment yield is lower due to deposition processes as colluvium or alluvium. Prof. Govers reviewed the experimental field plots at the loessial belt in Belgium. He explained the monitoring, measurements and modelling of the data. We discussed the LISEM model accuracy in runoff and sediment transport quantity in two different catchments in Brazil.

Results and implications for restoration: One of their interesting studies I focused on related to desertification was the impact of land use changes on water pathways, soil formation and soil functioning. The overall objective of their research is to investigate how land use change affects water and biogeochemical fluxes and how these changes may, in their turn, affect soil and landscape development in the long term. Of interest to me was

COST ES1104 Desert Restoration Hub

that while there are many links between gully development, land use practices, and land use changes, there are very few publications that deal with how to reverse or stabilize gullying.