"The Contribution of Soil Protection to Climate Adaptation"

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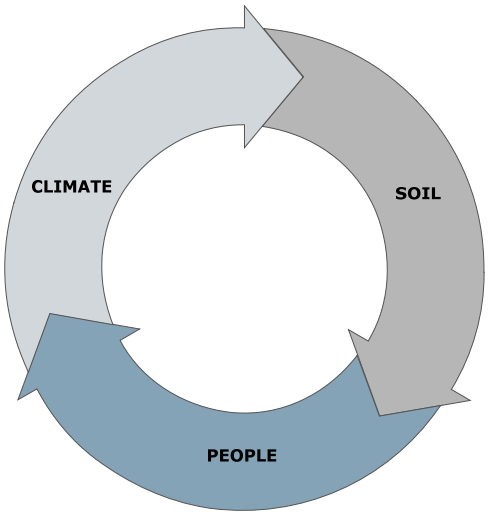
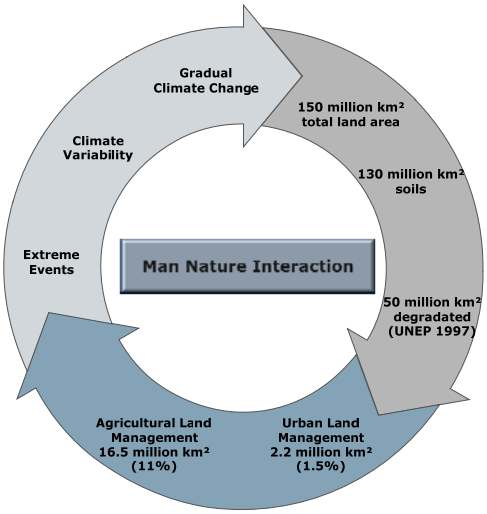
Two ways to see soil and earth

- Considering earth as planet and a global management task
- Considering earth as a local material and practical action

Climate & Soil & People Interaction



Bringing the issues together



- Climate, soil and land management undergo changes
- Dynamics are different, often not known
- Adaptations are required, aware people needed

Climat Change, Climate Impacts, Climate Adaptation

- Climate change is more than 20% directly influenced by land
  - Interactions
    - Soil
    - Vegetation
    - Water bodies
- Climate impacts
  - Extreme events
    - Floods
    - Droughts
    - Landslides
- Climate adaptation
  - Related to inhabitants
    - Actions to convert the change from unwanted to wanted or acceptable
    - Social: information, awareness rising
    - Technical: measures for improved management
    - Physical: changing the use

Soil, Soil Improvement, Soil Degradation

- Soil
  - Interactions
    - Climate
    - Vegetation
    - Water bodies
- Soil degradation
  - One third of land cover is degraded (UNEP 1997)
    - Soil losses for urbanisation
    - Polluted soils
    - Overused soils
    - Eroded soils
- Soil improvement
  - soil is „Earth“
    - There where man connect to the planet
    - Make the earth better
    - Key to many environmental problems and to climate in particular

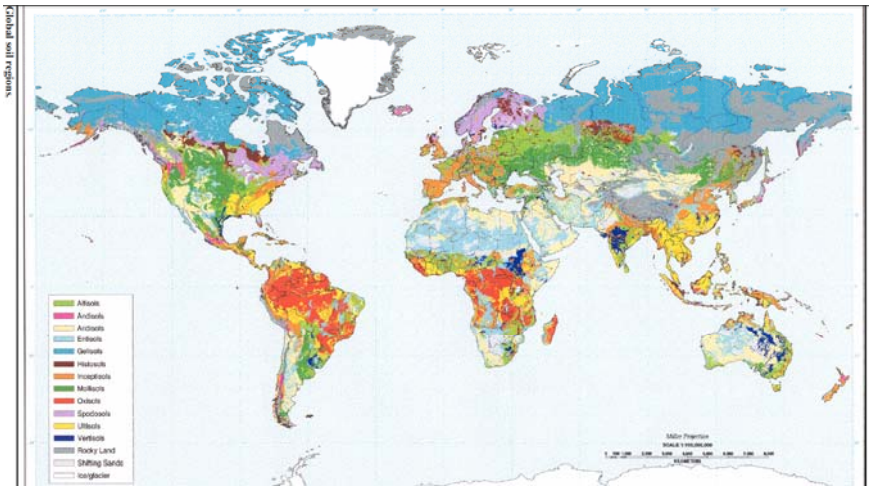
Rural & Urban Land Management, Soil Awareness

- Rural land management
  - Large increase of inputs into agriculture
    - Fertilizer, pesticides, chemicals and increase in CC potential
    - Loss in environmental performance and increase in vulnerability
  - Less people working in rural areas
    - Rural is unattractive and provides less income
    - Many soils are no longer used and neglected
- Urban land management
  - Best agricultural lands are converted to urban land
    - Industrial areas
    - Traffic areas
    - Settlement areas
- Soil awareness
  - Reconnecting people to „earth“
    - Forgotten knowledge
    - New knowledge
    - Particular the linki to climate change

Global land surface (150 million km²)

- Estimates of global soils
  - compiled from various sources
    - Forest ecosystem (34 million km² forest ecosystems)
      - Threat of deforestation
        - » Estimate of annual 100.000 km² loss
        - » http://www.globalchange.umich.edu/globalchange2/current/lectures/deforest/deforest.html
    - Dryland (70 million km², arid, semiarid, dryhumid)
      - Threat of desertification
        - » http://www.fao.org/docrep/007/y5738e/y5738e06.htm
    - Arctic land and glaciers (20 million km² cryosphere)
      - No pedogenesis
        - » http://en.wikipedia.org/wiki/Cryosphere
    - Agricultural used land 16,5 million km²
      - » USDA estimate 2001
      - » http://www.iiasa.ac.at/Research/LUC/External-World-soil-database/HWSD_Documentation.pdf
    - Urban land areas 2,2 million km²
      - » Annual increase 1970 to 2000 was 58.000km²
      - » Most likely number in 2030 4 million km²
      - » Seto et. al. 2011, http://www.plosone.org/article/info:doi/10.1371/journal.pone.0023777

Global Soil Types (Quelle: USDA 2001)



Technical & Physical Climate Adaptation in Soil Management

- Increase the water infiltration capacity
- Increase the soil water storage
- Avoid erosion and increase soil resilience
- Facilitate natural nutrient flow
  - Built up soil organic matter
  - Care for proper soil aggregation
  - Facilitate seed germination
- Reconnect broken cycles and
- Avoid alterations in water and energy balance

Social Climate Change Adaptation in Soil Management

- Explain the interaction climate and soil
  - Keep as much soil in good state
  - Soil tempers temperature extremes
  - Healthy soils minimize the impacts of extreme events
    - Droughts come later, plants survive longer
    - Floods are less severere, large water quantities can be stored in soil
- Explain the impact of good rural soil management
  - Minimum tillage
  - Precision agriculture and benefits for soil management
  - Avoided soil ersosion
- Explain the impact of good urban soil management
  - The importance of non sealed areas
  - Positive impacts of urban agriculture
  - The role of healthy trees and good soil quality interaction
- (Re-) Link people to soil issues and climate change interaction
  - Compare capacity of different soils and their role in climate events


Providing an understanding for
combined soil & climate measures


Common Efforts of Experts


Preference to local food
and local consumption


Home gardens to produce vegetables


Minimize fossil fuel consumption for agricultural products


Avoided Deforestation


Improve Agricultural Practices and
combined soil & water management


Organic Agriculture


Improvement of local resource availability: nutrients and water


Improve soils by planting


Protection of soil with trees


Increase the organic content of soils


Appriciate traditional diet


Support local farmers


Protection against wind


Urban Development


Water areas to cool houses and avoid air conditioning


Megacities & Soils


Care for urban green and
avoid sealed surface

Conclusion

- All measures on soil have also an impact on climate
- The term „earth“ connects smaller scales with the large scale.
- Minds and hands are needed to promote soil conservation and soil awareness
- Climate change proceeds everywhere on earth while climate adaptation is undertaken only in populated zones

For further reading: