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15 DECEMBER 2008: VEGETATION'S ROLE IN SUSTAINABLE DRYLAND LIVING AND DESERT ARCHITECTURE

THE ROLE OF VEGETATION IN COMBATING DESERTIFICATION

Use of Indicator Species (IS) in the enhancing conservation of drylands of Kenya

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Rapid vegetation changes in the drylands of Kenya are a result of increased human settlement and Climate Change. The need for food and fodder has seen the substitution of many aborigine xerophytes by fast growing adaptive species. In northeastern Kenya for instance, rapid vegetation degradation led to the introduction of *Prosopis juliflora*, commonly referred to as "Mathenge". The tree was a panacea to dryland afforestation but has turned to be such a bother to man and livestock. It has spread rapidly, covering expansive areas and choking indigenous vegetation. The tree is poisonous to man, goats, cattle and camels.

This paper presents baseline justification for the need to map indigenous vegetation in the drylands, starting with indicator species. Since indicator species are not fully documented, conservation will be given priority. This paper emanates from research done on conservation species found in Kibwezi and Kathonzweni Divisions of Makueni District in Kenya. The research had the following four interrelated objectives: identify and document indicator species for the drylands; establish and package indigenous methods for the conservation of the indicator species; build capacity of stakeholders along the entire production to utilization value chain of the indicator species; and document and disseminate information on conservation of indicator species. The study identified categories of species on the basis of utility.

The research generated the following outputs; indicator species for the drylands identified and documented as per their utility; indigenous methods for the conservation of the indicator species documented and ways of improving their domestication prescribed; capacity of stakeholders along the entire production to utilization value chain of the indicator species enhanced; and information on conservation of indicator species documented and packaged for dissemination. It was established that mapping the characteristic vegetation for the drylands is needed in order to capture vegetation that was there many years ago. This is important considering that the indigenous vegetation under conservation comes from ecologically disturbed sites, making the list not exhaustive. The relationship between soil characteristics and vegetation types need to be studied in depth. The information collected is based on indigenous knowledge to characterize sites. Enrichment planting of the indicator species is recommended while maintaining the natural state of the environment through the establishment of enclosures.

Green spots as a tool to combat desertification in the Aral Sea region

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The Aral Sea in Central Asia was the fourth largest lake on the planet in 1960. By 2007 it had shrunk to 10 percent of its original size. The receding sea has exposed and dried 54,000 square kilometers of seabed. Over 7.3 million tons of salty dust blows away from the Sea annually. Plants could prevent spreading of chemicals from the dry seabed to populated areas. Primary succession of the new desert Aralkum is very slow. The enhancement of vegetation cover by means of phytomelioration is a realistic way for stabilization of the dry seafloor surface. The continuing shrinkage of the Aral Sea had lead to desiccation of vast areas of the seabed with highly saline heavy sediments. New ecological conditions required new approaches for phytoreclamation of all types of soils including solonchaks of heavy texture. Experiments continued through UNESCO project showed that sandy soils have more favorable conditions for implementation of phytomeliorative measures than clay soils; the aridity of the first vegetation period plays a major role for the establishment of seedlings; species from local flora are more useful for phytoreclamation than introduced species.

Experiments on rehabilitation of coastal ecosystems have been supported now by AEON Environmental Foundation /Japan, 2005-2006 and Japan Fund for Global Environment, 2006-2008. Two tasks are included in the study: 1) establishment of green shelter belts around villages; 2) afforestation of the dry seafloor.

Two villages were chosen for planting activity with participation of local people. Saplings of *Haloxylon aphyllum* were planted in a plot of 1 ha in a dry bed of Bozkol bay (close to Kaukey village). Soil conditions are very harsh – highly saline clay. Method of pits with sand was used to increase survival rate which was 25% due to reclamation work. Green shelter belt of 2.5 ha near Karateren village was established in more favorable soil conditions (medium salt content, loam). Survival rate of saxaul saplings was 60% in a first year, 57% - in a second year. Next step for experimental study is to work out technologies for growing in nurseries some local shrubs (*Nitraria schoberi, Halostachys belangeriana, Suaeda microphylla*) for further planting in the dry seafloor.

Thus, a modern approach in reclamation of salt deserts and combating desertification in the coastal areas is creation of small plantations (oases, "green spots"). This will support the natural processes of vegetative and generative propagation and creation of seed banks for acceleration of natural succession. Also, green shelter belts will be created slowly around villages.

Desertification not at all costs – a matter of temporal and spatial scales and policies

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The dunes in the semi-arid region of Israel were subjected for decades to a grazing and cutting regime which caused: a) diminution of vegetation cover and primary production in the ecosystem, and b) diminution of soil fertility and destabilization of the sand. These two facts were expressed in a bare-shifting dune landscape along the coast and in the northwest Negev, as seen from aerial photographs taken from 1918 until the 1960s. This ongoing, regional scale regime was the driver of an evolutionary process that accelerated the migration of psammophile flora and fauna from the Sahara desert, where part of the species were endemic. When Israel was established in 1948, massive development and construction along the coast was taking place, which caused the partial disappearance of the dune landscape. Remaining dune areas were declared as nature reserves - grazing and cutting were forbidden. In these areas, a process of stabilization has begun, that is to say, an increase in vegetation cover and productivity as well as in diversity of species from Mediterranean origin. However, the shifting dunes have started to disappear from the landscape, and with them, the psammophile species. A comprehensive study since 2004 monitors the biodiversity throughout Israel's coast and the northwest Negev, and simultaneously examines restoration processes on a local scale to insure that conservation of the shifting dunes affects the entirety of the dune ecosystem. In this framework, I will present the spatial and temporal outcome of dune "desertification" on biodiversity conservation.