Ecological Degradation and Global Change: The Case of Drylands

By

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Summary

During the e-discussion on rehabilitation of degraded lands in sub-Saharan Africa, the need for clear definitions of drylands, land degradation and desertification emerged and these are discussed in this paper. Aspects of the extent and distribution of drylands did not feature well but have been discussed since they indicate the magnitude of the problems at hand. Causes of ecological degradation featured prominently and have therefore been discussed extensively. Both natural and human-related factors have been examined with an emphasis of the need to bring people at the centre of discussions. Finally, a section on the way forward has highlighted some of the key areas that should be the focus for the future.

Introduction

One of the issues that emerged during the TACCDA and GFIS-Africa e-discussion workshop on degraded lands in Sub-Saharan Africa related to the need for clear definition of some terms commonly used while discussing degradation or rehabilitation. In particular, the issue of degradation and drylands were discussed and we also want to add the one on desertification.

Whereas there exist different definitions and classifications of drylands, the one by UNESCO is universally accepted. According to this definition, drylands are areas where the ratio of mean annual precipitation (P) to potential evapotranspiration (PET) (i.e index of aridity) is less than 0.65 (Middleton and Thomas, 1997). Based on this definition and using the aridity index values, drylands are classified into four climatic zones: Hyper-arid (<0.05), Arid (0.05-0.20), Semi-arid (0.20-0.50) and Dry Sub-humid (0.50-0.65).

Desertification and degradation also have many definitions but the ones more widely accepted are given below;

- Desertification refers to land degradation in arid, semi arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.
- Land degradation refers to the aggregate diminution of the productive potential of the land, including its major uses (rainfed, arable, irrigated,

rangeland, forest), its farming systems (e.g. small holder subsistence) and its value as economic resource (Stocking and Murnaghan, 2001).

The two terminologies are the same as far as the drylands are concerned.

The aspect of the dynamics of land degradation or desertification was also discussed during the e-discussion. Whereas there might be varying processes of degradation, at least three stages are recognized in the drylands (Zewge, 2003);

- The first stage degradation relates to the natural and semi-natural woodlands. We call this "woodland degradation". These are degrading because of increased conversion to cropland or increased demand for tree products. Some of the questions to be addressed include: Do farmers have to continue converting these woodlands to agroforestry parklands and to what extent? Do we need to conserve these woodlands and for what purposes? How do we conserve them to meet the resource requirements of an increasing population?
- Second stage degradation relates to agroforestry parklands. Agroforestry parklands (AFP) are established when farmers convert natural or semi-natural woodlands to croplands, by cutting most of the trees and leaving behind some trees, those that they value most to fulfil their basic needs. AFP is the dominant land use practice in SSA and the most common types are *Faidherbia albida* and *Vitellaria paradoxa* parklands. The AFPs are sustainable only if we are able to maintain trees on the land either by re-planting or by fallowing to allow tree regeneration and restoration of soil fertility. However AFPs are now degrading because of increasing population pressure. Due to increased demand for cultivation area (space) and increased demand for tree products, the remaining trees on parklands are being cut down. Once trees are removed from the landscape the land becomes degraded. In areas where mechanization has not been introduced, farmers cannot fallow their land any longer again due to population pressure. A shortened fallow means lack of tree regeneration and ultimately land degradation. We call this "Parkland degradation". Questions to be addressed include: How do we increase the productivity of parklands to meet the increasing demand for food and other tree products?
- The third and final degradation takes place on lands which have already lost their woody vegetation and have now become degraded or are degrading as a result of intensive cultivation by increased mechanization, irrigation, etc... We call this "cropland degradation". Questions to be addressed include: How can we restore the woody vegetation to create environmental stability in these areas or how can we reclaim these degraded or degrading lands?

Meanwhile, drylands, like other ecosystems, play an important role in livelihood support, have unique characteristics and are quite resilient though fragile if used improperly.

Extent and Distribution of the Drylands

Aspects of the extent and distribution of drylands did not feature well during the e-discussion. Nevertheless, it is an important issue as it provides an understanding of the magnitude of the problem at hand. Drylands including hyper arid lands cover 70% of the African continent making it one of the driest in the world. Drylands alone cover about 43% of the landmass (comprising 65% of the countries in Sub-Saharan Africa). Assessment of the dryland areas show that approximately 16%, 21% and 8% are arid, semi arid and dry sub-humid lands respectively (Corbett et at, 1965; UNSO/UNDP, 1997).

Sub-region level statistics on the proportion of drylands in Sub-Saharan Africa are given in Table 1.

Table 1: Area per aridity zone by sub-region for Africa (Area numbers are in thousands of km^2)

	Hyper-arid		**Arid**		**Semi-arid**		**Dry Sub-humid**		**Total**
Sub-region		%		%		%		%	
Northern Africa	4,736	81	640	11	410	7	43	1	**5,829**
Western Africa	2,363	33	1,465	20	1,278	18	514	7	**5,620**
Central Africa	0	0	6	0	66	2	144	4	**216**
Eastern Africa	878	14	1,670	27	1,768	28	767	12	**5,083**
Southern Africa	96	2	823	13	2,579	42	924	15	**4,422**
Africa Total	**8,072**	**27**	**4,604**	**16**	**6,100**	**21**	**2,392**	**8**	**21,170**

Source of data: Corbett, 1996; UNSO/UNDP, 1997

However, the above categorization is only approximate since high variability in climatic conditions (especially rainfall amount/distribution) accompanied by drought and effects resulting from human activities mean that actual areas/boundaries are shifting over time. This brings into question the issue of reliability of the data given the dynamism of drylands resulting from the above factors. Regular monitoring of the extent of distribution of the drylands based on updated and reliable techniques is therefore necessary. Nevertheless, this also introduces another issue regarding methodologies and approaches for monitoring trends of degradation in various countries or sub-regions (which seem to be different). There is a need for development of harmonized approaches, methodologies and tools which can enhance common interpretation and therefore priorities for action. One might ask, is there adequate capacity in Africa to carry out this activity? Which institutions in Africa or partner organizations overseas can collaborate in this area?

Causes and Consequences of Ecological Degradation

Causes and/or drivers of degradation generated the highest level of participation from the discussion papers and contributions from participants of the e-discussion. It was generally acknowledged that proper understanding of the root causes of degradation is required in order to develop sound intervention measures. There was also a general consensus that while the root causes are complex and site specific, the driving forces fall into two broad categories; natural and human related factors.

Natural factors like climatic variability, drought, temperature variability, wind, physical environment and biological factors are well covered in the background paper (available on the ETFRN website) and discussion papers by Drs. Demel Teketay and Bashir Jama. However, whether the affected governments or responsible organizations have put in place mechanisms for monitoring the environment and areas vulnerable to drought including aspects like early warning systems, legal and institutional framework for drought management and empowering communities to address pertinent issues did not come out clearly. Issues about land degradation and global warming e.g. Africa's contribution to the latter or carbon sequestration were least discussed (except some thoughts from Dr. Frank Berninger). The role of wind as a causative agent did not receive the desired input despite its contribution to land degradation in the Sahel. These are important issues for consideration during the period of this workshop.

Human-related factors generated the highest level of interest. Indeed, human-related activities are responsible for the accelerated forms of land degradation (Stocking and Murnaghan, 2001) and, as was rightly pointed out, we need to bring people at the centre of discussion if our interventions are to bear fruit.

Several issues under social and economic aspects as well as issues on dryland management will be presented at this workshop by various resource persons and discussed in the plenary and in working groups. This paper does not want to pre-empt the anticipated valuable contributions. Nevertheless, it is desirable to mention some of the factors discussed in the e-discussion. Over-grazing, over-cultivation, deforestation, water-logging and salinisation of irrigated lands came out quite prominently. Poverty and food insecurity, lack of individual and communal ownership of natural resources, poor market access and political instability came as a second group of causative factors. Additional factors concerned inadequate institutional arrangements, inadequate or lack of suitable dryland development policies and lack of skills in recognizing natural resource bases and their potentials.

The issue of population growth and dryland degradation was debatable. However, it was generally agreed that whereas increase in population can put pressure on available dryland resources and lead to land degradation, there exist examples where it has spurred development and sustainable use of existing resources. The key issue relates more to appropriateness or inappropriateness of land use practices including policies.

The impact or consequences of land degradation seem to occur in a vicious circle with one being responsible for the other. The main consequence in the drylands is desertification which manifests itself in various biophysical and socio-economic conditions. Some of the biophysical effects include soil degradation, reduction in available water including its quality, diminution of vegetation resources (including biological diversity) as well as urban and related industrial problems. Socio-economic conditions include poverty, rural-urban migration (environmental refugees) and reduced per capita agricultural production of affected countries (UNEP, 1991), among others.

The Way Forward

The background paper on drylands has captured well some of the gaps in knowledge and proposed the way forward in the form of recommendations. Expert review on the background papers by Edouard Bonkoungou [also posted on the ETFRN website] has also made useful recommendations. Meanwhile some useful contributions were generated during the e-discussion and possible areas for intervention proposed. Lastly, the current paper has identified some of the gaps and presented questions for consideration. This section will therefore highlight some of the key areas that should be the focus for the future.

Land degradation due to natural causes is believed to occur at a rate which is in balance with that of natural rehabilitation but human-related factors are said to be responsible for the accelerated forms of degradation. There is therefore a need to place people at the centre of development of the drylands and fully integrate their activities in response to the biophysical changes, that is, the ecological degradation taking place. The capacity of communities in the drylands need to be built through advocacy, education and training and resource mobilization so as to empower them deal with specific problems arising from their actions.

Dryland ecosystems are generally endowed with a rich diversity of natural resources and yet they continue to suffer from lack of diversification in resource use with high levels of poverty. This is partly because of the pastoral lifestyle of a majority of the communities living in the drylands. There is a need to recognize the potential that exists in the other dryland resources and develop them for sound economic development. A good example is the gums and gum-resins found in the drylands of Eastern Africa and highly sought after in industrialized world. We need to see even beyond trees or plants and relate dryland management to broader development goals building on the understanding that the main structural components of land include soil, minerals, water and a range of biological resources, both flora and fauna.

In terms of technologies, the aspects of trees outside forests (TOF), use of domestic waste water as well as the ability of dryland trees to regenerate through suckering and layering were proposed as some of the valuable interventions in rehabilitation initiatives.

Finally, to ensure sustainability of various development initiatives, the African people should play an active role in the formulation and implementation of various projects. Opportunities are emerging through various technical networks like FORNESSA, AFORNET, SAFORGEN, NGARA etc that provide useful fora for negotiation. Additionally, there is need to forge alliances with programmes and institutions such as the New Partnership for Africa's Development (NEPAD), sub-regional intergovernmental bodies like IGAD, CILSS and SADC as well as the African Development Bank.

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