

THE PROBLEM OF COMBATING DESERTIFICATION: A DEFINITIONAL CONTROVERSY OF CONCEPT.

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ABSTRACT

A ding-dong controversy over the term and reality of desertification has developed between two schools of thought in the environmental arena. The critics are of the view that desertification is a myth and is not occurring, while the pro-desertification opinions are supporting its existence. However, after a critical review of the situation, it was observed that the critics bases for contest, centre principally on the definition and characterization of desertification, the inaccurate statistics of the rate and extent of desertification; and the widely quoted 5.5 kilometres annual desert advance south of the Sahel given by the United Nations. These the critics say are not based on scientific standards and are full of speculations and subjective ideas; and thus, desertification is a political and "development" fiction. The paper therefore suggests the adoption of the term "environmental modification" on (land, water and air, (which can be negative or positive depending on needs) in place of "desertification" or "land degradation". It further suggests a harmonization of concepts by the two parties in addressing the issue of this phenomenon under contention, while also expressing the fear that the socio-economic activities of man, which are ever changing could make it very difficult for a common definition and perception about desertification to be achieved in near future.

KEYWORDS: Two schools of thought, definitional controversy, environmental arena, concept, desertification.

INTRODUCTION

Since Aubreville (1949) first coined the term desertification in the context of the humid and sub-humid zones of West Africa, there has been considerable discussion about what the term really means (Stiles, 1995). More than one hundred definitions have been recorded (Warren and Agnew, 1988, Odingo, 1990), and opinions vary greatly on what the concept of the phenomenon should include.

Some definitions include both climatic and human causes; others restrict it to human-induced degradation; some restrict the term to the drylands; while others think it should apply to more humid areas as well. The question of irreversibility has been included by some, with all of the controversy that this term invokes. More recently, debate has begun about the validity of using vegetation degradation as an indicator of desertification.

On the same issue, over the past thirty years, the general perception of desertification has been of growing deserts. In 1977, the Worldwatch Institute maintained that in the Sudan, where "the spread of the Sahara" has probably been measured most precisely, "vegetational zones are shifting southward as a result of overgrazing, wood cutting and accelerated soil erosion, desert creeps into steppe; and while steppe loses ground to the desert, it creeps into the neighbouring savanna which, in turn, creeps into the forest".

In the late 1980s, Barber Conable, then Presidents of the World Bank, similarly spoke of the advance of the desert", adding that in Mali, the Sahara has been drawn 350 kilometres south by desertification over the past three decades. Also, the United States of America was urged to give aid to the Sudan because desertification was advancing at 9km per annum in that country.

There have been many of these statements; but these and descriptions of desertification are rarely accompanied by a description of the survey techniques and methodologies employed. It is also rare that any primary data, based on physical measurements, is presented or referred to. Consequently, it appears often impossible for the reader to assess the statements reliability. This situation has tended to create two schools of thought; with one (the negative) group (Nelson, 1988; Olsson, 1993a; Thomas and Meddleton 1994; Warren and Agnew, 1988; Wallens and Millington, 1993; Cardy, 1994; Hellden, 1994) going as far as claiming that desertification is a myth and that it is not even occurring, while the other (the positive) group (Dregne, 1983; Stiles, 1995; UN, 1977; FAO/UNEP, 1993) is of the strong view that the phenomenon is a reality.

There is lack of consensus on what desertification means, in spite of an internationally negotiated and accepted definition made at the United Nations (UN) Conference on Environment and Development (UNCED) in 1992. The "positive group", not only believes that desertification (i.e dryland degradation) is occurring, but it recognizes that it is a very serious threat to the well-being of about one billion people living in the drylands, and focuses on finding solutions that would achieve good land and natural resource management for sustainable development.

Various studies, Hellden (1988), Nelson (1988) Olsson (1985), Warren and Agnew (1988), and applications since the mid-1980s question aspects of the concept and extent of dryland degradation, and these have had significant consequences in political and policy-making circles, particularly in the industrialized countries.

One reason for the weak support given by the North to the proposal for a desertification convention, is thought by some to be well-publicized claims that the UN has exaggerated the extent of the desertification

problem and that it has misrepresented the concept for political reasons (Warren and Agnew, 1988, Olsson, 1993a, Thomas and Middleton, 1994).

It therefore becomes pertinent in this regard to examine these controversies critically as they may be severely threatening the efforts being made in some quarters to combat desertification.

DEFINITIONS OF DESERTIFICATION

A representative sample of definitions will be presented in order to highlight the main points of controversy concerning the concept.

Desertification is a concept that has received no single satisfactory definition by scholars and environmental organizations. Some see it from controversial position. Wellens and Millington (1993) describe desertification as an evocative and a misleading term. It is evocative in that it conjures up a picture of encroaching desert of dunes advancing over agricultural land around the edges of deserts. They further went on to say that it is misleading in that it implies a simple process rather than a number of different processes and that the desert edge does not advance intact. It is a process whereby lands bordering true deserts are reduced to desert-like conditions.

The 1977 UN Conference on Desertification (UNCOD) defined desertification as:

the diminution or destruction of the biological potential of the land, and can lead ultimately to desert-like conditions. It is an aspect of the widespread deterioration of ecosystem, and has diminished or destroyed the biological potential, i.e. plant and animal production, for multiple use purposes at a time when increased productivity is needed to support growing populations in quest of development.

Further discussion in the UNCOD report and associated conference documents (United Nations, 1977) made it clear that the UN viewed people as a main causative factor in dryland degradation, though the process was complex and varied, and that term should be restricted to the drylands. No official definition of drylands was given, though a detailed discussion of the concept was presented, along with a map showing the geographical distribution of various values of the Budyko-Lettau dryness ratio (Hare, 1977) and the 1977 UNESCO map of the World Distribution of Arid Regions.

The UN also stressed that desertification was not something that emerged from deserts, carried by hot dry winds. It could occur anywhere where land was overexploited and it was generally not correct to envisage it as an advancing wall of sand dunes or desert frontier. Rather, it is usually far removed from any nebulous front line and it is a more subtle and insidious process than an advancing desert front.

Food and Agriculture Organization/United Nations Environment Programme (FAO/UNEP) (1983) offered a revised definition of desertification in the context of their efforts to develop a methodology for assessing and mapping desertification. They defined desertification as a comprehensive expression of economic and social processes as well as those natural or induced ones, which destroy the equilibrium of soil, vegetation, air and water, in the areas subject to edaphic and/or climatic aridity. Continued deterioration leads to a decrease in, or destruction of the biological potential of

the land, deterioration of living conditions and an increase of desert landscapes. This definition included aridity in it, but again did not define its boundaries. However, FAO maps of desertification have always excluded areas with more than 180 days agricultural growing period. It also introduced the concept of ecological equilibrium, one that is now under re-evaluation in dryland grazing ecosystems. FAO/UNEP also viewed desertification as a process, going through several stages before reaching the final irreversible one. The processes were both natural and human but desertification could only be slowed or stopped by human actions.

Milner and Douglas (1989), reporting on the problems of land degradation in commonwealth Africa, defined desertification as "the deterioration and impoverishment of terrestrial ecosystems under the impact of man. It can be detected and measured by changes in important ecosystem parameters. In particular, the reduced productivity of desirable plants, undesirable alterations in the biomass and diversity of the fauna and flora, accelerated chemical and physical soil deterioration leading to erosion and loss of productivity and a perceptible increase in hazards for human occupancy".

This definition implies that there is a continuum in the degradation process from slight, with only small changes in the ecosystem, to very severe, where complete breakdown occurs. It also places due emphasis on the fact that desertification is primarily a result of man's activities, although changes in climate may increase (rarely decrease) the rate at which the process proceeds. Nothing in this definition restricts desertification to arid regions despite current, understandable, preoccupations with extreme examples of the phenomenon caused by the interaction of man's activities and drought.

Dregne (1983, p.5), a long-standing expert in desertification offered this definition: Desertification is the impoverishment of terrestrial ecosystems under the impact of man. It is the process of deterioration in these ecosystems that can be measured by reduced productivity of desirable plants, undesirable alterations in the biomass and the diversity of the micro and macro fauna and flora, accelerated soil deterioration, and increased hazards for human occupancy.

Dregne's definition is one of the few that does not mention climatic factors as a cause. The definition is also not restricted to drylands. By using such terms as "desirable and undesirable", he also introduces the concept of a socio-economic rather than purely biological assessment of land degradation. An undesirable alteration in biomass could be bush encroachment into rangelands, decreasing their economic value for grazing livestock. In purely biological terms, however, bush would have raised productivity.

Nelson (1988) strongly criticized the entire concept of desertification as one that was poorly characterized and as a term that obscures its true shape because of the diversity of the definitions. This, however, did not prevent him from adding to that diversity by offering his own definition (1988, p.2).

Desertification is a process of sustained land (soil and vegetation) degradation in arid, semi-arid, and dry sub-humid areas, caused at least partly by man. It

reduces productivity potential to an extent, which can neither be readily reversed by removing the cause nor easily reclaimed without substantial investment.

Nelson goes along with FAO in defining the upper limit of drylands as having no more than a 180 day growing season and a maximum of 1200-mm average annual rainfall. He recognized that degradation was naturally reversible, and he introduced the concept of relative irreversibility. This he arbitrarily defined as a 10 - year natural recovery period of productive potential, or a substantial capital investment to effect rehabilitation. Presumably, if natural recovery would take more than 10-years, or if the investment was uneconomical, then it might mean that desertification was occurring.

FAO (1993) has added biodiversity to its definition: Desertification is the sum of geological, climatic, biological and human factors which lead to the degradation of the physical, chemical and biological potential of lands in arid and semi-arid areas, and endanger biodiversity and survival of human communities.

Warren and Agnew (1988, p.3) do not offer a definition of desertification of their own, but say after a review of definitions: The definitions do not distinguish between desertification (conversion to a desert) and processes that diminish rather than eliminate productivity without necessarily producing deserts, namely land degradation. They take desertification in a very literal sense as a process that should lead to simulated deserts. Thus, in their own concept, they see waterlogging from over-irrigation, bush encroachment or increasing unpalatable species in rangelands not as desertification, but as degradation. They also argue that sparser vegetation, i.e. lower biological productivity, can sometimes be more nutritive and desirable for livestock than more biologically productive vegetation, thus productivity itself is not a valid indicator. It is their view that desertification must cause permanent degradation and that vegetation resiliency means that vegetation degradation must be very serious to be an indicator of desertification.

These, and other criticisms that were made prompted the UN to reconsider the official definition of desertification. An ad-hoc consultative meeting of experts convened in 1990 decided that there was no point in distinguishing desertification from land degradation in the drylands, as this only confused the whole problem. What was of primary concern was the fact that land was degrading and producing less food and commercial output, resulting in increased hardship, poverty and migration. Whether land actually ended up looking like a desert was immaterial and not of relevance to the socio-economic questions, and these technical squabbles were diverting attention from the real issues at stake. The definition arising from this concept was:

Desertification/land degradation, in the context of assessment, is land degradation in arid, semi-arid and dry sub-humid areas resulting from adverse human impact.

Land in this concept includes soil and local water resources, land surface, and vegetation and crops. Degradation implies reduction of resource

potential by one or a combination of processes acting on the land.

These processes include: water erosion, wind erosion and sedimentation by those agents, long-term reduction in the amount or diversity of natural vegetation, where relevant, and salinization and sodication (UNEP, 1991). Furthermore, after many debates during the preparations for the 1992 UN Conference on Environment and Development (UNCED), climatic variations were added to human impact as contributing causes in the definition. All participating governments approved Agenda 21, which defines desertification as:

----- land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Drylands had previously been implicitly arid, semi-arid, and dry sub-humid, using an adaptation of the Thornthwaite moisture index of the ratio of precipitation to potential evapotranspiration (UNEP, 1991, P.9).

Hyper - arid	< 0.65
Arid	0.05 - 0.20
Semi-arid	0.21 - 0.50
Dry sub-humid	0.51 - 0.65
Moist sub-humid	> 0.65

Hyper - arid areas are considered to be unproductive land, except in very small favourable patches, and are therefore not included in measurements of desertification. In spite of the fact that international community formally accepted at the UNCED the recommendation of a group of dryland experts to include vegetation as an important indicator of land degradation, some still do not accept the new definition and wish to distinguish desertification from land degradation as something unique (Thomas and Middleton, 1994). This posture, according to this paper, may still perpetuate the controversy about desertification.

Desertification is best seen as land degradation taking place in the drylands as defined above, following the same principles and processes as those seen in other eco-climatic zones (Stiles, 1995). It is a cluster of processes which can fluctuate, with periods of regeneration, and it is only irreversible economically in its mid to later stages. Its nature and causes will be particular to any given situation, depending on the natural ecosystem variables and history of land use. It is normally a very slow process and thus can be assessed only over decades of observation, not years. It is rarely ecologically irreversible though, natural regeneration would only occur from a severe state, either in the absence of human pressure or under exceptionally good management practices. It is nothing mysterious and singular, and the term is more of a political symbol than a scientific expression (op. cit.).

EXAMINING THE FACTS: THE CRITICS FURTHER POINTS OF VIEW

During the 1970s and early 1980s, a devastating drought affected the Sahel. Satellite images showed clearly the altered vegetation patterns; talk grew of "expanding desert" and "marching sand dunes" (Cardy, 1994). Closer scientific inspection revealed that

much of the vegetation change reflected water shortage, not permanent loss of soil fertility or land degradation. Loss of productivity of the land is the issue that causes concern for so many millions of people, and it is the impact on people being forced to abandon their land that is central to this issue.

Much argument centered on the definition and nature of desertification and what could be done about it. Further difficulty and confusion arose because of inconsistencies in the scientific and technical information resulting from different and changing definitional bases. In an attempt to get away from the contentious word altogether, UNEP redefined desertification as land degradation in the drylands resulting from human actions (op. cit.).

Land degradation or loss of soil productivity, however, are not attention grabbing titles. Some also interpreted this definition as an allocation of blame rather than a window of opportunity for effective remedial action.

Since the general view for some decades now is that desertification is occurring, and recent development contesting the reality of its existence is gradually evolving, some of the critics' view points will only be further considered in this section.

Hellden (1994) has reported that desertification in the Sudan has been studied by a team of geographers, combining remote sensing techniques, extensive field observations, observations reported from the previous century, national statistics and spatial modelling at the University of Lund, Sweden since the end of the 1970s. Altogether, several hundred thousand square kilometres have been repeatedly observed by means of high resolution satellite data combined with repeated field surveys.

He observed that none of the studies could verify any creation of long-lasting desert-like conditions corresponding to the magnitude described by many authors in the Sudan between 1962 and 1984. There was no trend in the creation or possible growth of desert patches around 103 examined villages and water holes. No major shifts in the northern cultivation limit, major sand dune transformations or Sahara desert encroachment could be identified; nor could any major changes in vegetation cover and crop productivity which could not be explained by varying rainfall characteristics found. There was a severe impact on crop yield during the 1968 - 1974 Sahelian drought followed by a significant recovery as soon as the rains returned.

Recent studies concerning the data series up to 1991 confirm these results. So the studies based on environmental data sets forming up to 20 - 30 years time series, indicate that most of the negative and positive annual deviations from the mean annual production of the major natural and rain-fed agricultural production systems of the Sudan can be explained by climatic variations without having to consider man's possibly adverse impact on the environment.

Meteorological satellite observations have thrown serious doubt (the report pointed out) on the validity of statements claiming that permanent shifts in vegetation zones have occurred on the south side of the Sahara as the result of desertification.

In 1990 an international expert meeting on the subject of natural desertification and human - induced

land degradation was held at Vrends Slotf, Sweden. It concluded in summary:

- The variation in estimates does not even make it possible to raise the question of what has happened on a global scale within the last 20 - 30 years.
- The available data, although unreliable, do not support the common belief that agricultural systems in the Sahel are near collapse. Frequent statements on rapid and large - scale desert encroachment cannot be substantiated.
- So far there have been no international or local efforts to monitor and document desertification through repeated observation, physical measurements, and analysis of primary data on a national or regional scale in the Sahel.
- A few usable data sets do exist, representing different environments and areas of varying size in a number of African drylands. These do not confirm the hypothesis of a secular mainly human made trend towards desert-like conditions.
- Our present knowledge is inadequate to formulate policies for socio-economic changes in Africa in the name of desertification.

The report concluded that, as long as the effects of desertification in Africa and elsewhere are not documented according to scientific standards, there is an obvious risk that the desertification issue will become a political and "development" fiction rather than a scientific fact. Anti-desertification measures and land rehabilitation development projects can only be successful if based on a correct diagnosis.

Some authors, (Olsson, 1985, 1993a; Thomas and Middleton, 1994; Warren and Agnew, 1988; Hellden, 1984, 1988, 1991) have accused the UN, and UNEP in particular, of promoting a misleading image of desertification as the advancing desert. This school of thought has further stated that the UN desertification assessments (UN, 1977; UNEP, 1984, 1991) were made with inadequate data and that they have exaggerated and misrepresented the extent and nature of the desertification problem. They have criticized the UN data as lacking in evidence on the rate and extent of desertification; stating further that inaccurate statistics have led to a false appreciation of the problem, which has resulted in inappropriate action. Their major criticisms can be reduced to: a widely quoted figure of desert advance of an average of 5.5 kilometers a year southward; the UN statistics of the rate and extent of desertification, and the definition and characterization of desertification (e.g. that desertification is land degradation, and that vegetation degradation should not be included as an indicator of desertification.)

On the inaccurate statistics issue, Wellens and Millington (1993, P. 251) have made a statement which tends to reflect this, to the effect that the data they adopted from a survey carried out by Mabbutt (1984) for the UNDP to determine the spatial distribution of desertification are estimates based on questionnaire surveys sent to national governments and not on field measurements.

On the issue of not including vegetation degradation as an indicator of desertification, this has

generated considerable debate between the "positive and negative groups". Thomas (1993), a member of the latter group claims that since vegetation degradation should not be assessed as a desertification indicator, the problem is much smaller in extent than UNEP presents it. This question is a very complicated one as it involves concepts of vegetation resiliency regeneration, social versus biological standards of vegetation productivity, and so on.

The positive group claims that this author overlooks the fact that biomass provides over 90% of household energy and construction material in most dryland rural areas. Wild plants, they say, are also sources of medicines, food, ritual objects and raw materials for utensils.

The critics' view also ignores the question of undesirable species increase. The importance of vegetation for soil conservation and livestock production is well known. The fact that vegetation can regrow is no reason to ignore the grave socio-economic consequences of vegetation degradation. The fact that vegetation change can occur without concurrent soil changes can also be questioned.

The proponents or supporters of desertification also opine that, what few people seem to realize, is that the current and historically recent (i.e. the past 50 years) observations are not the complete picture when assessing land degradation. The zero point to start measuring change is not 30 or 50 year ago; it is the time from which people started using an area of land. When viewed in this context, assessments of land resiliency, regeneration, dryland robustness and so on will become more balanced.

CONCLUSION AND RECOMMENDATIONS

In 1977 after the United Nations Conference on Desertification and its plan of Action to Combat desertification, the governments of the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil in 1992, negotiated an international definition of desertification and defined a programme to address it.

However, an exciting debate has developed between two schools of thought on the existence of the desertification phenomenon; with the critics arguing that desertification is a myth and is not occurring, while the "positive group" upholds the reality of the phenomenon.

The most contentious issue, is the definition and characterization of desertification as to whether is land degradation or not; and whether the assessment of vegetation degradation should be an indicator of desertification.

A non - unified definition of concept of desertification may imply lack of proper identification, articulation, and perception and focus for the assessment of the problems for solution. This apparently misconception of views has started manifesting itself negatively on the social circle. For example, (LO, 1994) has observed that desertification gets less respect from the West than it deserves. In many circles there is a persistent refusal to recognize its global impact and a belief that its magnitude is exaggerated, or non-existent.

Both the public and decision-makers continue to confuse desertification with expanding deserts. This

misunderstanding tends to reduce the phenomenon to its physical dimensions and fails to take into account such social and economic effects as lower agricultural returns and increasing poverty. All the definitions and arguments so far advanced to illustrate the global nature of the effects of the problem, the links between it and such phenomenon as climate change, or decreasing biodiversity, and the serious implications for agricultural production, have done little to alter opinion in the West. This has placed the world in a dilemma about the reality of this phenomenon and the effective strategies to adopt in combating it if it does exist. The paper on this basis therefore suggests a unity of purpose amongst researchers in accepting common concept (e.g "environmental modification") in the quest for knowledge in this desertification saga for sustainable development of our global environment.

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