Combating Desertification, Land Degradation and Climate Change: Management of Drylands

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By

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About the Author

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Dr. Chouhan has participated in number of International Conferences and Presented Research Paper and Chaired the Technical Sessions. He has visited Brazil, Morocco, Saudi Arabia, Tunisia, Argentina, Germany and France etc.

Dr. Chouhan has worked intensively on the following project:

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(ii) Desert Eco System in India (UNESCO Project Encyclopaedia of Life Support System).


He has also completed one UGC major Research Project on “Geo-informatics for Combating Land Degradation and Desertification in fragile Aravalli foothills eco system of Rajasthan”.

He has to his credit more than 70 research papers published in reputed journals in India and abroad and is the author of more than two dozen well acclaimed books. He has been guiding research work for the last more than two decades and supervised more than fifty doctoral theses.

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Dr. Chouhan holds the membership of various International, National and Regional Academic Societies contributing in most valuable manner.
It is generally believed that desertification and land degradation are primarily due to misuse and degradation of natural resources by human-induced efforts and their domesticated animals in arid, semi-arid and dry sub-humid regions of the world. There are, however, two conflicting views on the subject of trends towards increasing aridity. According to the first view, the era of long period droughts as a consequential impact is likely to further worsen the situation. This hypothesis is based on the expansion of the cold air from the polar zones, which has caused equatorword shifting of the major high-pressure belts that limits the advances of the Inter-tropical front from the equatorial regions. The second aspect, to which most biologists and agriculturalists now subscribe, that desert expansion in recent years has been entirely due to human interference with the ecosystem.

The world is presently facing two severe problems, viz., decrease in the productivity as the resultant impact of desertification and land degradation and its feared impact on reduction of food production. The other problem is the unchecked growth of population. The production of food/grains increases slower than the increase in the population as the present trend reveals and its further acceleration due to desertification and land degradation could result in devastation. Therefore, the problem needs to be addressed in the earnest manner to avoid hue and cry for food and survival of the humanity. The social and human dimensions of desertification are equally relevant with stress on physical degradation and resultant social changes as impact.

Efforts made by the international agencies and country governments to arrest the problem could not yield requisite success due to various reasons explained in the book implicitly and explicitly. The situation highlighted through the publication is evident that about 40% of the global land is arid, semi-arid and dry sub-humid, which is severely prone to desertification and land degradation and the population inhabited in such regions is more than 47% of the total world population. Although the arid, semi-arid and dry sub-humid regions respectively cover 12%, 18% and 10% of the global area but the inter-continental and inter countries variations significantly very. Further the specific situations need specific treatment of the problem keeping in view the geo-physical and climatic conditions. The citations given in the book reveal that there
cannot be a single universal system of combating desertification and land degradation problems. The efforts made by international and country governments for replication of success stories of one region to other parts could not yield similar results as no efforts could be made to assess the local acceptability of area and the people. The lessons need to be learnt, as the process of combating desertification is cost-effective and time-consuming.

Many International agencies and developed countries have come forward for helping the developing and underdeveloped countries for treatment of the problems. Technical and financial assistance has been liberally provided but the results could not be visible in view of various factors. The major factor for unsuccessful or insignificant success was lack of awareness generation among the people and their active association in formulation and implementation of programmes. There is necessity to learn lessons from the past and more in right perspective as the people in dryland areas are facing severe problems and have no courage to wait for further duration in view of faulty implementation process.

Desertification and land degradation are inversely related to poverty and recurrent droughts are the resultant impacts responsible to worsen the situation. The assistance for facing the drought-hit population is human cause for survival of the people but the affected countries need to develop conditions to face their problems as assistance is not the ultimate remedy of the problem. This adversely affects the developmental efforts of the country governments and the primary need becomes to save the affected population. The examples quoted are lessons to initiate remedial measures to save the fertility of the land and survival of vegetative cover. The climatic surfaces of the dryland areas need to be focused on aridity determination with potential impact of climatic variations on desertification. The mitigation measures of droughts need to be incorporated in the context as these have significant impact on the nature and dynamics of vegetation growth and resilience in the drylands.

The population growth in dryland regions is alarming which hampers the efforts of developmental process as the growth of net domestic product is mitigated by the population growth. The measures suggested for combating desertification and land degradation need to be applied keeping in view of the areas-specific conditions. There is an urgent need for developing political will to implement the suggested measures in a well defined timeframe.

Water management is the prime necessity in dryland regions as water is very scarce. Study of water resources of dryland areas is very relevant and this needs to be taken as an indicator of social and economic situation of the people of these area; Positive and negative impacts of desertification need to be assessed with stocktaking the impact of
combating measures for changes in the dryland areas. The national
governments need to derive strategy for efficient water management
available from rainfall and underground sources. There is necessity to
enforce the measures for water saving devices as well as adoption of
suitable cropping management for specific regions. Adoption of
biotechnology is the ultimate answer to solve various problems of land
degradation.

The cultivators of the dryland areas are very knowledgeable of the
problems, but they possess traditional practices. Their knowledge need to
be equipped with technological support as this is the best mode of
application of requisite measures. Every national and local government
need to develop its own research system and feasibility studies need to
incorporate the cultivators, as their experiences are quite relevant. This
can help in developing extension efforts for encouraging sustainable
development of dryland areas.

The book is useful for the country governments, planners,
geographers and agronomists, and ultimately to the ordinary people who
are the victim of the problems. The publication is the signpost pointing
towards the exit from the trap. The future of the human species will
depend upon whether or not the advice is taken.

J. K. JAIN

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The term “desertification” was employed in 1949 by the French forester Aubreville, who used the term to refer to the displacement of tropical rain-forest by secondary savannah and scrub in those parts of Africa, where forest was being cleared and burned to provide land for cultivation (WMO-UNEP, 1996). Aubreville concluded that the process was especially active in the sub-humid tropics of Africa and was akin to the creation of deserts in the formerly forested areas. The extent of accelerated soil erosion induced by indiscriminate felling of forests and woodlands in Africa and changes in the soil-water budget and hydrological cycle were understood as some of the factors leading to land degradation. There was also a growing recognition of the part played by human activities and climate changes such as prolonged and frequent droughts aggravating land degradation This led to formally defining desertification as “land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities” (UNCED, 1992), which is used as the basis of the UNCCD.

Desertification and land degradation are admittedly impressive terms and have an unusual relationship. This is a worldwide problem but in view of its very slow effect, very insignificant attention is paid especially in developing countries. The people living in the affected areas are facing various problems and recurrent droughts are the resultant impact, causing misery to humans, livestock and environmental deterioration. Declining productivity, combined with world population expansion, fluctuations in climate and increasing encroachment on productive lands by roads and cities during drought period constitute an alarming threat to the global life support system. In addition, there are social and human dimensions of desertification, the physical degradation and social change.

Desertification directly affects and puts at risk the livelihoods of more than one billion people, who are directly dependent on land for their survival. Desertification is the degradation of productive land with variable impacts over drylands in the form of droughts, and in irrigated areas as water-logging, salinity and alkalinity. The intensity of the problem lies in the fact that on one side the productivity of land is decreasing constantly and on the other side the population growth is alarmingly high. Main problematic areas are the world’s drylands including the Savannas of Africa, the Great Plains and the Pampas of the Americas, the steppes of Asia, the outback of Australia and the margins of the Mediterranean. Desertification is occurring to such a degree that some lands can no longer sustain life.

Drylands of today, have been central in the evolution of humankind. These are the lands that sustained our transition from hunting to pastoralism and agriculture. They still provide much of our grain and livestock and provide the habitat that supports most of the remaining big game animals. They also support a burgeoning human population, but with increasing insecurity as the available land per capita diminish. In this sense, the world is proceeding on the path of destruction and alarms for immediate corrective measures to rectify the problem until it is too late.
Desertification and land degradation affect mainly the arid and semi-arid areas of the earth, but though it may be accelerated by droughts and famines, it is rarely caused by it. On the contrary, their causes are man-made. Desertification is a symptom of the disease of under-development. It results from the combination of social and economic factors, including overgrazing, deforestation, expansion of intensive cash cropping on the marginal land more suitable for pastoralism, poor management of boreholes to water stock and the settling of previously nomadic people, nature and dynamics of vegetation growth and resilience in the drylands.

Desertification also tends to occur more commonly in semi-arid than in arid areas. When rainfall is at least moderately reliable, the desperation to grow more food is higher; and when the ground cover begins to disappear, rains may be heavy and frequent enough to do real damage to the exposed topsoil. The natural causes of desertification and land degradation are eminent and no efforts can succeed on natural disasters. However, the intensity of severity can be minimized with sincere efforts. Human induced effects are very severe, even more than natural hazards; the stoppage of further deterioration is the immediate action to be taken by the human beings, societies, national and local governments. The measures to combat desertification are cost effective and require planned efforts. The on-site and off-site economics need to be ascertained and economic impact and relationship with desertification are the relevant factors of application mode.

The causes of desertification and land degradation cannot be generalized as the reasons for each area are certainly different, but the general issues, which are common in all the regions, need to be addressed with international, national and local efforts. Desertified land can recover, provided enough good soil remains in place and provided local climates have not changed too radically, the land recovers slowly. Once the process to recover is initiated, the impact starts regaining the fertility and ecology.

Therefore, desertification and land degradation need to be understood through various facets, like the causes and severity of the problem particularly in different areas of the world, the natural and manmade reasons for the problem. Unless the problem is not understood fully, further course of actions is completely futile. The second part of the problem is stoppage of the problems identified for each area and making all out efforts at all the levels stalling from the people at gross root upto the international levels. The third and ultimate issue is rectification of the problems to make the world prosperous.

Desertification is a complex phenomena resulting from the factors of physical, biological, socio-economic, cultural and political nature. Desertification is not confined to the desert areas of the arid region, but relates to the land degradation in significant area falling within the arid, semi-arid and dry sub-humid regions. Land degradation has a direct impact on land and other natural resources, which results in reduced agricultural productivity, loss of bio-diversity and vegetation cover, decline in groundwater and availability of water in the affected regions. All these lead to a decline in the quality of life, eventually affecting the socio-economic status of the region. About 40% of the total global land is degraded in some form or the other.
and the problems of land degradation have reached serious proportions threatening the very existence of the people.

United Nations Convention to Combat Desertification (UNCCD) was adopted on 17th June 1994, which stressed the need for integrated efforts and long term strategies on cross-sectoral issues such as environmental conservation, agricultural productivity, sustainable energy and fodder production and use, efficient management of land, water and other natural resources, developmental activities for the local communities to improve their living standards. The UNCCD has provided a platform for addressing these issues in the global context. The study of water in dryland areas is the need of time. For assessment of the impact of combating measures of desertification need to incorporate social and economic indicators to assess and monitor changes in the dryland areas.

The International Organizations have yielded in alarming the world community to take suitable measures including technological and financial assistance for combating the desertification, but the ultimate approach is to be formed by the national governments keeping in view the local conditions as neither common yardstick can be framed and nor it is applicable in every part of the world. The climatic conditions and area specific situations need to be kept in view while formulating any strategy by national or local governments for combating the desertification and land degradation.

Efforts have been made to site various examples of applications and it is an accepted fact that the success stories of one region cannot be applied in similar manner in other parts of the world, without suitable changes in view of area specific conditions and without taking whole hearted support of the local community in view of their socio-economic situations. Therefore, country governments are required to formulate suitable action plans by associating their own experts of all related disciplines and the people who are facing the problems as well as well aware with the implementation strategy for their own benefits.

Combating desertification and land degradation is a costly process and requires reasonable time to rectify the situations. The people of the area especially the cultivators are well conversed with the situations their traditional knowledge need to be upgraded with technological developments relevant to area and such practices for combating desertification are the best way to initiate the process. There is also necessity of concurrent evaluation with the flexible approach to rectify the practices for further development.

There is need for intensive and extensive research to evolve strategy for reversal of the course of desertification through feasibility studies. The technical know-how relevant to local area can encourage people for sustainable management of drylands. It is therefore, necessary to take the earnest efforts for combating desertification for the well-being of the mankind keeping in view the present and future, where the world is likely to face serious challenges of population increase.

T. S. Chouhan
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I am thankful to our colleagues for inspiring us for initiating the tedious task and express our gratitude for encouraging us in one way or the other to publish this book.

I shall be failing in my duty, if I do not express my sincere thanks to my wife Vidhya Chouhan, who strived hard during preparation of this publication.

T. S. Chouhan
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