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SOCIAL AND ECONOMIC DIMENSIONS OF LAND DEGRADATION AND DESERTIFICATION

Theodoros Iosifides¹ and George Korres²

Abstract: The paper discusses some of the most important social and economic aspects of land degradation and desertification, raising issues related to integrated socio-economic and environmental sustainable development. Although it is widely recognized that social and economic forces, phenomena and policies play a central role in the production and reproduction of desertification problem, most studies analyze and emphasize rather the biophysical aspects and dimensions of desertification and land degradation. This article draws attention to crucial socio-economic forces underlying the problem, such as economic policies, institutional organization, production and market structure, social development, social inequality, poverty and population mobility. Finally, the paper raises the question of an integrative policy framework for mitigating and combating the problems of desertification and land degradation.

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1. Introduction: The Problem of Desertification

This paper concerns a preliminary examination of some of the most crucial social and economic aspects of the problems of land degradation and desertification. It is based on primary findings of an international research program, MEDACTION (Policies for Land Use to Combat Desertification). It also aims at opening up a debate about the issue of direct and indirect policies, which influence those problems. This introductory part starts with an attempt to define the desertification problem and phenomenon taking into account all the dimensions (biophysical and socio-economic) which characterizes it. Emphasis will be given to the political, social and economic processes, which produce, reproduce and affect desertification, on the human and social causes and consequences and on the implications the phenomenon has on human socio-economic organisation and life.

According to the United Nations Convention to Combat Desertification (UNCCD):

(a) “*desertification*” means land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities;

(b) “*combating desertification*” includes activities which are part of the integrated development of land in arid, semi-arid and dry sub-arid areas for sustainable development which are aimed at:

(i) prevention and or reduction of land degradation;

(ii) rehabilitation of partly degraded land; and

(iii) reclamation of desertified land

[...]

(f) “*land degradation*” means reduction or loss, in arid, semi-arid and sub-humid areas, of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as:

(i) soil erosion caused by wind and/or water

(ii) deterioration of the physical, chemical and biological or economic properties of soil; and

(iii) long-term loss of natural vegetation;” (UNCCD 1994: Article 1)

Even by the above relatively technical definition it is clear that the desertification phenomenon is characterised by great complexity and by a very strong interplay between physical-environmental and human factors, which act together, generating the problem. The term “desertification” was introduced by the French ecologist Auberville in 1949 referring to the degraded soils in the Sahel region of Africa (Perez-Trejo 1994). Perez-Trejo (1994) in a European Commission Report on Desertification and Land Degradation in the European Mediterranean offers ten different definitions and orientations of the problem from 1976 to 1992. According to the last three definitions desertification is:

“- the process of desert advancement in the savannah area as a consequence of the recurrence of rainless years and increasing anthropic pressure on the

land resources. The term has now been extended to any kind of soil and/or land degradation process leading to a more or less irreversible state of unsuitability to sustain vegetation growth (Chisci, 1990).

- the degradation of ecosystems in semi-arid or arid regions, degeneration usually being measured in loss of primary productivity and/or species diversity (Barrow, 1991)

- the degradation of land in arid, semi-arid and dry sub-humid areas resulting mainly from adverse human impact (UNEP 1991)...” (Perez-Trejo 1994: 9)

The same author notes that from the evolution of the definitions of the desertification phenomenon it is evident that the emphasis is given on human activity and socio-economic processes as the principal causes possibly aggravated by natural climatic conditions. Generally the main symptoms of desertified and degraded land and ecosystems are reduction of yield and crop failure in irrigated or rainfed farmland, general and gradual reduction of cropland and soil productivity, reduction of perennial or woody biomass, reduction of the availability of water, soil erosion, chemical degradation of soil, salinization, sodification and acidification of soils and water, increasing flooding, sedimentation of water bodies and disruption of social life due to deterioration of life-support systems (Drenge et al 1991 in Perez-Trejo 1994, GCAD 2000). Tables 1,2 and 3 illustrate the main classification criteria of desertification, desertification class and the desertification of arid lands, respectively.

Table 1: Desertification Criteria

Map Classification	Percent of Area in Various Desertification Categories
Slight Desertification	> 50 % of area in slight category < 20 % in severe category < 10 % in very severe category
Moderate Desertification	> 50 % in slight category < 30 % in severe and very severe category
Severe Desertification	> 30 % of area in severe category 0 - 30 % in area in very severe category
Very Severe Desertification	> 30 % of area in very severe category

Source: Data available at UNEP and UNCTAD

Table 2: Desertification Class

Desertification Class	Desertification Class	Percent of Arid Lands
Slight	24,520,000	52.1
Moderate	13,770,000	29.2
Severe	8,700,000	18.5
Very Severe	73,000	0.2
Total	47,063,000	100.0

Source: Data available at UNEP and UNCTAD

Table 3: Desertification of Arid Lands of Area Affected

Desertification Class	Desert Class	(%) of Arid Lands	Desert Class	(%) of Arid Lands	Desert Class	(%) of Arid Lands
Slight	12,430,000	71.7	7,980,000	50.9	2,330,000	36.6
Moderate	1,870,000	10.8	4,480,000	28.6	3,150,000	55.2
Severe	3,030,000	17.5	3,120,000	20.5	520,000	8.2
Total	17,330,000	100.0	15,670,000	100.0	6,360,000	100.0

Source: Data available at UNEP and UNCTAD

The underlying causes of the phenomenon of desertification are directly related to human activities, human pressures on the environment and resources, social, economic and productive organisation and practice and unsustainable ways of producing, using of natural resources and living. The overexploitation of land and water resources, excessive irrigation, deforestation, urban development, the development of tourism etc. are only some of the human activities and practices which derive from deeper political and socio-economic causes and processes, that lead to unsustainable forms and types of development.

Land degradation and desertification in a broad sense are social problems mainly because the idea and practice of appropriation and use of land are socially constructed. Thus, considerations about land and soil productivity and capacity, land use, cultivation, sustainable development etc. are the products of the process of human-nature interaction (Blaikie and Brookfield 1987). The themes of social and economic organisation, social integration, inequality and social policy and their relations to the production and reproduction of land degradation and desertification are discussed further in the next part of the present report, where they intermingle with the theoretical framework of sustainability and sustainable development. Here we briefly relate some of the most crucial socio-economic phenomena and processes to the desertification problem. This relation presents in an integrated way the interplay between underlying factors, driving forces, causes, consequences and implications of the human-nature interaction regarding desertification and land degradation.

Desertification Processes

Desertification is seen as being related to and interacting with two other phenomena (UNEP 1991):

- “desert expansion and contraction” which is the observed (via satellite), natural, cyclic oscillations of vegetation productivity at desert fringes, and
- drought (the natural periodic scarcity of water).

Another significant item in the current UNCOD definition of desertification listed above is the idea of "land degradation." UNCOD defined land degradation as follows: “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 1992).

The population-supporting capacity of the land, based on livestock and crop products, was evaluated for different input levels for the years 1975 and 2000. The results of this evaluation indicate that, taken as a whole in the five regions considered, the area of potential rain-fed cropland is liable to be reduced by 18%. Rain-fed crop

production potential could be reduced by 29 %. Currently productive land could be degraded to marginally productive land. The overall loss in production from rain-fed crops and grassland over the five regions is estimated at 19%. The situation is particularly severe in desert-prone regions of Africa, largely dependent on rain-fed production and in South America (FAO, 1977). Tables 4 and 5 indicating the areas affected by desertification, whereas Figure 1 illustrates main causes of dryland soil degradation by region.

Table 4. Area of regions affected by or in danger of desertification

Degree of Desertification risk	South America		North and Central Africa		Asia		Australia		Europe			
	Km ²	%	km ²	%	km ²	%	km ²	%	km ²	%		
Very high	414195	2.3	163191	0.7	1725165	5.7	790312	1.8	307732	4.0	48957	0.5
High	1261235	7.1	1312524	5.4	4910503	16.2	7253464	16.5	1722056	22.4	-	-
Moderate	1602383	9.0	2854293	11.8	3740966	12.3	5607563	12.8	3712213	48.3	189612	1.8
Extreme desert	200492	1.1	32638	0.16	177956	20.4	1580624	3.6	-	-	-	-

Source: FAO and Unesco, World Map of Desertification, 1988.

Table 5. Areas likely to be affected by desertification (classified by bioclimatic zone)

Degree of Desertification risk	Hyper-arid		Arid		Semi-arid		Sub-humid	
	km ²	%	km ²	%	km ²	%	km ²	%
Very high	-		1110477	6.4	2180546	12.1	158528	1.2
High	-		13439968	77.3	2440098	13.6	579717	4.3
Moderate	-		2105167	12.1	12452272	69.4	3172905	23.3
Extreme existing Desert	7991710		16655612		17072916		3911150	

Source: FAO and Unesco, World map of desertification, 1988.

2. Economic Aspects of Desertification and Land Degradation

Low productivity of the resource base in the dry zones, coupled with fluctuations in yield, due to low and erratic precipitation, has tended to discourage investment and the development of scientific inputs to conserve and develop the productivity of low rainfall areas. Whereas the argument for giving priority to allocation of development funds to the more productive areas may seem to be justified in terms of bank criteria, such policies, where adopted, have set in motion a vicious circle whereby lack of adequate investment (financial and technological) perpetuates retrogressive management and an anemic economy in low rainfall areas, because of the degradation of natural resources.

Even from an economic viewpoint, the validity of this option is doubtful. Concentration on more productive areas has most often been synonymous with concentration on cash crops, for which dry areas are generally ill suited. The resulting distortion, in terms of insufficient foodcrop production, has had severe economic as well as social consequences in many parts of the dry region. Treatment of these areas as anti-priorities, and hence areas to be neglected when establishing priorities for *development*, has accentuated *socio-economic disparity* within the rural sector itself, between "favourable" and "less favourable" land areas and their populations and generated disruptive pressures. It has prevented the low rainfall areas and their people from making a greater contribution to, as well as benefiting from, overall economic and social progress (FAO 1991).

There are, however, valid economic possibilities for return on investment. For instance, if crop production is integrated with livestock, then low yields in crops could be partly offset by income from livestock products. With further integration of crops, livestock, forestry, wildlife, cottage industries, etc., investment possibilities are more likely to move from "marginality" to profitability. Desertification stems from complex socio-economic-environmental problems requiring integrated multi-disciplinary approaches and action programmes to solve them. A number of common constraints inhibit effective remedial action and need priority attention in the course of determining practical physical means to combat desertification (FAO 1992). Major constraints are:

- lack of econometric models to analyse the efficiency of alternative production systems;
- insufficient knowledge of economic gains, direct benefits and costs, opportunity costs and externalities;
- under-exploitation, in many instances, of cash economies in rural communities;
- insufficient knowledge of marketing opportunities that are external to rural communities;
- lack of institutional arrangements by which production systems, and particularly agroforestry systems, can be planned, financed and administered;
- insufficient or partially complete planning;
- informing decision-makers and others that in many instances, long periods of protection are needed for noticeable yields and desired results; this is especially the case with agroforestry systems;
- communication and attitudes between technical administrators and rural people;
- legal conflicts, including land tenure;
- education and training, which too often is patterned on "Western models" not suited to arid zones.

Human activities are the main factors triggering desertification processes on vulnerable land. These activities are many and vary by country, society, land use strategies and the technologies applied. The impact of human society does not depend solely on its density. FAO believes that the concepts of "carrying capacity" and "critical threshold" need to be considered with care, as many examples demonstrate that these criteria can evolve according to the strategies and technologies applied by local people (FAO 1992). Some of the human activities that can cause desertification are:

- cultivation of soils that are fragile, or exposed to erosion by wind or water;
- reduction in the fallow period of soils, and lack of organic or mineral fertilizers;
- overgrazing - often selectively - of shrubs, herbs and grasses;
- overexploitation of woody resources, in particular for fuelwood;
- uncontrolled use of fire for regenerating pasture, for hunting, for agricultural clearing, or for settling certain social conflicts;
- agricultural practices that destroy the soil structure, especially the use of unsuitable agricultural machinery;
- agricultural practices that result in the net export of soil nutrients, leading to loss of the soil fertility, such as cash-cropping;
- diversion of rivers to create irrigation schemes; or
- irrigation of soils prone to salinization, alkalization or even waterlogging.
- All these activities derive from two root causes. The first five are typical of poverty and underdevelopment, while the rest result from "modern" development that disregards the impact of the technologies used on land sustainability.

Factors typical of the first category include:

- undernourishment or malnutrition, leading to physical weakness and vulnerability to disease;
- no access to credit, thus preventing any chance of investment in tools, seeds or fertilizers;
- limited access to basic schooling and technical training;
- a search for short-term survival strategies (e.g. annual or seasonal migration);
- the lack of any framework to support rural communities with technical advice, infrastructure, access to energy, training, organization of barter exchanges or market access; and
- the lack of basic security.

The second category includes factors such as:

- the search for immediate results through increased production;
- international competition and unfavourable terms of exchange between primary products (particularly agricultural) and manufactured goods; and
- insufficient knowledge of the long-term consequences of applying particular technologies.

3. Social Aspects of Desertification and Land Degradation

We briefly examine the relation between desertification and land degradation, and social demography and population dynamics, social inequality and poverty, resource management at the local and supra-local level, migration, population mobility and urban development, forms of socio-economic development (especially rural development within the framework of urban-rural dynamics) and some more general aspects of social development and integration. For a selection of social indicators related to sustainable development see Table 3.

Social Demography and Population Dynamics

The common perception or common logic on the relation between population dynamics and land degradation/desertification is that population pressures lead to the intensification and exacerbation of the problem. Indeed research findings and evidence from several developing countries (Costa Rica, Pakistan and Uganda) support this notion (UNRISD 1994). Nevertheless in many cases land degradation and desertification occur in geographical areas with limited population pressures. Furthermore periods of population decline coincide with the exacerbation of the problem (Blaikie and Brookfield 1987). These observations show that the relation between population dynamics and pressures and desertification is complex and non-linear and that always other contributing factors (socio-economic and natural) must be taken into account (Perez-Trejo 1994).

High absolute population numbers in an area or population increase does not necessarily lead to land degradation and desertification. What is more important is the combination of the sensitivity and fragility of land, of the rate of population increase and of other crucial contributing factors and driving forces such as land use and settlements patterns, social and economic conditions and organisation of production, cultivation practices etc. (UNEP 1992, Perez-Trejo 1994). Thus there seems to be no simple and clear causal connection between population growth and pressure and desertification or a stable and static “carrying capacity” of land beyond of which the problem starts to worsen. According to UNEP:

“ ...population density is but one socio-economic factor that affects the propensity of a society to degrade the environment, with for example, the levels of technology available being another. A further complicating factor, preventing simple population – degradation relationships being deduced, is environmental variability. For example, similar population densities and land - use histories can lead to very different problems and severities of degradation if, for example, soil types are dissimilar, due to differences of vulnerability and resilience.” (UNEP 1992: 108).

The relative absence of a direct causal relationship between population pressure and desertification must not lead to the demise of this factor as a strong driving force towards land and environmental degradation. This is because, in a series of cases and with the combination of other physical, social and economic factors, population pressure may be the catalyst for the intensification and severity of the problem of land degradation. Some of these cases are for example, the following:

- Population pressures in combination with lack of access to the means of production innovations exacerbate the problem especially in ecologically or economically marginal areas (Blaikie and Brookfield 1987).
- In environments of a specific type of production organisation, population abundance may lead to production intensification and unsustainable cultivation practices (Blaikie and Brookfield 1987).
- Excess population growth may lead to poverty increase, which is another strong underlying factor behind land degradation and desertification.
- Population growth and concentration must also be seen within the framework of urban-rural dynamics and balance. Rural outmigration, concentration of population in urban and metropolitan centers, rapid urban and industrial growth

and rising demand for food and agricultural production lead, in many cases in intensification and unsustainable cultivation and agricultural practices.

- Furthermore the complete commercialization of agriculture in combination with global competitive pressures may lead to intensification of production, outward migration to urban areas, higher dependence on mechanization, agrochemicals and fertilizers and to increasing rates of soil degradation (Perez-Trejo 1994).

The phenomenon of social inequality and poverty and especially rural poverty lies at the heart of the debate about the relation between social processes and land degradation/desertification. Before we analyze the complex relations between poverty and environmental degradation it is important to define and conceptualize some of the more important dimensions of the problem. Poverty can be seen as a phenomenon resulting from social inequality and can be measured in both absolute and relative terms.

“ Absolute poverty is generally taken to mean a condition characterized by severe deprivation of essential needs at a basic level such as nutrition, housing, health services, safe drinking water and sanitation facilities and education.” (UNESCO 1995: 4).

Table 3: Selected Social Indicators for Sustainable Development

GENERAL CATEGORY OF SOCIAL INDICATOR	SOCIAL INDICATOR	DEFINITION	PURPOSE OF MEASUREMENT	RELEVANCE TO SUSTAINABILITY, LAND DEGRADATION AND DESERTIFICATION
Combating Poverty	Unemployment Rate	The ratio of unemployed people to the labor force	The rate measures the part of the labor force which, during the survey reference period, was neither (i) at work nor temporarily absent from work; (ii) available for work; (iii) seeking work	It is useful and relevant to measuring sustainable development, especially if uniformly measured over time, in combination with other indicators. It is one of the main reasons of poverty.
Combating Poverty	Head Count Index of Poverty	The proportion of the population with a standard of living below the poverty line	To enable poverty comparisons, to assess a country's progress in poverty alleviation and/or the evaluation of policies or projects	An integrative viewpoint which simultaneously takes account of development issues, resource use and environmental quality and human welfare must be taken if sustainable progress is to be achieved
Combating Poverty	Poverty Gap Index	The mean over the population of the proportionate poverty gap, where the poverty gap is given by the distance of the poor below the poverty line, as a proportion of the line. The non-poor are counted as having zero poverty gap.	To enable poverty comparisons, to assess a country's progress in poverty alleviation and/or the evaluation of policies or projects	It measures the depth of poverty in a country or region and the degree of non-sustainability in the social sector.
Combating Poverty	Squared Poverty Gap Index	The mean of the squared proportionate poverty gap	To enable poverty comparisons, to assess a country's progress in poverty alleviation and/or the evaluation of policies or projects	This indicator better reflects changes in the severity of poverty in a country or region
Combating Poverty	Gini Index of Income Inequality	A summary measure of the extent to which the actual distribution of income,	Provides a measure of income or resource inequality within a population. It is the	This indicator is particularly relevant to the equity component of sustainable development. Income or resource distribution have direct

		consumption expenditure, or a related variable, differs from a hypothetical distribution in which each person receives an identical share	most popular measure of income inequality	consequences on the poverty rate of a country or region
Combating Poverty	Ratio of the Average Female Wage to the Male Wage	Obtained as a quotient of average wage rates paid to female and male employees at regular intervals for time worked or work done for particular occupations	An assessment of remuneration offered women vis-à-vis their male counterpart to ultimately determine the level of women's participation in the economy	It is a measure of gendered social inequality
Demographic Dynamics	Population Growth Rate	The average annual rate of change of population size during a specified period	It measures the speed of population change	It is a crucial element affecting long-term sustainability. Rapid population growth can place strain on a country's capacity for handling a wide range of issues of economic, social, and environmental significance, particularly when it occurs in conjunction with poverty and lack of access to resources, or unsustainable patterns of production and consumption, or in ecologically vulnerable zones
Demographic Dynamics	Net Migration Rate	Ratio of the difference between the number of in-migrants and out-migrants from a particular area during a specified period to the average population of that area during the period considered	It measures geographical mobility. Migration affects directly the population size in a given area	Net migration is a major force of demographic redistribution. Increases of net migration linked to a loss of livelihood can be a symptom of unsustainability. Direct and indirect relations of migration with natural conditions in fragile environments
Demographic Dynamics	Total Fertility Rate	The average number of children that would be born to a woman in her lifetime, if she were to pass through her childbearing years experiencing the age specific fertility rates for a given period	It is one of the most commonly used summary indicators of the level of fertility, which is not affected by the age distribution of the population	An imbalance between demographic rates and social, economic and environmental goals, together with unsustainable patterns of production and consumption, has serious implications for sustainable development
Demographic Dynamics	Population Density	The total population size of a country or area divided by its surface area	It measures concentration of a human population in reference to space	Agenda 21 makes specific references to population density in relation to desertification. Higher or growing population density can threaten sustainability of protected forest area and ecologically fragile or marginal land. It also affects rural-urban dynamics and balance.
Demographic Dynamics	Total National Health Expenditure Related to Gross National Product	This indicator is defined as a share of GNP devoted to health expenditure. It includes public and private expenditure	The purpose of the indicator is to measure the proportion of national resources devoted to health	Health and sustainable development are intimately interconnected. This measure provides a first indication of the priorities granted to health as compared to other sectors within the same country
Promoting Education, Public Awareness and Training	Rate of Change of School - Age Population	The average annual rate of change of school-age population size during a specified period	The indicator measures how fast the school age population is changing	Education in general, is critical for promoting sustainable development and improving the capacity of people to participate in decision making to address their full potential. Knowledge of the rate of change of the school-age population assists planning for educational facilities and services at the national and local levels
Promoting Education,	School Life	Estimated average	It can be used to gauge	Limited significance in developed

Public Awareness and Training	Expectancy	number of years a student will remain enrolled in an educational institution	the overall level of development and performance of an educational system	countries but crucial in many developing societies
Promoting Education, Public Awareness and Training	Women Per 100 Men in the Labour Force	Women per hundred men in the labour force	The ratio measures men and women's respective shares in the labour force structure and should not be confused with participation rate	A small women's share, assuming properly designed surveys, indicates non access to education and inequality of opportunity and treatment. Such situations are usually accepted as unsustainable
Promoting Education, Public Awareness and Training	Gross Domestic Product Spent in Education	Education expenditure expressed as a proportion of GDP	The indicator provides a measure of financial resource input into education and its share of national revenue support	Education is critical for achieving awareness, values, skills and behavior consistent with sustainable development, and for effective participation in decision making. Financial resources for education directly determines school capacity and quality, which in turn influences enrollment, retention and learning of children and youth in school.
Protecting and Promoting Human Health	Life Expectancy at Birth	The average number of years that a newborn could expect to live, if he or she were to pass through life subject to the age-specific death rates of a given period	It measures how many years on average a new-born baby is expected to live, given current age-specific mortality risks. Life expectancy at birth is an indicator of mortality conditions and, by proxy, of health conditions	Mortality, with fertility and migration, determines the size of human populations, their composition by age, sex, and ethnicity and their potential for future growth
	National Health Expenditure Devoted to Local Health Care	Proportion of national health expenditure devoted to local primary health care. This is the first-level contact and includes community health-care, health center care, dispensary health, etc, but excludes hospital care	The indicator measures the proportion of resources devoted to primary health care	It is an important element of social care and welfare
Promoting Sustainable Human Settlement Development	Rate of Growth of Urban Population	The average annual rate of change of population living in defined urban areas during a specified period	This indicator measures how fast the size of urban population is changing. It aggregates impacts of natural increase in urban population, net rural-to-urban migration, and increased land area with urban characteristics	When needs of a rapidly growing urban population pose a major challenge for sustainability. Pressure on resources increases with implications for both urban and rural areas
	Percent of Population in Urban Areas	The percentage of total population of a country or area living in areas defined as urban	This indicator is the most commonly used index of the degree of urbanization	The indicator shows the evolution of urban – rural dynamics in a country or region. Urbanisation has implications on the allocation and use resources, demand for agricultural goods, allocation of social policy funds etc. which go beyond the urban areas
	Area and Population of Urban Formal and Informal Settlements	Urban residential area in square kilometers occupied by formal and informal settlements, and the number of their occupants	The indicator measures both the sizes of informal urban settlements and the residential density of both formal and informal Settlements. By focusing on the legality of human settlements, this	In many cases, and especially in developing countries, it reveals rapid internal rural-urban migration

			indicator measures the marginality of human living conditions	
	House Price to Income Ratio	This indicator is defined as a ratio of the median free-market price for a dwelling unit and the median annual household income	It measures housing affordability and provides information on the overall performance of the housing markets	It is a key indicator measuring settlements sustainability and generally living conditions in urban and rural areas
	Infrastructure Expenditure Per Capita	This indicator is defined as the per capita expenditure in US dollars by all levels of government including government-owned companies and utilities, on urban infrastructure services during the current year	The indicator measures the involvement of different levels of government and the private sector in the provision, improvement and maintenance of infrastructure	The relation of the indicator to sustainability is strong. In many cases the indicator shows the trends for land development, urban expansion, rural-urban relations and dynamics and the allocation of infrastructure resources and funds between urban, semi-urban and rural areas

Source: Compiled by the authors. Based on selected data outlined by the United Nations Department for Policy Coordination and Sustainable Development (<http://rojasdatabank.org>)

From this brief discussion and analysis of the role of population dynamics and pressures regarding land degradation and desertification, it becomes quite clear that a necessary component within the mixture of policies and policy measures for combating and reversing the problem, has to be a comprehensive population policy aiming mainly to population decentralization, prevention of internal and rural migration and to a more sustainable balance between rural and urban areas.

Social Inequality and Poverty

In a more complete way Singh and Strickland (1994: 7) give some key definitions and measurement concepts of poverty:

“Poverty line: The minimum level of socially acceptable household consumption, often calculated on the basis of an income two-thirds of which is spent on essential food items at lowest cost.

Absolute poverty: The state in which income falls below the minimum standard of consumption (the poverty line)

Relative poverty: A state of deprivation relative to existing social norms of income and access to social amenities, not necessarily below the poverty line.

Seasonal poverty: Poverty associated with the fluctuation of seasons, often harshest before the first harvest and characterized by food shortages, high prices, hard work and increased illness.

Structural poverty: The state of deprivation which persists over time and which cannot be eliminated without comprehensive long-run expansion of the economy and change in production process.

The “newly poor”: These are direct victims of recession and austerity programs, as well as vulnerable groups pushed into absolute poverty by the interaction between economic problems and reform policies (e.g. social expenditure, consumer pricing).”

Additionally, the poor and especially the rural poor, are characterised, in many cases, by geographical isolation, vulnerability regarded to natural disasters, and socio-economic changes and powerlessness due to limited or no access to a variety of public, private or social goods such as for example, education, health, information, social provision etc. (Singh and Strickland 1994).

Poverty has been seen and analysed as both a causal factor and as a consequence of land degradation and desertification. Again, as for population dynamics and pressure, this factor does not present a clear and linear line of causation with desertification. The links between the two phenomena are more complex and complicated, and show that in the most cases poverty and social deprivation is a mechanism through which other factors lead to degradation (UNEP 1992). These other factors may be institutional mechanisms, policy frameworks and measures or markets. Under different conditions and manifestations of the above factors the poverty-land degradation trends and links may either be exacerbated or mitigated (UNSO 1994).

In the literature on the relation between poverty and degradation one can identify three main lines of argument. The first relates directly the two phenomena in a vicious spiral where the cause of the one is the result of the other and so forth. This view is over simplistic and ignores the series of other contributing factors to the manifestation of both phenomena. For example, this notion emphasizes degradation as the causal factor of poverty, especially in developing countries, leaving aside other important contributing factors e.g. economic policy or structural features. The second line of argument is more realistic and relates the two phenomena indirectly taking into account other factors such as government policy, structures of local markets, institutions, as well as poverty itself. The third approach may be seen as a continuum of the second, as it emphasizes the importance of poverty in accelerating the problem of land degradation and desertification and vice versa where public policy is inappropriate and market and institutional functions are weak (UNSO 1994).

To make the complex links between poverty and land degradation/desertification more specific, we refer to some of the most critical relations, as follows:

- In many cases the poor rely directly on their own limited natural resources and/or complement their income exploiting 'common property resources'.

“ Natural capital that can be assessed without a rental or ownership contract is called a ‘common property resource’ (CPR). Examples of CPRs are woodlands, grazing areas and rivers that can be used by members of the community. A study of rural villages in India found CPRs to account for 14-23% of average household income (Jodha 1992). It is this characteristic of heavy reliance upon natural, capital-based sources of income that typifies many poverty-stricken people.” (UNEP 1992: 155).

- In many circumstances the pressure of human activities on the environment and land increases when poverty leads to the use of more intensified methods of cultivation in areas, which in many cases are, already degraded. Furthermore one must take into account the broader implications of poverty to people, such as lack of access to other valuable resources like education and training, information, health and social provision etc. Lacking these resources and living in conditions of social deprivation, it is very difficult and in many cases impossible to understand, accept, participate and implement environmental-friendly and sustainable development policies and/or practices.
- Another factor worth mentioning, is the association of poverty and poor people with marginality and the implications this phenomenon has for environmental and land degradation. According to United Nations Economic and Social Council

(UNESCO 1995) about 60% of the world's poor live in ecologically fragile and marginal areas because of a combination of socio-economic factors such as expropriation, demographic reasons, intergenerational land fragmentation, privatization of common lands and consolidation and expansion of commercial agriculture with reduced labor inputs.

“Either pushed out or squeezed out of high-potential land, the rural poor have no choice but to over-exploit the marginal resources available to them through low-input, low-productivity agricultural practices – overgrazing, soil-mining and deforestation, with consequence land degradation. Mainly the poor have certainly not caused Land degradation. Logging interests and/or rich farmers with considerable concessions has caused most deforestation. Soil erosion, waterlogging and salinization, which have resulted in desertification in many parts of the world, have been caused by rich farmers with considerable financial support.” (UNESCO 1995: 9).

- One of the many responses of the poor to situations of poverty and social deprivation may be migration to other rural areas or urban centers or change in livelihood strategies with shift of employment from agriculture in other sectors or kinds of employment like petty trade, the service sector, mining, road construction, urban development etc. (UNRISD 1994). The above observations reveal mainly two features. First, that the poor are not always the passive victims of the degradation-poverty spiral. Second that in many cases the responses contribute to land degradation in a ‘new’ and more indirect way. For example rural-rural migration may lead to increases of population pressures in other areas and rural-urban migration may result in higher population concentrations in urban centers, higher demand for food and agricultural products in general and higher pressures for intensification in the agricultural sector.

Resource Management at the Local and Supra-local Level

Directly related to the previous analysis is the issue of resource management in local, regional and wider geographical scales. By resource management we mainly refer to practices of use and allocation of natural resources as inputs to the system of production. More specifically we refer to various cultivation practices and rural resource management for agricultural production.

Resource management and cultivation practices depend on a series of factors of political, economic, social and natural/environmental origins. The social structure as it affects directly the structure of production is one of the most important factors. A social and economic structure characterised of social inequality, deprivation and poverty offers numerous opportunities of unsustainable methods of production and cultivation to prevail. Furthermore in conditions like these the possibility of effective formulation and implementation of environmental friendly policies is limited.

The structure of land ownership is another factor of critical importance. The conception that communal ownership of resources under any conditions leads inevitably to overexploitation and degradation is not supported by empirical evidence. In situations where active participation exists and local institutions are strong

“...empirical work has established that communal resource control can be effectively maintained, and furthermore that it often fulfils an important insurance function by spreading the risks of poor productivity in a given season across the whole community.

Empirical work has also established that, within social and economic structures that encourage land concentration and capital accumulation, private land ownership and unrestricted land markets can be very damaging for the environment. This process is particularly obvious in parts of Latin America, where land accumulation and economic policies can create incentives for speculation and “throw away” patterns of resource exploitation, in which resources are mined for short-term profit. Policies that decrease security for tenure for small farmers have also been implicated for environmental damage. Increasingly large number of people alienated from their land often migrate to areas which may be forested or more ecologically fragile.” (UNRISD 1994: 12).

Furthermore land fragmentation is in many cases a structural feature that leads to more intensified use of land and natural resources caused by low crop yields and low productivity. This feature, very common in developing countries, is a permanent structural characteristic (due to historical and contemporary socio-economic reasons) in countries of North Mediterranean as well e.g. in Greece. To give one example from a developing country, Mexico, the subdivision of land parcels from generation to generation lead to more intense cultivation practices and the cultivation of ecologically sensitive and marginal land (UNEP 1992).

Another crucial factor affecting directly resource management is the existence of a permanent mechanism of environmental education, training and information dissemination associated with satisfactory economic incentives towards sustainable production and development practices. To give but one example, the shift from conventional unsustainable agriculture to organic farming in a rural area, presupposes the combination of local knowledge with special education and training, a system of effective technology transfer and strong economic incentives to overcome initial difficulties and to create or enter a market of organic products in an efficient way.

In an era of globalisation and great interdependence between economies and societies all over the world, local resource management is affected by developments in the regional or global scale, by the structures or fluctuations of the world market, the economic relations between developed and developing countries and the political will in a global scale to formulate and effectively implement agreements and conventions to promote sustainable production and development. Thus, when we examine resource management and practices in local or wider levels, one must take into account the global – local interplay, which determine most of the decisions affecting the human-nature relationship.

Migration, Population Mobility and Urban Development

Migration and population mobility is a very complex phenomenon, which correlates directly or indirectly depending on the specific case, with problems of environmental and land degradation and desertification. Migration can take many forms, two of the most important of which, have to do with the temporal dimension

and the direction of movement. Regarding the temporal dimension of migration we can identify seasonal, semi-permanent and permanent movements. According to direction, migration may be among others, rural-rural, rural-urban, internal or international.

Every different type of migration movement has different implications on issues of land degradation. Migration can be seen as an important driving force for degradation, as a consequence of degradation and desertification and a process helping to combat the problem. These conflicting with each other notions reveal two important elements. First, the complexity of the relation between migration and desertification, which is a relation of non-linear causality. Second, that the functioning of migration movements against or in favor of the environment and sustainability depends on other important factors such as local and regional conditions, urban-rural dynamics, policy framework, socio-economic processes and development etc. More specifically the association between migration and degradation can take several positive and negative forms, some of the most important of which are the following:

- Generally, massive internal migration and extreme urbanization and urban development may result in higher and more persistent pressures for the agricultural sector. Higher demand for agricultural products may increase the pressure on fragile and marginal land or on natural resources. Furthermore urban concentration may increase the political pressure to resist paying higher prices for agricultural products and rural energy or to lead to allocation and reallocation of social and economic resources in favor of the urban sector and away from rural areas (UNSO 1994).
- On the other hand rural emigration means considerable change in livelihood strategies. The diversification of income sources may reduce pressures on land and natural resources, especially when migration is directed to non-agricultural employment and the urban – rural dynamics and balance remains stable.
- Rural-rural migration is an important feature especially in developing countries. When this type of movement is directed towards sustainable natural environments the consequences on degradation are positive. On the other hand excess population pressures caused by rural movements towards fragile environments can lead to rapid deterioration of the quality of land and to extreme degradation and desertification problems (UNESCO 1995).
- International migration (legal or illegal) is also a phenomenon of great importance and a challenge for societies, economies and governments. The effects of international migration to degradation depend on the local and regional socio-economic and political context, on the concentration patterns and geographical distribution and on the terms and conditions of adaptation and adjustment in the system of production (UNEP 1992).

It is certain that migration policies have to be an integral part of a set of social policies aiming to combat degradation and desertification. The association of the phenomenon with other social processes and phenomena such as poverty, population pressures, urban-rural dynamics, urban development and socio-economic structures of productions lead (or has to lead) to a comprehensive policy framework towards population decentralization, prevention of excess and unwanted internal migration and incorporation of international migrants in the system of production in a sustainable manner.

4. The Question of Policy

Economic Policies

Economic policies are one of the main factors, which directly or indirectly determine sustainable development. Monetary policy involves changes in the monetary base (i.e. currency plus bank reserves) accomplished through open market operations. In practice, central bank implements monetary policy using the interest rates incentives for investment and credit policy as the main policy instruments. Monetary policy including investment and incentive policy, and credit policy. Monetary policy determines the quantity of the monetary base, and, as by product establishes the aggregate amount of credit that the Central Bank will extent. Credit policy is part from monetary policy involves the choice of central bank assets, i.e. the allocation of credit. Central bank credit policy determines how the given aggregate amount of credit will be allocated across alternative assets.

The policy adopted by a government for raising revenue to meet expenditure and for influencing the level of business activity. Fiscal policy finds expression in the annual budget. Fiscal policy including the tax-policy, the public finance system and public expenditure policy. Taxes can be classified as direct taxes (taxes on wealth and income) and indirect taxes (surcharges on prices, which are paid eventually by consumers, like VAT and excise taxes). Trade Policy is undertaken in pursuit of the government overall macroeconomic objectives available to a country that seeks to restrict or modify the pattern of its international trade in some way. Sectoral policy is a supplementary important tool for sustainable development and furthermore for economic and social cohesion. Sectoral policy including agricultural and industrial policies. The agricultural policy is very important for the union. Industrial policy can be defined as government actions to influence industry and thus considered as state interventionist policy (Eichengreen 1995).

Economics plays a major role in the sustainability and desertification. In order to be sustainable, agriculture must be economically viable. That is not to imply that all producers or all forms of production must be viable in any region at a particular time. Variations in the returns are necessary and indeed desirable. They stimulate change in the mix of products produced, thereby achieving consistency with the demands of the market. The emphasis on grain production on the prairies combined with the associated dependence on export markets has rendered the prairie region highly susceptible to changes in the world economy. Trade policies of other nations can and do impact severely on the region. In consequence, government has been moved to alleviate the ensuing distress through various programs of assistance.

Farm income received from the marketplace has varied significantly over time, a pattern no more evident in any combination of products than in grains and oilseeds. In recent years, shortfalls of producer income have been partly assuaged by large infusions of government funds. The magnitude of these infusions is very impressive. As a result, the fluctuations in farm income were much less than they otherwise would have been, thereby reducing the financial stress of many producers. While the money was very acceptable on the part of the recipients, little was accomplished in terms of reorienting of agriculture on the prairies in a more sustainable direction. Land prices were maintained at levels higher than those which

could be supported by returns from the market. Desirable change in farm structure was retarded and little change occurred in the mix of products produced (IMF 1986).

While considerable progress has been made in agricultural, forestry, livestock, industrial and tourism development in the wetter zones, little has been done so far for the low rainfall areas. Low productivity of the resource base, coupled with the fluctuation in yield due to erratic precipitation, have tended to discourage investment and the development of scientific inputs to conserve and develop the productivity of low rainfall areas.

Whereas the argument for giving priority for allocation of development funds to the more productive areas may seem to be justified in terms of "bankability" criteria, such policies, where adopted, have set in motion a vicious circle whereby lack of adequate investment (financial and technological) perpetuates in low rainfall areas a retrogressive management and an anaemic economy subsidized through the wasting of natural resources. Even from an economic viewpoint, the validity of this option is doubtful. Concentration on more productive areas has most often been synonymous with concentration on cash crops for which dry areas are generally ill suited.

The resulting distortion in terms of insufficient foodcrop production has had severe economic as well as social consequences in many parts of the dry region. Treatment of these areas as "anti-priorities", and hence areas to be neglected when establishing priorities for development, has accentuated socio-economic disparity within the rural sector itself, between "favourable" and less favourable land areas and their populations, thereby generating disruptive pressures. It has prevented the low rainfall areas and their people from making a greater contribution to, as well as benefiting from, overall economic and social progress.

There are, on the other hand, valid economic reasons for return on investment. For instance, if crop production were integrated with livestock, then low yields in crops could be partly offset by income from livestock products. With further integration of crops, livestock, forestry, wildlife, cottage industries, etc. investment possibilities are more likely to move from a "marginality" base into profitability. Therefore, for physical, economic and social reasons, development strategies need to aim at "total production" through first sponsoring the horizontal integration of production (agro-silvo-pastoral management) and second, the vertical integration of the products of the land with processing and marketing in order to maximize and optimize investment.

Because of intrinsic low productivity, inadequate infrastructure and numerous social constraints, private entrepreneurs under a free market economy are unlikely to be attracted to invest in the development of low rainfall areas, at least in the initial stage. While, as explained earlier, this development is necessary, it is above all a matter for direct public sector involvement (Jacob 1996).

Whereas the level and magnitude of the investment resources to be allocated for the development of arid regions and the control of desertification will, naturally, have to be determined within national priorities, the finance strategy will depend on national policies to:

- provide sustained and consistent inputs and services;
- ensure through the creation of extra agro-silvo-pastoral employment that likely improvement in productivity not is frustrated by increase in the human population working the land;
- establish, through legal measures, incentives for individual and collective groups to invest in the development of dry regions.

But, most arid countries are poor. In fact, they constitute most of the poorest countries and hence they need external assistance. The assistance has already materialized but it often seems to be too scattered and too localized for its impact to be perceptible. It would be necessary, therefore, considering the advanced stage of resources degradation and desertification, that this assistance be moved from localized project to programme assistance. To move on to programme assistance would imply not only an increase in the volume of external aid but also for governments to make a planned use of funds from donors and funding agencies. Finally, new methods of credit funds management towards the creation of local credits need to be developed and implemented.

Social Policies

Social policies in general, are of high importance in combating the problems of land degradation and desertification, because of their strong social dimensions and implications. Having in mind these specific relations one can identify three sets of policy options, which in most cases are interrelated and complementary:

“...- growth strategies which create the maximum possible employment both within and outside agriculture;

- policies and programmes which create incentives for farmers to invest in land where agricultural potential exists; and

- public employment-cum-income support programmes to relieve short run conflicts between the incomes of the poor and the reversal of land degradation.” (UNSO 1994: 4).

- Access to knowledge and skills (endogenous and external) to maintain natural capital stocks and environmental sink capacities.” (Singh and Titi 1993 in Singh and Strickland 1994: 10-11).

- As social inequality, poverty and especially rural poverty are in most cases gendered phenomena, policies of equitable participation of women to economic and social life are needed as an integral part of the wider set of social policies for poverty and social exclusion alleviation.
- Social policies with an emphasis on human resources development especially education and training. Education and training schemes have to comprise a direct and strong environmental and sustainability element. Furthermore stable and permanent mechanisms for information dissemination and policy implementation are needed in association with direct or indirect economic incentives. These schemes have to promote alternative livelihood and cultivation strategies in favor of the environment and sustainability.
- The formulation and implementation of social policies in order to combat and reduce poverty and social inequality in general and especially in rural areas is crucial for the creation of a sustainable and equitable social and economic environment. Only in an environment like this, it is possible for people to

understand, accept and participate in the implementation of environmentally friendly policies and practices.

For the purposes of the present debate emphasis is given in social policies aiming in relieving poverty-degradation conflicts, reducing and alleviate poverty in general and especially rural poverty and empowering the poor. A set of some important and crucial policy options and approaches within this framework, is the following (Singh and Strickland 1994, UNRISD 1994, UNSO 1994, UNSEC 1995):

- Social and economic policies aiming in general at employment creation either in the agricultural or in the urban sector or both in order to help the poor to change their livelihood strategies and escape the poverty-land degradation nexus.
- Income transfers to the rural poor (direct or indirect) to complement their personal or collective income and reduce the pressure on resources.
- Decentralization of rural institutions and incentives for active participation in local sustainable development programs.
- Direction of public investments or public-private investment schemes in human capital (education, health, social provision, social and technical infrastructure) in rural areas.
- Policies aiming to population decentralization and at the same time policies aiming to encourage geographical mobility for employment reasons mainly from areas with severe degradation problems.
- Social policies aiming to empower the poor:

“- *Direct participation in community decision making and representative government, particularly by women and youth.*

- *Provision of space for cultural assertion, spiritual welfare, experiential social learning, and the articulation and application of indigenous knowledge.*

- *Access to entitlements to natural resources, change-oriented education, housing and health facilities.*

- *Access to opportunities for generating income, assets and credit.*

5. Concluding Remarks

Desertification is a global process with serious local consequences, and it concerns everyone. Some because they actively or passively cause it or aggravate it, others because, directly or indirectly, they suffer its consequences. The international community has long recognised that desertification is one of the most serious problems facing the planet, since it has clear social, economic and environmental implications. Insofar as desertification and drought affect around 1/6 of the world population and a total surface area of around 3.6 million hectares (i.e., approximately 30% of the continental zones of the planet), they have become a burning question calling for urgent measures to combat them. Like humid and sub-humid climates, desert and semi-arid climates are dynamic by their very nature and should be understood in terms of the general circulation of the atmosphere. However, there is another aspect of the climate more closely linked with processes of desertification, and that is the physical climate of the Earth's surface, which is connected, with the system of exchange and balance linking the atmosphere to other climatic sub-systems. This physical climate of a given location is transformed when humans alter the nature of the surface, and these changes may affect the global climate through processes of internal re-feeding which may work at the level of regions, continents or even the

whole planet. The first impact of incorrect soil use takes place at the level of the local physical climate, i.e., the microclimate. An understanding of the processes of desertification therefore depends on the ability to discern the influences that local man-made changes to the microclimate have on the global climate.

“Desertification” is progressive loss and spatial redistribution of primary productivity and is the dominant process of land degradation of arid and semi-arid landscapes. It is a complex, non-linear phenomenon influenced by physical, ecological, and human systems and processes.

The seriousness of desertification depends on factors which vary from one region, country or year to another. These factors include:

- the severity of the climatic conditions in the period considered (particularly in terms of the annual rainfall);
- population pressure and the standard of living of the people involved;
- the level of the country's development, and the quality of the preventive measures established there.

A new understanding of the desertification problem reveals its universal impact and causes, which extend well beyond the drylands most immediately affected. Desertification not only destroys a nation's productive resource base, and hence causes famine and starvation during prolonged dry periods, but also causes the loss of valuable genetic resources, increase in atmospheric dust (which could have as yet unknown consequences on the global climate), disruption of natural water recycling processes, loss of markets and the disruption of national economies.

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