

HUMAN CAUSES OF LAND DEGRADATION: A REVIEW OF DIFFERING PERSPECTIVES

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Abstract

Scholars have attempted to explain land degradation from several perspectives¹. For some, it is embedded in two or more physical and structural characteristics, including rainfall erosivity, soil erodibility, land-per-person ratio, and the percentage of poorer people dependent on agriculture. For these thinkers, the causes of land degradation are readily identifiable. For others, the causes of land degradation go beyond simple structural relations and are best visualized in wider, much more complex political/economic relationships and historical processes. For instance, land-use practices may be as important in explaining land degradation as rainfall erosivity and soil erodibility. Land-use practices are in turn influenced by the wider social or historical processes that influences the access to land.

Conflicting explanations result in substantial confusion as to the causes of land degradation and its significance as a problem. Such uncertainty in knowledge of human causes of land degradation is also indicative of the limitation of the theory for practical purposes. In addition to a range of problems associated with physically measuring land degradation, it is argued in this article that the existing uncertainty of knowledge of the phenomenon is also caused by an oversimplistic approach to a multiple causative problem and the differing ideological allegiances of the analysts.

Introduction

Land degradation is a process whereby the intrinsic qualities of land undergo changes after which its productive capacity diminishes so that it can no longer be used as it previously had been. Such changes include the natural physical, biological, or chemical conditions of the land (Chisholm and Dumsday, 1987:7).

Land degradation has been variously defined. For instance, Blaikie and Brookfield (1987:6-7) propose that the land can be considered degraded when

... it suffers a loss of intrinsic qualities or a decline in its capabilities.

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Similarly, according to Barrow (1991:1):

Land degradation may be defined as the loss of utility or potential utility or the reduction, loss, or change of features or organisms which cannot be replaced.

Problems associated with land degradation include the loss of croplands both in absolute and relative terms, falling crop yields, and growing food deficits (Postel, 1989; Worldwatch Institute, 1978). Food-production sustainability can become a serious problem due to loss of croplands in the poorer, ecologically less-favorable tropical regions of the world². Thus, the problem of land degradation cannot be dissociated from food security in developing countries, since an inability to produce food increases their dependency on an unstable global market (Echolm, 1976; Brown, 1990,1993).

This article concerns the differing perspectives of human causes of land degradation. The human causes are defined to include different standpoints adopted by social scientists to explain the human factor in land degradation. Such attempts involve explaining land degradation in relation to various human factors. For instance they are defined to include population pressure on land, poverty, unequal distribution of land resources, exploitation of land users in the spheres of production and exchange.

Attempt at relating land degradation to human factors also recognizes that land degradation is a natural process that occurs across time and space irrespective of the type of political administration or mode of production (Blaikie 1985; Blaikie and Brookfield 1987). For instance, soil erosion is caused by the interaction between land use, the land's natural characteristics and vegetation, and the erosive forces of water and wind (Stewart, 1970). However, increasing intensity of land degradation is often attributed to inappropriate land-use practices, neglect, or mismanagement. Thus inappropriate land use practices can be treated as human causes of land degradation. In the present study, land-use practice is defined to include cropping patterns, cultural practices, and various approaches to land management. *There are many approaches to land management. In pastoral and shifting cultivation systems, reproduction of land capability is left to the nature after use. Pastoral systems adopts rotational grazing by taking the herds from place to place over a large area of pasture. Land is left to fallow for a long period to regenerate the soil fertility under the shifting system of farming. All other forms of land management systems depend on application of external inputs on site such as the organic and inorganic fertilizers to replenish the soils after crop production. Combined with above mentioned land management techniques include various forms of slope and water control methods.*

2 Estimates of land lost to agriculture due to degradation, or crop losses attributed to it, vary. An often-quoted illustration of the magnitude of this type of devastation is that of the World Resources Institute (1991) which estimates that as a result of human use an additional 1.2 million hectares has been degraded (i.e., some 11 percent of the earth, *World Development Report 1992* (p.6), in some countries the loss in productive potential attributable to soil degradation amounts to between 0.5 and 1.5 percent of their annual gross domestic product.

Problems related to the explanation of land degradation in terms of human causes are mainly two fold. First, there is little agreement of the specific human factors causing the problem. The population theory of land degradation, for instance, posits that pressure on natural resources increases to meet the needs of a burgeoning population. According to this perspective, the higher the population density, the higher the expected level of land degradation. Poverty-based theories, on the other hand, seek to explain how the poor, lacking an alternative means of sustaining themselves are compelled to exert undue pressure on natural resources to subsist. Thus, according to this theory, the poor are both the victims and agents of environmental damage (*World Development Report 1992:7*). The explanation that both poverty and affluence cause land degradation is discordant.

Many others note that the tiller's approach to the use of land is embedded in much wider social, economic, political, institutional and historical contexts (Blaikie and Brookfield, 1987; Redclift, 1987). These include skewed land distribution and unfavorable tenurial conditions, the government's urban /industrial-biased policies and the exploitative role played by multinational agribusiness. Scholars argue that as the subsistence living of the small agricultural producers are affected under such conditions, they in turn are compelled to exploit the natural fertility of land (Bernstein, 1977, 1979). For some, environmentally sustainable polycultural practices undertaken mainly for subsistence production are replaced by cash-crop farming (Lappe and Collins, 1986). Cash-crop farming by smallholder subsistence producers is considered a process by which they become pauperized due to unfavorable "terms of trade" on the commodities they produce.

The second problem involving social scientific explanation of land degradation is that there is little agreement on the significance of the problem itself. For instance, the population theorists posit that the "carrying capacity of land" is reduced due to population pressure. Therefore, attempts at their overexploitation to feed burgeoning populations amounts to 'ecocide.' By contrast, the approaches based on technological optimism predict a future of abundance on the basis of human ability to continue to create new resources or to intensify and recycle existing resources in order to overcome limitations imposed by nature (Simon, 1981). Also according to this perspective, population growth can stimulate technological innovation, leading to additional improvements (Boserup, 1981; Simon 1981). Thus, the technology theory repudiates the "limits to growth" assumed under the population theory. At the same time, in opposition to the predictions of technology theory, poorer countries have tended to experience rapid growth in population which has not been followed by significant technological innovation.

Contradictions observed in the social theories of land degradation can cause significant confusion among those who intend to use them for practical purposes. Therefore, it is useful to know the nature and grounds of such contradictions. This article critically reviews the existing social theories of land degradation. It also attempts to identify the possible sources of existing confusion.

Differing Perspectives on Land Degradation

Explanations Based on Physical and Natural Factors

Land degradation, like any other form of environmental degradation, is a natural phenomenon that occurs in differing degrees in different ecological regions. This explains the importance of natural and physical factors such as the erosivity of rainfall, and erodibility of soils in land degradation. In this sense, natural factors explain to a substantial extent the high levels of land degradation prevalent in tropical regions (Sanchez, 1976; Young, 1976; National Resource Council, 1993).

Similarly, rural poverty is a phenomenon contingent on the quality of land (Blaikie, 1981:3). Thus, a poor environment results in social marginality. By 1989, approximately 470 million (70 percent of the poorest people) in developing countries lived in ecologically fragile marginal areas characterized by arid lands, limited fertile soils and steep slopes (Leonard et al., 1989:19). Holding the poor living in marginal areas responsible for land degradation amounts to 'blaming the victim.'³

On the other hand, institutional forces strengthen physical and social marginalities (Redclift, 1984; Leonard et al. 1989:33). Often-quoted illustrations include the highly skewed pattern of land distribution and the exploitative tenure relations prevalent in most less-developed countries. Biased government policies also exacerbate the problems that result from physical marginality, either by neglecting the social and physical specificities of such regions in formulating public policy or by omitting these areas altogether when constructing public investment programs. In mountainous regions, physical specificities include infertile soils: high cloud cover and low solar radiation during the wet season (Chung, 1968); difficult topography and high rainfall (Plucknet, 1976:3); relative inaccessibility, fragility, and marginality (Rhodes, 1990; Jodha, 1990); relatively higher soil erosion (Moran, 1987; Graft, 1993); and high population pressure on land (Sharma, 1992:655; Jodha, 1992:5; De Boer, 1989:137).

Population Based Explanations

Thomas Malthus (1798) first posited the relation between population growth and land degradation when he asserted that population growth accelerates at a geometric rate, whenever living standards rise above the subsistence level, and is in turn checked by the rate of production which continues at an arithmetic rate. Malthus assumed static technologies, implying that only a shift in the agricultural frontier (adding more lands to production) could counteract the distress situation bound to take place with a dramatic population surge.

Recently scholars have revived the Malthusian theory not only to explain the effects of population growth on environmental resources (Ehrlich, 1975; Hardin, 1974; Ehrlich and

3 Thiesenhusen (1990:13) makes this argument.

Ehrlich, 1990), but also to explain its negative impact on food production, nutrition, and economic growth (Pierre, 1977; Brown, 1978; Harf and Trout, 1986:26; Bilsborrow, 1987). Modern versions of the theory differ little in terms of premise. They acknowledge that technology is evolving and dynamic, but with a pervasive negative impact on the environment.

Resource exploitation, in general, speeds up under new technologies, exacerbating the problems of degradation, depletion, and pollution. Recent commentators also focus on the population growth rates of less developed countries. By their account, such countries should come to grips with the problem by reducing high fertility rate; the State may even take coercive measures (Ehrlich, 1975, Hardin, 1974).

There are a number of problems with this formulation of population theory. It is now understood that the relationship between population and environmental degradation is too complex to grasp with simplistic theories (Ghimire, 1993). In spite of this understanding, this ever-popular theory stresses that pressure on land is caused by growth in population. For a number of reasons this argument is only partly true. First, change in population size may occur due to in-migration or exodus from one region to another, factors not much affected by family planning. Second, the observed pressure on land may also emanate from various other sources. These include:

1. Highly skewed distribution of the land resources.
2. Swift changes in local land-use practices, including diversification from food crops to pasture for large-scale cattle breeding and the production of bio-mass energy such as ethanol (Redclift, 1987); cash-crop production to meet the demands of the affluent abroad (MacNeil, 1989).
3. Mass rural poverty and a lack of alternative sources of employment outside agriculture.

The theory postulates uni-directionality of effects by assuming not only that limits to growth are not only natural but immutable. This is either because technologies are static or because those available are not accessible to those in need. Some innovative technologies enhance, natural resource exploitation causing further degradation and/or generating pollution.

Assumption of a 'finite carrying capacity'⁴ for natural resources and the static technologies basic to population-based theories was repudiated by scholars who examined the relationship between human innovations and resources. In two very important works,

⁴ Carrying capacity is a term used to denote the maximum capacity of a resource within a given politico-geographic boundary to sustain a human population without jeopardizing its ability to restore itself. However, a resource's carrying capacity will depend on such factors as its potential for exploitation in economic terms, trade, differential uses and technologies, other resources, and environmental and institutional attempts to manage it.

Boserup (1965, 1981) demonstrated with historical and cross-cultural evidence that, contrary to the expectation of diminishing productivity in Malthusian terms, additional labour led to significant productivity gains⁵. Boserup (1981:50) also argued that, in some cases, population growth actually induces desirable agricultural innovation. For instance, she claims:

Growing populations may in part have destroyed more lands than they improved, but it makes little sense to project past trends into the future, since we know more and more about methods of lands preservation and are able, by means of modern methods, to reclaim much land which our ancestors have made sterile. (1981:22)

These ideas contrast markedly with the Malthusian perspective. In Boserup's formulation solutions do not rest with fertility control.

In exhorting a simple solution, population theorists appear to move away from the social complexities influencing both the problem and possible solutions. For instance, it is now understood that difficult economic conditions create strong incentives for large families as a source of labour, old age insurance, potential sources of additional income, and to ensure family reproduction in the light of prevailing high child-mortality rates (Blaikie, 1985:103). Similarly, experience teaches that when income and female-education levels improve and infant mortality rates decline, the fertility rate also declines.

Land degradation in fact occurs under both high-and low-density population conditions (Blaikie and Brookfield, 1987). High population densities may also coexist with inadequate labour for both farming and conservation, since poorer farming households (whether producing for subsistence consumption or for the market) are usually compelled to depend on off-farm incomes, often hiring themselves out (Collins, 1987).

Meanwhile the issue of whether poverty causes high population growth or whether high population growth causes poverty remains unresolved. Most evidence indicates that fertility rates drop as economic prosperity increases, distribution of income becomes more equitable, and incomes are raised above the poverty level. This argument implies that the population problem must be approached as part of a broad-based development policy.

Poverty Based Explanations of Land Degradation.

Recent literature links widespread poverty which characterizes less-developed countries with environmental degradation (Eckholm, 1976, 1982; Lappé and Collins, 1977, 1986; Brundtland Commission,⁶ 1987; Durning, 1989:40). The Brundtland Commission

5 The idea that technology can deal with problems of resource depletion has been advanced by others, with contemporary examples. Simon (1981), while acknowledging that lands in some places go out of production due to soil erosion and other destructive forces, points out that the amount of arable land in the world is increasing year by year as technology finds and creates new resources.

6 Also referred to as World Commission on Environment and Development.

(1987) emphasized that though environmental stress has often been attributed to a growing demand on scarce resources and to rising standards of living among the relatively affluent, the poor contribute to the stress on the immediate environment in order to sustain themselves. Thus by linking land degradation to underdevelopment, poverty-based theories dispute explanations based on affluence and economic growth.

When poverty is viewed as a cause of land degradation, it in turn stresses the need to examine 'degradation' in relation to its wider milieu. Often rural poverty is attributed to multifarious causes. As Chambers (1981:1) shows:

Rural poverty is variously and in varying degrees attributed to a continuing condition of underdevelopment; to an active process of underdevelopment and the extraction of surplus through colonialism, neo-colonialism and the forces of capitalism and unequal exchange; to ill-health and nutrition; to war; to natural disasters; to famines; to population growth and its pressure on resources; to degradation of the environment, to the impact of inappropriate capital intensive technology and the failure of government services to provide for basic needs.

In addition, poverty-based theories of degradation also reflect the less developed country perspective on natural resources degradation (Amanor, 1994).⁷

In spite of the fact that poverty as an analytical variable can be useful to analyze the social sources of land degradation, it is also a variable beset with a number of problems if used in the formulation of practical policies. The relationship of poverty to the environment is an inverse one—a circular effect by one phenomenon causes the other (Mishan, 1977; Blaikie and Brookfield, 1987; Huecting, 1980; Douthweite, 1992; Brown et al., 1993). Thus by implication, poverty-based theories underscore the need for economic growth. The proven upward path for economic growth is based on a capitalist mode of production, with industry and international trade fulfilling the key roles. This path is teeming with formidable constraints. The likelihood of strong capitalist development for almost a wide spectrum of poor is bleak in less developed countries. The problems that developing countries face in terms of access to markets, deteriorating terms of trade, slow growth, and lagging technologies are major ones. Second, rapid growth itself calls for excessive exploitation of natural resources and may further their debilitation. Thus, the failure of poverty theory apparently lies in explaining only the "why" of the problem, but not the "how" which could lead to its solution.

Relation of Cash-Crop Production to Land Degradation

Simply defined, cash crops are agricultural products produced for sale. Ecological stability is threatened by cash-crop agriculture for a number of reasons. First, cash crops

7 Amanor (1994) shows that the southern perspective at the Earth Summit 1992 was that more stable utilization of the environment would only be attained once a basic level of economic development was achieved.

grown on a monocrop basis or within a relatively less-diversified cropping system tend to replace more diverse, environmentally harmonious, and sustainable polycultural systems (Lappé and Collins, 1977; T. B. Bayliss-Smith, (1986). Second, cash-crop farming tends to lead towards land mining driven by the profit motive. Third, cash cropping is linked with a reduced fallow period, overstocking, clear felling and open-field farming. Fourth, the adoption of exogenous technologies and the increased use of machines and chemical inputs are also linked with cash-crop agriculture (Barbier, 1989:883). All of these cash-crop practices differ from conventional farming practices under erosive tropical conditions and may lead to negative environmental effects, including soil erosion or compaction, loss of soil fertility, eradication of biodiversity, desertification, water pollution, and salinisation.

Cash-crop cultivation has other repercussions for peasant economies. First, the practice is frequently a remnant of the colonial heritage or an institutionalized linkage by which peripheral nations serve the demand of the "Center" nations on an exploitative relationship (Lappé and Collins, 1977, 1986). Second, a significant shift towards cash-crop farming by resource-poor subsistence farmers disrupts not only their ability to produce their own food, but their ability to withstand disasters like droughts. Third, the spread of cash crops is strongly associated with the removal of poorer subsistence producers from more to less fertile land (Myers, 1989:65), and the process by which they are denied land altogether by an advancing land market and are compelled to work as hired labourers or migrate (Eviota, 1983:8-9).

Other scholars would argue that subsistence agriculture, not cash-crop farming, causes land degradation. Depleted soils or soils of inherently low fertility may function for subsistence food production without inputs or with low inputs under the extremes of population pressure or poverty (Lal et al, 1993:2). The application of off-farm inputs may break the vicious cycle that leads to soil mining in impoverished situations (Feder, 1977; Thomas 1988). This practice has implications for the introduction of cash-crop farming. *Therefore, the relation between the cash-crop farming and land degradation appear to be a complex one. Above relation may depend on a range of factors such as the farming and vegetation system replaced by a cash crop, land managers' relation to the land and his/her attitudes toward land management, institutional factors such as the land distribution and land tenure and the production technology adopted on the land.*

Role Played by Colonialism in Land Degradation

Lappé and Collins (1975) argue that much current destruction of the ecosystems in less-developed countries began with colonialism, which introduced conquered lands to export-oriented agricultural-production systems; the best land was expropriated for plantations, while the local farmers were dispossessed and often dispatched to marginal, hilly lands, unsuitable for farming. Cash-crop agriculture was also introduced to indigenous farmers, and they were often obliged to practice it in order to pay cash for taxes, as required by the colonial rulers. Lappé and Collins also argued that under colonial regimes the indigenous food sector was neglected while the cash-crop sector, mainly oriented to export, thrived under State

patronage. An economic dualism infiltrated less-developed countries under colonialism.⁸ At the time of independence, colonized nations were heavily dependent on primary commodity products for export incomes, food cereals from temperate countries were a major part of their total imports.

The Role of the State

The State has been called upon to play a major role in alleviating environmental degradation. Some call for government intervention to introduce land and agrarian reform, which aim toward redistributive justice. In some perspectives, elimination of land access to common property was a paramount policy. Population-based approaches (Ehrlich, 1975; Hardin, 1974; Hardin and Baden, 1977) called for stern measures to control fertility. The role of the State fails, from these perspectives, when it falls short of regulating land tenure and population.

In fact, State failure results from many causes. Some claim governments do not give human resources the rights to impasse, that public and private social-infrastructure institutions are underdeveloped, that technological impasses exist, and that the lack of financial resources compounds the other problems. For others, the state's adoption of rational policies is constrained by the political considerations. Still others argue that State ineptness is a product of corruption. Those with the latter perspective tend to believe that issues such as population growth are overemphasized, providing a scapegoat by which inept or corrupt governments pass the blame on to others (Bromley, 1989).

For some, the problem with the State is not that it fails to intervene, but that it interferes with a bias that influences how agricultural producers manage the land. For example, some State policies (e.g., fiscal, food, and investment policies) are biased toward industrial and urban development over agricultural and rural development (Lipton, 1977). From this perspective, the correction of such biases is necessary to solve the problems associated with rural land degradation.

As a correction to biased governmental policies, others call for a non-interventionist State. On the one extreme, the proponents of free trade advocate the withdrawal of the State as a means of inducing productivity growth in favor of one based on a free-market. At the other extreme, State withdrawal is recommended because the State is believed to be involved in exploiting the farmers' surplus production. The projects and programs of agricultural modernization can also be viewed as considered attempts at incorporating subsistence agricultural producers in the wider market economy. Thus, these theorists suppose that, under extreme pressure for survival, farmers exert increasing pressure on their land and State policies are designed accordingly on a sort of "response to demand."

8 It is useful to recall here that dualistic theories of economic development (Lewis, 1955; Higgins, 1956; Jorgensen, 1961; Myint, 1958) distinguish between the introduced, progressive, modern industrial sector and the backward, static, traditional sector.

Radical perspectives provide other ideological complications. Marxists believe the 'State' is solely the executive committee for the dominant class and is predisposed to serve it.⁹ Dependency theory argues that the elite in the former colonies serve themselves by serving the capitalist interests of the exploitative center when they open up their countries to multinational agribusiness.

It should be apparent from the preceding discussion that the role played by the State in land degradation is a complex one. Sometimes the state is inept in taking corrective measures that are deemed to be necessary to overcome the human causes of land degradation. Often the State is biased in its policies and actions and such biases may exasperate the human factors linked to land degradation. Therefore, the State becomes both biased and inept at the same time due to various reasons. These may range from lack of will and ignorance by the State actors to widespread corruption and exploitation by the state. It should be noted that the State consists of different actors with different levels of knowledge, attitudes and interests—a major source of contradictory actions by the actors for the state. Likewise, the modern State is also under the influence of various global powers causing the State actors to implement policies that are not necessarily good for maintaining a balanced natural environment in a given country.

Relation of Production and Exchange Based Arguments

Also in Marxist thought, land-use practices are determined by the extent to which the "surplus generated on the land" is extracted by others. Such exploitative social relations are embedded in "relations of production" and "relations of exchange."¹⁰ The idea of "surplus extraction" is a complex one. Farmers, in applying labour on land, are able to produce a commodity—the value of which is more than the input value. This extra value—the surplus produced on the land—is extracted by landlords, merchants, commission agents, agribusiness firms, and the government.

Extraction occurs through production and exchange. Extraction at farm or ranch level is evident in exorbitant cash or material rents and/or obligatory labour services performed by tenants for the landlords. The word denotes a set of social relations governing production. In a similar manner, extraction in exchange reflects the conditions when, for

9 It should be noted that the State is also dependent on the capitalist class in a different sense. Growth in investment is necessary for growth in the gross domestic product. Growth would then indicate the success of government policy, and in turn increase its legitimacy. Those with capital fulfill an important function here. Such interpretation cannot be separated from the reasons why the State in a capitalist society tends to serve the interests of capital.

10 Blaikie and Brookfield (1987) define the relation of production and exchange as follows:
"These relations are primarily defined by who has control of land, labor, implements, inputs and outputs; who decides upon cropping or grazing strategy, and upon investments, including in this case, the creation of landesque capital, irrigation, tree planting and the like; and the type and rate of surplus creation and extraction through rents in labor services, cash or kind, usury, or through the employment of wage labor".

example, a farmer receives a price for a commodity which is low in relation to the costs of inputs incurred in its production.

Unfavorable terms of trade for agricultural commodities derive from a number of sources: monopolistic merchants, commission agents, informal lenders, input suppliers, retailers, capital intensive producers, progressive local producers favored by State policies and programs, and government policies geared to provide cheap urban-wage goods (Bernstein, 1977, 1979). Blaikie (1985:124) establishes the connection between land degradation and the social relations of production and exchange as follows:

The essential connection is that, under certain circumstances, surpluses are extracted from cultivators who then in turn are forced to extract surpluses (in this case energy) from the environment (stored up fertility of the soil, forest resources, long-evolved and productive pastures and so on), and this in time and under certain physical circumstances leads to degradation and/or erosion.

The Impact of Capitalistic Penetration into Less Developed Countries

Compared to subsistence crop production, the profit motive under capitalist agricultural production is responsible for the land mining which tends to rapid land degradation. A closely related factor is the unprecedented growth in consumption that occurs in richer countries, which is related to affluent living. This is a major source of the wasteful and inequitable use of the world's natural resources (Brown, 1978:22; King, 1980). Capitalism plays a role both in creating this demand and in meeting it with natural resources.

Analysis rooted in Marxist ideology plays an important role in emphasizing links between the capitalistic system of production and human-induced land degradation. Karl Marx (1887:102) once remarked:

"All progress in capitalist agriculture is a progress in the art of not only robbing the labourer, but of robbing the soil."

Lenin (1920) thought that capitalist penetration into agriculture would invariably result in the demise of the peasant-production system, since the capitalist producers can outprice the peasant producers by benefiting from economies of scale¹¹ and advanced technology. Others note that the peasantry continues to exist as the purchasers of industrial inputs and the suppliers of raw material and labour (Kautsky, 1902; De Janvry, 1977; 1981). Some claim that by emphasizing the relations of production, especially those between labour and capital, earlier Marxist theorists lagged behind in analyzing the social causes of land

11 This is the cost advantage of large-scale production. It assumes that the average cost of production falls with increasing outputs before diseconomies of scale set in.

*degradation and have mistakenly treated natural resources as an enabling input of relative abundance (Blaikie, 1985; Redclift, 1984).*¹²

Recent arguments based on Marxist ideology consider a range of linkages the capitalist development has for land degradation. These, besides showing that the capitalist agriculture is a major motivational factor to exploit land to increase the profits to the capitalist, that the capitalist development paved the path for increasing poverty among the small holder agriculturist. Such arguments, for example, attempts to provide an explanation for the increasing incidence of poverty and hired agricultural labour in poorer countries. They argue that proletarianization¹³ and semi-proletarianization of the peasantry in these countries occurs with the increasing commercialization of agriculture followed by establishment of large-scale capitalist farms. According to these arguments, the subsistence food producer turned commodity producer is badly affected in the market. According to them, small holder production which is already vulnerable due to vagaries of nature and biological factors affecting production, are now become also depended on market forces. For instance, now they become dependent not only on the markets for inputs but also for the sale of their output by increasing the chances of their being exploited by various market forces. This is when they start to suffer a reduction in subsistence, and begin to work for the capitalist farms for a wage as semi-proletarians (De Janvry, 1981). The capitalist producers have an advantage when they employ such labour because they have a fairly captive labour force and can hire it at a wage below what they would have to pay a member of the proletariat.

According to another perspective, peasant-farmers turned commodity-producers become pauperized as the surplus is extracted in the market process (Bernstein, 1977, 1979). Basic to this view is a 'vertical integration' of agriculture. Commodity production is seen as the mechanism by which peasant production is brought under the control of capital.¹⁴ It is achieved through the provision of commercial trade organized by merchants, money-lending, industrial use of peasant products, and the provision of industrial inputs. According to Bernstein (1977, 1979), the new technology of commodity production (high-priced tools,

12 Labour in Marxist analysis fulfills the pivotal role by adding value to raw material, of which the surplus value is extracted by the capitalist. Therefore, in classical Marxist theory the need for human mastery over nature is accentuated. Implicit is the need for technological innovation. Therefore, from a Marxist perspective, the barriers to full realization of the potential for natural resources to enhance the welfare of people rests on the social and institutional arrangements of production. In other words, the limitations are social, not natural.

13 The term is used here to identify the process by which farmers become wage labourers, selling labour power for a living.

14 This idea differs from earlier Marxist ideas as to the fate of the peasantry under capitalism. For instance, Lenin (1920) stipulated the possibility of squeezing the peasantry to its demise by enveloping agricultural production by capital. He thought that by benefiting from scale of economies, the capitalist producer can "out price" the small producers and displace him/her from business altogether. Quite contrastingly, Kautsky (1902) argued that the existence of the peasantry is functional to capitalistic development both as producers of raw material and market for finished products. Amin (1974), noted that in the process of vertical concentration, not only is the farmer willing to forego rent and profit, but also to accept compensation only equal to agricultural wage. He also noted that in the process of vertical concentration, prices of peasant products often decline to agricultural wage levels.

Reinhart (1988) provides an account that complements the idea of "vertical integration". She distinguishes between the processes of industrial and agricultural production, and notes that agriculture is less amenable to direct control by capital. Agricultural production, according to her analysis, is unique in the sense that it directly relates to and is controlled by processes which are biological, sequential, spatial, and seasonal. The family farm can readily respond to such biological and, hence, such sequential processes, through intensive exploitation of family labour, for farming than is the modern capitalist enterprise with its impersonal labour force.

Therefore the capitalist development is responsible for causing land degradation as it is linked with pauperization of the peasantry and increasing landlessness and land fragmentation among them. In the process of capitalist agricultural development, the small holder subsistence producers can also become spatially marginalized because more fertile lands will be used for cash crop farming. Another major implication of these radical interpretations is that damage to the underclass is inseparable from damage to the land. However, if capitalistic development is the source of land degradation, a major question challenging the theory's integrity is in explaining why land degradation also occurs under feudal and socialist modes of production. In other words, land degradation should not be present in pre-capitalist or socialist systems because it is totally attributable to capitalism. This is, of course, untrue. Socialist Russia and the People's Republic of China have not been free from significant land degradation (Blaikie and Brookfield, 1987).

Degradation of Common Property Resources

The implication of different property systems for natural resource management is a topic that has been debated since the 1960s. Garret Hardin (1968) set the stage for a detailed discussion of the collective management of natural resources (Ciriacy-Wantrup and Bishop, 1975; Bromley and Cernea, 1989). Common property resources are natural resources held collectively. They are subject to individual use but are not individually possessed. Those with user rights are members of an entitled group which excludes others from the resources. A frequent used illustration of a common property resource are the common grazing lands in pastoral Africa.

Hardin (1969) argued that natural resources under common property ownership are bound to be degraded as each owner, in the short run, attempts to derive a higher personal utility, without regard for limited potential of such resources. The system, Hardin thought, could have worked to ensure a regular check on population growth—through wars, poaching, or diseases, for example. But once such conditions are under control, individual users of common property resources will act to maximize personal gains by increasing their benefits, with costs accruing to the community.

Most scholars now agree that Hardin oversimplified unrestricted access to common-property grazing rights and overstated the selfish behavior of the individual herders (Gilles and Jamtgaard, 1981; Berkes, 1987:70). For instance, some show that the use of land for both cultivation were strictly controlled, cultivation was essentially private and members

of the community had rights to graze only a limited number of animals. However, the effect of communal property arrangements, especially when each user is capable of extracting from the resources with common access or from community welfare cannot be underestimated. Private property, in contrast to common property, offers the right to exclude and regulate on an individual or group basis. Often such rights are exclusive and negotiable. Therefore, much of the literature that attempts to link the relation between property rights and land degradation stresses the importance of private ownership for efficient land management. Here, one should take in to consideration the public lands which the State has the exclusive right to hold and use.

Technological Change and Land Degradation

As noted earlier, population-based arguments posit that population control is the solution to the problem of land degradation. The achievement of this simple objective is seen as constrained by the ignorance or neglect of the inhabitant or by 'inept governments' that fail to implement policies for the involuntary control of fertility. Therefore, the source of the problem and the solutions to it lie with those affected and under such circumstances there is little that others, can do about solving the destruction.

Technology-based theories do not attempt to explain why land degradation takes place, but how technological innovations have been able to overcome the limits to growth imposed by nature. According to these ideas, humans are capable of innovating—from simple intensification of land-use practices to biochemical technologies—with substantial productivity gains per unit of natural resource. These theorists argue that population growth can function as a stimulus for technological innovation (Boserup, 1965, 1981; Simon, 1981; Simon and Kahn, 1984). It is also suggested that a substantial reduction in labour supply may result in significant land degradation since the land cannot be managed properly due to lack of labour.

Therefore, theories based on technological optimism cast significant doubt on population growth as a major source of land degradation, and they are optimistic concerning the availability of technical solutions. The problem then is reduced to something amenable to human ingenuity. This claim, by literally forecasting a future of abundance due to technological innovation, should be contrasted with population theory which claims formidable natural limits to growth. Technologically optimistic theories seek to repudiate some of the premises on which the population-based theories are constructed, with the result that policies based on both theories are mutually inconsistent.

Technological theory suffers from a number of shortcomings. First, the extent to which technical solutions provide an antidote to the problem of land degradation is deceptive. For instance, potential productivity losses are sometimes masked by new technologies, such as chemical fertilizers and improved crop varieties (Jodha, 1990). But those inputs may provide for short-term gains and long-term losses.

A second set of problems includes the effect of new technologies on the natural

resource base. Quite contrary to the Boserup's expectations (1965 and 1981), available evidence indicates that the land-use intensification reflected by overgrazing or declining fallow periods results in a substantial reduction in natural carrying capacity (Cassen, 1976:807). Thus Boserup's arguments present a correction, rather than a repudiation, to the neo-Malthusian interpretation of population pressure on lands.

Immoderate changes in crop mix and planting technology, are important sources of natural-resource degradation, especially when introduced as exogenous technology. For instance, modern varieties of rice and wheat introduced during the green revolution have had the effect of narrowing the genetic resource base (Frunkel, 1970; Harlan, 1975; Wilkes, 1983). Erosion of the genetic base in turn can place limitations on further development of the germ plasma. Productivity-enhancing technologies appear to have resulted in substantial environmental damage. It is argued that green revolution technology resulted in pollution from pesticide and fertilizer residues and salinization from a prolonged reliance on irrigation (Shiva, 19:11). Pest problems also became endemic in traditional crops such as rice (Glass and Thurston, 1978). Nitrogen fertilizer applied to high-yielding varieties of rice tend to stimulate weed growth (Moody, 1981).

A third set of problems includes the extent to which technical solutions are accessible to the marginal groups who need them most. The problem, borrowing an idea from Sen (1982), is not what is available but who commands it. Blaikie (1985:18) views quite cynically the proposition that productivity-enhancing technologies will be easily available in the following terms:

The belief that agricultural technologies will be developed for marginal, ecologically fragile areas, and for the marginal poor farmers and pastoralists that live there is, it will be argued, a triple heroic (1985:18).

Fourth, the experience of the green revolution in many countries demonstrates that marginal farmers—resource-poor farmers and those located in physically marginal areas—are quite systematically excluded from access to productivity-enhancing technologies. This may happen at the very inception of technological programs; green revolution technology had a bias towards crop species that respond to manufactured inputs.¹⁵

As Blaikie (1985:19-20) suggests, green revolution technologies provided :

“unparalleled opportunities for trans-national companies manufacturing chemical fertilizers, pesticides, tractors, and pump-sets to sell their wares to a vast new market.”

¹⁵ Green revolution technology was aimed at increasing land productivity. Hence, new wheat and rice varieties were developed which had a high response to chemical fertilizers. Newly improved varieties were also relatively more susceptible to pest and fungus attacks than the traditional cultivars. This resulted in increased demand for pesticides and fungicides. In contrast, bio-technology is aimed at biological methods of increasing production and plant disease control (see, for example, Redclif, 1989 for a discussion of social implications of different agricultural technologies).

According to Boserup (1965), productivity-increasing autochthonous innovations would follow population growth. In spite of Boserup's expectation, the evidence is that substantial population growth in most less developed countries has not been accompanied by autochthonous innovations. Recent works on indigenous systems of knowledge suggest that several technologies used by the Third World in the past—including indigenous methods of controlling pests and plant diseases, and methods of augmenting soil fertility—have diminished over time. Currently the agricultural technologies used at local levels tend to evolve from central locations, like central breeding stations, to be disseminated to local farmers rather than being locally produced.

The experience of less-developed countries shows that new technological packages like the green revolution may intensify existing social inequalities (Lipton, 1978:335) and result in social disruption.¹⁶ It appears that structural debilities found in these countries, for instance the highly-skewed distribution of productive resources, tend to restrain the reaping of social benefits usually accrued to technological innovations. Green revolution technology has also been greatly instrumental in incorporating the agriculture of less-developed countries into international agribusiness. The green revolution has meant nourishing Third World demand for inorganic fertilizers and other agrochemicals.

Therefore, it appears that technological innovation, and its potential for providing solutions to land degradation, appear to be mediated through a number of factors. A set of them includes the specificities of natural and physical environmental factors themselves. A second set would include human factors such as population density, incomes and a range of other factors included under social relations of production. Others would include the role played by the less developed countries in the global community and the forces that bolster it. Most of these factors would function in a polemical manner with the specific natural and physical factors (Posner and Mac Pherson, 1982; Blaikie, Cameron and Seddon; 1980).

Concluding Remarks

The literature on land degradation suggests that it is a phenomenon caused by a multiplicity of factors. The attempts at attributing it to singular causative factors within different perspectives have resulted in confusion in terms of its causation as well as the significance of the problem itself. Thus, it is quite evident that knowledge regarding the human causes of land degradation is quite insufficient for practical policy purposes.

Considerable uncertainty about the human causes of land degradation may emanate from problems intrinsic to the subject matter itself (Blaikie 1985:1; Blaikie and Brookfield 1987:xvi-xxiv). First, the problem of physically measuring land degradation. When land degradation is defined as a lessened capacity to produce, a range of measurement problems as to the causes, degree, and timing of the process ensue. Degradation occurs owing

16 For instance, Lipton observed that: "The poorest producers—small farmers and landless laborers—got poorer relatively.....the system therefore, has great power to alienate poor."

to both natural and human causes, which also are responsible for any restoration process. Degradation, then, equals the difference between quantity degraded minus quantity restored. Then there is the problem of the lengthy period required for measuring the whole process, a situation that cries out for longitudinal data. As Blaikie and Brookfield (1987:238), point out:

...we are not dealing with a situation in which "soft social science" is merely trying to explain phenomena which "hard natural science" has firmly established.

Existing confusion as to the human causes of the problem and its significance also may arise from different sources. First, attributing land degradation to human and non-human causes can be a formidable task in itself. For instance, besides singling out human causes, there is also a wide variety of ways in which one can interpret the human effect.

This may partly explain why there have been many, often incompatible, perspectives regarding the social theory of land degradation. Second, the observed incompatibility of theories may also emanate from two further source, including an oversimplistic approach to a problem with multiple causes. Such an approach invariably results in overgeneralization (Spooner and Mann, 1982; Blaikie 1985; Blaikie and Brookfield, 1987; Glantz, 1987,1988, 1989). A third is caused by utilizing narrow disciplinary or paradigmatic approaches to a multifaceted problem or by adhering to a set of ideological boundaries in such an analysis.

It is useful to note that inconsistent views of the human roots of the problem results from differing ideological allegiances among the analysts. Amanor (1994:6), for example, observes that attempts to use the notion of a "carrying capacity" as a basis for sustainable development in developing countries is blatantly ideological in conception. Similarly, Alier (1990) finds that attempts to define degradation as stemming from poverty is ideological and shifts the responsibility for environmental degradation to developing countries by justifying and dismissing the damage caused by affluent living. It should here be noted that such ideological "biases mobilized as facts" can influence how the problem is conceived altogether by affecting the very attitudes, values, and parameters by which the problem is identified and assessed.

In addition, there is the theoretical confusion affecting the analysts. As Blaikie and Brookfield (1987: xvii) claim:

...much of the literature on land degradation is beset by a fundamental theoretical confusion ...Facts, ideologies, and beliefs are not identified, and the relevance and accuracy of much of the data base remain in doubt.

Whatever the source, there is substantial confusion as to the socially-induced causes of land degradation. Such shortcomings in the literature leave the reader uncertain not only as to the role played by human causes, but also as to the true significance of the problem. This uncertainty may have a debilitating effect on the development of practical policy programs appropriate to solving this problem. It is possible that such inadequacies are partly responsi-

ble for the limited acceptance of existing theoretical positions and the policy prescriptions based on these positions in less developed countries. Perhaps the widely observed failure of conservation programs in developing countries can be attributed to this problem.

In addition, the ideologically-bent analysis may constrain the scope for comprehensive analysis of factors causing land degradation by suppressing the facts in favour of mobilizing biases as to how the problem is perceived altogether. These biases may include ideas, values, conceptual frames mobilized through such analysis. It is not very clear why such biases are mobilized except for political and ideological reasons.

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