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Absenteeism of Policy Framework of Land Resources Management and its Influences on Land Productivity and the Ecosystem: A Review

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ABSTRACT

Based on the global distribution of land and soil quality and the world population, future trends in the agricultural use of land and soil resources are mainly constrained by loss of fertile land caused by insufficient soil management and through urbanization and industrialization. Due to this problem, sustainable land use for the production of food and fiber will be under threat. Due to this fact, this paper was reviewed to examine the influence of absenteeism of policy frame work of land resource management on land productivity and ecosystem. The reviewed paper showed that absenteeism of policy frame work had a significant effect on land productivity and ecosystem. Due to absenteeism of policy frame work there was inappropriate farming practices adopted at individual farmer. The adopted practices includes farming on steep slopes, deforestation and overgrazing, limited soil and water conservation measures, limited application of organic matter, burning of dung and crop residues influences. Hence, due to the above in appropriate farming practices, the land resources were faced a problem including, soil erosion by water and wind and further severe forms of soil degradation, such as loss of organic matter, contamination and loss of soil biodiversity, compaction, salinization, flooding, nutrient mining, desertification, drying of lakes, loss of biodiversity and these problems were resulted in low productivity of land and ecosystem as well. Hence, to improve land productivity and the ecosystem, appropriate technologies with to respective to land use system for the improvement of the productive capacity of the land should be implemented very well. Therefore, for effective land resources management, policy framework of land resource management should be developed and implemented for successful improvement of land productivity and ecosystem at the national level.

Key words: Absenteeism, Ecosystem, Land productivity, Land resource management, Policy frame work.

Land degradation, low and declining agricultural productivity, poverty and food insecurity are the main problems facing in the world. At the outset, it was noted that the proximate causes of land degradation and low productivity in the East African highlands are relatively well known, including increasing cultivation on steep and marginal lands; low and declining use of fallow; loss of vegetative cover resulting from deforestation and overgrazing; limited soil and water conservation measures; limited use of soil fertility-enhancing inputs such as fertilizer, manure and leguminous crops; and limited adoption of soil and water conservation practices (Clarke *et al*., 2008).

Underlying these proximate causes are many socio-economic and policy-related factors, including population pressure; poverty; limited development of and access to markets, infrastructure and credit; limited farmer awareness of appropriate and profitable technologies; limited development or responsiveness of agricultural research and extension systems to farmer's needs; land tenure insecurity, land fragmentation and limited development of land markets; limited education of farmers; limited alternative livelihood options; and policies related to these factors. Thus, the above problems are mainly constrained by absenteeism of policy frame work of land resource management. These problems can be alleviated by effective land resource management techniques through adoption of appropriate policy frame work of land resource management (Foley *et al*., 2011).

Land management addresses all issues related to the sound and sustainable use of land. It is the process by which the resources of land are put to good use. It covers all activities concerned with the management of land as a resource both from an environmental and an economic perspective. It maintains production, reduce level of risk, protect the potential of natural resources and prevent soil and water degradation, be economically viable and be socially acceptable (Lal, 2009).

Hence, there is a great need to adopt policy frame work of land resource management by farmers to produce more and improve their land productivity and the ecosystem

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as well. Therefore, the objective of this paper is to review the influence of absenteeism of policy frame work of land resource management on land productivity and ecosystem.

Objectives

General objective

The overall objective of the review was to reviewab senteeism of policy framework of land resources management and its influences on land productivity and the ecosystem.

Specific objectives

- To review concepts and roles of land resource management.
- To review role of policy frame work of land resource management.
- To review influences of absentees of policy frame work of land resource management.

Methodology

This paper is essentially a review article, is based on secondary data from earlier studies on absenteeism of policy framework of land resources management and its influences on land productivity and the ecosystem. The most current research publications and review papers were examined in this work. As a result, a thorough reading of both published and unpublished books, journals and articles served as the foundation for this article's review.

Concepts and roles of land resource management

The broad concept of land resource management refers to activities on the ground that uses appropriate technologies in the respective land use system for the improvement of the productive capacity of the land. This includes activities such as use of physical soil and water conservation measures, soil fertility management practices, controlled-grazing, agricultural water management, forestry and agroforestry practices (FAO, 2009).

Land management incorporates the adoption of land use systems through appropriate management practices that enable land users to maximize the economic and social benefits from the land while maintaining the ecological functions of the land. It can be seen from economic, social, institutional, political and ecological dimensions. Thus, land management practices emphasize finding economically *via*ble, socially acceptable and ecologically sound solutions at a local, regional, national and global level, which could promote participatory land management practices to deal with land degradation (FAO, 2009).

Land management is a complex process, which is not only the result of will or act of land users. Its problems and achievements go beyond the household's domain of operation to include actors in the surrounding environment. It combines technologies, policies and activities that are aimed at integrating socio-economic principles with environmental concern so as simultaneously maintain production, reduce level of risk, protect the potential of natural resources and prevent soil and water degradation, be economically *via*ble and be socially acceptable (Regassa, 2002).

Land is not just a commodity that can be traded in the market. It represents the following multiple values which should be protected by both policy and law: (a) Land is an economic resource that should be managed Productively; (b) Land is a significant resource to which members of society should have equitable access for livelihood; (c) Land is a finite resource that should be utilized sustainably; and (d) Land is a cultural heritage which should be conserved for future generations (Blum, 2009).

Land management is determined by private decisions made at the farm household level, as well as by collective decisions made at the village or higher levels. These household and collective decisions will determine current agricultural productivity and affect the condition of land resources (thus influencing future agricultural productivity), which in turn affect the level of farm income and rural poverty. It is important to emphasize that it is such outcomes (productivity, resource conditions and household incomes) and not adoption of specific land management practices per se, that are likely to be of most concern to rural people and to policy makers. It is thus critical to consider the ultimate impacts of any policy or technology on these outcomes and the extent to which there may be trade-offs or complementarities among these objectives. For example, a strict regulatory approach, *e.g.*, prohibiting farmers from planting annual crops on steep lands, may be effective in reducing soil erosion, but may also have severe implications for agricultural production, food insecurity and poverty (Pretty, 2008).

On the other hand, there may be. win-win-win strategies available that promote greater productivity and incomes as well as improved resource conditions. For example, promoting intensification of annual production on less steep lands and perennial production on steep lands may reduce land degradation, while increasing agricultural productivity and farm incomes (Anjum *et al*., 2010).

Land management decisions are determined by many factors operating at different scales (plot, household, village, region, nation and international). Many of these factors influence land management directly include population density, access to markets and the level of local prices also influence land management. Some of these effects are direct, while others are indirect. For example, access to markets and local prices determine the profitability of alternative practices. On the other hand, population pressure leads to smaller farm sizes and often to more fragmented holdings, which may reduce farmers (Blum, 2009).

One important indirect way in which biophysical and socio-economic factors affect land management is by determining what livelihood strategies have comparative advantage in a particular location and for particular households. For example, in areas close to a major urban market and high agricultural potential, farmers may be able to earn relatively high incomes from production of perishable cash crops (such as horticultural crops) or

intensive dairy production. The development of different livelihood strategies in a particular location may be influenced by many village level factors, such as agricultural potential, access to markets, population density and presence of government programs and organizations (Bardgett *et al*., 2005).

Role of policy frame work of land resource management

Land is the foundation for all life-sustaining processes on earth. Land supports the vast proportion of earth's biodiversity and underpins a wide range of ecosystem goods and services that humanity depends on for survival. Above all, land use in agriculture and forestry plays an important role. Policy frame work for Land resource management plays a great role to ensure sustainable, productive and equitable development, conservation, use and management of natural and man-made resources and serve as guides for the development of related sector policies, plans and investment opportunities (Anjum *et al*., 2010).

Furthermore, policy frame work has a role in preventing environmental degradation and its social and economic costs. These are sustainable management and utilization of land resources, conservation, management and protection of ecologically sensitive areas (forests, coastal and marine areas, wetlands, freshwater, watersheds), biodiversity and the strict control of development activities in these areas, scientific knowledge as a basis for decision-making, such as the use of the best spatial data and other tools, including resource inventories, as a basis for land use zoning. Further, policy frame work recognizes the values of economic productivity, equity, environmental sustainability and the conservation of culture and seeks to facilitate their protection (Blum, 2009).

A fundamental aspect of the proper use of land is to guarantee the sustainability of agricultural land and land resource. Proper use and management of agricultural land implies improving land productivity through encouraging different conservation and rehabilitation mechanisms and rational utilization of the country's land resource. This strategy is targeted mainly to chronically food-insecure, moisture deficient and pastoral areas. The focus is on environmental rehabilitation to reverse the current trend in land degradation and as a source of income generation for food insecure households. Watershed-based water harvesting and introduction of high value crops, livestock and agro-forestry development are new elements in the revised strategy (Clarke *et al*., 2008).

Government policies, programs and institutions may influence livelihood strategies and land management and their implications for productivity, sustainability and household incomes at many levels. Macroeconomic, trade and market liberalization policies will affect the relative prices of commodities and inputs in general throughout a nation. Agricultural research policies affect the types of technologies that are available and suitable to farmers in a particular agro-ecological region. Infrastructure development, agricultural extension, conservation technical assistance programs, land tenure policies and rural credit and savings programs affect awareness, opportunities, or constraints at the village and household level (Pretty, 2008).

Some studies have shown that farmers use various soil fertility management practices including manure, bund, crop residue, crop rotation and cover crops. Most soil fertility management practices were targeted at gaining short-term benefit from agricultural yield. On the contrary, farmers gave less emphasis for management practices that ensure long-term benefit of agricultural yield. Organic and inorganic sources of nutrients and agronomic management practices are crucial to improve soil fertility status in general and for the productivity of agricultural lands in particularly (Clarke *et al*., 2008).

Influences of absentees of policy frame work of land resource management

Land productivity and ecosystem can be challenged not only by long-term insecurity of land, water and forest resource bases, but also challenged by absenteeism of policy frame work of land resource management to protect these resource bases to enhance agricultural productivity and improve the livelihood of rural dwellers (Barrios, 2007).

The land management problems, constraints and opportunities for improved land management in such a situation (*e.g.* declining soil fertility, potential for use of inorganic fertilizers or livestock manure, potential benefit of credit) are likely to be significantly different than in more remote areas where less intensive subsistence mixed crop-livestock production may predominate (*e.g.* opportunities for improved fallows, need for improved management of common grazing lands, appropriate technical assistance to improve both livestock and crops). The unavailability of legally accessible and affordable land policy frame work has contributed to the chronic problems of squatting and other illegal development on both government and private lands (Pretty, 2008).

Therefore, absenteeism of policy frame work of land resource management is the main problem. Due to this, farming on steep slopes, deforestation, overgrazing, limited soil and water conservation measures, limited applicants of nutrients/organic matter, burning of dung and crop residues may be the dominate practices. As a result, loss of land productivity and ecosystems has been occurred in the past (Bardgett *et al*., 2005).

Influences on land productivity

Low levels of land productivity and subsequent land and resource degradation can often be traced to inadequate access to the best or most appropriate knowledge required to overcome local constraints. Providing better information to both technology developers and farmers can stimulate

the adoption of both soil conservation technologies and improved land management practices. Most of the threats to land and soil arise because we expect the soil to perform a range of functions, in some cases many functions at the same (Lal, 2009).

These threats are increasingly seen as particularly relevant to the biomass production function of soils and hence impact global food security soil sealing through urbanization and industrialization Establishment of the infrastructure for modern life, housing, roads or other land developments is known as soil sealing. When land is sealed, the soil is unable to perform many of its functions including the absorption of rainwater for infiltration and filtering in general. In addition sealed areas may have a great impact on surrounding soils by changing water flow patterns. Soil sealing is almost irreversible and there is increasing concern amongst governments and environmental regulators at this permanent loss of soil and the associated loss of ecosystem functions (Pretty, 2008).

Land productivity dynamics

The term 'land productivity' effectively refers to variations in the rate, quantity and timing of the standing biomass production of an ecosystem. Factors that influence ecosystem biomass production include climate and climate variation, ecosystem structural elements (such as altitude, slope, soil and all the life-supporting characteristics of the soil), type of biomass and of course human interaction (such as urban, forest, agriculture or pastoral activities) (Lal, 2009).

Hence, land productivity is an expression of the combined changes that occur in such area in terms of overall standing biomass production. Care must be exercised in interpreting this new metric. It provides a consistent overview but, given the measurement scale, cannot be used for highly localized decision making. Land productivity is an indication of the level of sustainable land use, calculated as the relationship between land quality in general productive terms and hat is obtained as output (Pretty, 2008).

Although signs of declines and increases in land productivity are found throughout the EU territory, this does not necessarily indicate land-degradation neutrality. To establish this condition, an assessment by contextual analysis in relation to the major land degradation issues in Europe is required. Key land degradation issues in Europe include inappropriate agricultural or pastoral intensification, soil sealing, soil erosion, agro-silvo-pastoral land abandonment and increased frequency of climatic extremes that impact the vegetation and/or condition and functioning of the soil (Lal, 2009).

Therefore, the signs of declines and increases in land productivity need to be evaluated with respect to their association to one or more of these land degradation issues. Ecosystem types and related land use options need to be included in the trade-offs. Decline, or its early signs, in land productivity can be caused by processes such as meteorological extremes such as droughts (and the related increased fires risk), or floods, by climate variability resulting in changes to the start and/or end of the growing season, or abnormally warmer or colder periods that cause plant stress. In densely populated areas, a decline in land productivity may be due to loss of soil or productive land that is caused by expanding infrastructure rather than lower biomass production per surface area unit (Reynolds *et al*., 2007).

In agricultural areas (croplands and pasture), land productivity decline may be attributed to the loss of semi-natural vegetation converted into agriculture or other land use changes. Overgrazing may be a factor and other changes in land management can also cause a decline in production (*e.g.* cultivated varieties producing less biomass, changes in fertilizer regime, irrigation and land drainage (Pretty, 2008).

Indicators of low land productivity

Decline in soil organic matter

Organic matter plays a central role in maintaining many key soil functions and is a major determinant of soils resistance to erosion and underlying soil fertility. There is evidence that with a shift in the last half century towards greater specialization and cereal monoculture particularly in temperate regions, losses of soil organic matter through decomposition are often not completely replaced. Specialization in farming has led to the separation of livestock from arable production so that rotational practices which were important in the past in maintaining soil organic matter content no longer exist (Brussard *et al*., 2007). The application of organic matter improves soil aggregation, thus increasing porosity and available water capacity (Afifatul *et al*., 2024).

Losses of soil organic matter can be reversed with the adoption of land management practices such as conservation tillage, including no tillage cropping techniques, organic farming, permanent grassland, cover crops, mulching and maturing with green legumes, farmyard manure and compost (Lal, 2002).

Moreover, carbon as a major component of soil organic matter plays a major role in the global carbon cycle. Recent studies have emphasized the important role of the soil carbon pool in the context of global carbon fluxes. Soil contamination may result in damage to or loss of individual or several functions of soils and the possible contamination of water. The occurrence of contaminants in soils above certain levels entails multiple negative consequences for the food chain and thus for human health and for all types of ecosystems and other natural resources. Soil contamination may impact food production because the contaminants inhibit growth and the food may be unfit for human consumption. The increased urbanization has the potential to produce soil contamination and further impact on global food production (Blum,1998).

Decline in soil biodiversity

Soil is the habitat for a huge variety of living organisms (Bardgett *et al*., 2005). Soil bacteria, fungi, protozoa and

other microorganisms play an essential role in maintaining the physical and biochemical properties needed for soil fertility (Barrios, 2007). Larger organisms such as worms, snails and small arthropods contribute to reducing the size of organic matter which is further degraded by microorganisms and carry it to deeper layers of soil, where it is more stable. Furthermore, soil organisms themselves serve as reservoirs of nutrients, suppress external pathogens and break down pollutants in to simpler, often less harmful, components (Turb *et al*., 2010). The interrelationships and interdependence amongst species is complex. The loss of a single species may have a cascading effect because of this interdependence (Pimentel *et al*., 2006).

Reductions in soil biodiversity make soils more vulnerable to other degradation processes and frequently reduce their ability to perform many ecosystem functions (Hunt and Wall, 2002). Because soil biodiversity interacts with many soil and broader environmental functions it is often used as an overall indicator of the state of soil health (Chapin *et al*., 2000).

Soil compaction occurs on agricultural land when soil is subject to mechanical pressure through the use of heavy machinery or overgrazing, especially in wet soil conditions (Horn and Peth, 2011). Compaction reduces the pore space between soil particles and the soil partially or fully loses its capacity to absorb water. Compaction of deeper soil layers is very difficult to reverse (Horn *et al*., 2000). The overall deterioration in soil structure caused by compaction restricts root growth, water storage capacity, biological activity and stability and significant reduces fertility and food production (Clarke *et al*., 2008).

Soil nutrient mining

Soil nutrient mining is possibly one of the most significant threats to food production in large parts of the tropics. Agricultural production in much of Africa is threatened by nutrient mining. The context of agricultural production in much of the continent is one of fragile ecosystems, low inherent soil fertility and low use of modern inputs such as mineral fertilizer and improved crop varieties. The traditional practice in Africa and in particular Sub-Saharan Africa is one of fallow systems, where soil is left uncultivated to allow recovery (Reynolds *et al*., 2007).

Increasing pressure on land through both rising population and in some countries exclusion of indigenous populations from parts of the landscape through land grabbing has resulted in a reduction in the length of fallow periods and in some cases their removal. Nutrient balances which consider the inputs and outputs from the system have been used to estimate the magnitude and extent of nutrient mining. During the period of 2002 2004 85% of African agricultural land (15 million km^2) had annual nutrient mining rates of over 35 kg (N, P and K) per hectare and 40% had annual rates greater than 60 kg per hectare (De Jager *et al*., 2001).

Influences on ecosystem

Absenteeism of policy frame work of land resource management has a tremendous effect on ecosystem. It results in rapid environmental degradation that results from agricultural expansion to marginal lands and deforestation. Rapid environmental degradation results loss of biodiversity, desertification, drying lakes (Dagnachew, 2008). The pressure on natural habitats, soil degradation, including the depletion of soil health, erosion and pollution of natural resources, will increase with intensive cultivation, the clearing of more forest lands for crop production and increasing cropping intensity on existing croplands. The conversion of natural ecosystems into agricultural lands, known as agricultural intensification, alters the type and quantity of organic residual input, as well as how it is distributed in the soil and accelerates the mineralization of soil organic carbon (Guo and Gifford, 2002).

Desertification

Desertification is a complex process of land degradation through natural and human induced impacts (eg. As a result of environmental responses to climate change),expressed in increased periods of droughts or overuse of natural resources, especially vegetation covers, by grazing or fuel wood collection, with subsequent soil degradation and losses, including salinization (Anjum *et al*., 2010). Desertification increases the pressure on still productive land and soils for food production and may even cause social conflicts (Blum, 2009).

Dregne (1998) estimated that 3592 billion hectares of land had been affected by desertification. Eswaran *et al*. (2001) estimated that a “desertification tension zone affects a total land area of about 423 billion hectare of which 117 billion ha occur in areas with high population density (<41 persons per km^2). Bai *et al*. (2008) estimated land degradation affected 35 billion ha or approximately 24% of the global land surface. Reynolds *et al*. (2007) discuss more sustainable approaches in the use of drylands at a global level in response to these pressures.

Drying lakes

Lake Haramaya, Ethiopia: the most dramatic changes on wetland degradation severe soil erosion, resulted from the intense rainfall and steep slopes, over abstraction of the water which led to problem of sedimentation and siltation and complete dried up of the lake. The case of Lake Haramaya can be an example of the serious threat and an alert for other existing lakes in Ethiopia/Africa (Dagnachew, 2008).

Lake Naivasha, Kenya, an official ‘Ramsar Site’ 30,000 hectare, has turned into a shallow mud pool during the 2009 drought. The wetland areas are facing commercial overexploitation. Flower farmers in the lake continue their production, despite the extreme water shortage that the area is facing. The falling water levels, pollution caused by agro chemicals and fertilizer residues, over-exploitation of fisheries, poor wetland management, especially unsustainable use of water resources, is the root cause of the totally drying up of wetlands in Africa (Wetland International, 2009).

Lake Chad, once one of Africa's largest freshwater lakes, has shrunk dramatically in the last 40 years. Lake Chad's shrinkage is due to ever increasing demands of an expanding population, overgrazing surrounding the lake and subsequent decline in vegetation causing extensive desertification. This environmental degradation is mainly due to resource depletion (Wetland International, 2009).

Land degradation

High land areas are facing for serious land degradation and loss of bio diversity due to human intervention, poor land and water management due to absence of policy frame work for land resource management (Gete, 2007). In order to preserve the health of the soil and meet human requirements, it is crucial to implement a sustainable land use system (Pankaj *et al*., 2024).

CONCLUSIONS AND RECOMMENDATION

The sustainable production (availability) of food is increasingly threatened through impacts deriving from human activities, especially changing forms of land use at local and global scales. Most critical are soil losses through sealing by urbanization, industrialization and transport, probably the most important threat to food security of all, but also erosion by water and wind and further severe forms of soil degradation, such as loss of organic matter, contamination and loss of soil biodiversity, compaction, salinization, flooding, nutrient mining and desertification. Moreover, the decrease in productive agricultural area and the degradation of the remaining productive surfaces is not the only threat to food security. Moreover, climate change is threatening food security directly through increasing losses and degradation of soil, mainly through extreme events and in many regions a decrease of water resources is threatening rain fed and irrigation agriculture. Meanwhile, an emerging severe competition occurs through the competition for space, energy and water for biofuel production and the concomitantly increasing demand for food and fiber on the local and world food markets.

New economic concepts and speculation on food markets can hamper the access to food through high fluctuation in prices. Moreover, the decreasing availability of productive agricultural land has led to land grabbing, mostly in developing countries of Africa, Asia and Latin America, threatening land and soil quality. Without new approaches in land and water conservation at local and worldwide levels, it has to be expected that within one or two decades food shortage will severely further threaten millions of people and increase hunger, especially in countries in development.

Hence, it is recommended that policy framework of land resource management should be developed and implemented for successful improvement of land productivity and ecosystem at the national level.

Conflict of interest

The author declares that they have no conflicts of interest.

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