

Land Degradation and its Management: A Review



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Submission: June 22, 2020; **Published:** July 02, 2020

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Abstract

Land is the essential component which provides us food, shelter, and fiber. It is non-renewable resource which is degraded day by day. Some major factors like climatic, natural and anthropogenic deteriorate quality of land and degraded it for agriculture use. Agriculture sector is directly linked with land while most of the agriculture land is degraded by some factors. Due to rapid changes in climatic conditions, deforestation, desertification, erosion, salinization, waterlogging, and organic matter depletion lead to land degradation. For restoration of land, it is important to minimize these activities and properly managed all factors. We can manage our land by ground covers, alternate fuels, timber replantation, dams and by making the policies. Furthermore, organic agriculture may be an alternative to save our land from degradation. The present review focuses on effect of land degradation on agriculture and environment; and how we can manage our lands from further degradation.

Keywords: Land; Degradation; Agriculture; Environment; Management

Introduction

Agriculture is an important sector of economy and plays a significant role like GDP share, foreign exchange earnings and employment etc. The development in this is very important because it is an important economic sector, which gives the basic constituents to the population. It is observed that increased agriculture productivity and output tend to share substantially to all economic development sectors [1]. However, there are many factors which influence the agriculture productivity such as weeds, poor nutrition and the most soil degradation. Land degradation is an environmental process in which biological, economical and quality of land is lost due to alteration in chemical, physical and biological properties. Land degradation may be caused by erosion, loss in soil organic matter, soil acidity, deforestation, desertification, salinization, soil compaction and such more phenomena that make agricultural land unfavorable for crop production [2]. Globally, about 60 percent of area is degraded [3]. Furthermore, land degradation alters biogeochemical and hydrological cycles in earth [4]. Land degradation is an ecological sensation that disturbing arid lands and effect the economic and natural excellence of an agronomic land [5]. Other hand land

degradation is a continuing deterioration of environment [6] and production [7]. Globally annual degradation cost is about USD 40 billion [8]. It will remain an important issue for 21st century due to its negative effects on crop production, environment and food security. It has become an important environmental problem [9]. Globally, degraded lands are approximately 18.1 million km² in which 92 percent is due to mismanagement and 38 percent is due to overgrazing of animals [10]. Overall, 20 percent of arable land, 30 percent forests and 10 percent grasslands are affected due to land degradation, affecting 1.5 billion people and it may be due to the result of different factors or combination of anthropogenic activities like climatic variations and unsustainable management of land [11]. It occurs in the form of total loss in vegetative covers and loss of its economic productivity or biophysical by exposure of soil surface to water and wind erosion, and by water logging, soil and salinization, leading to decline in biological, chemical and physical soil properties. The continued vegetation loss due to human activities and salinization also depletes the biodiversity, and it decreases the capability of natural ecosystem for CO₂ sequestration with long-term influence of climate and global

warming; the overgrazing to animals in rangelands is particularly very severe in arid lands [10]. There are many strategies to manage the soil degradation process by ground covers, alternate fuels, timber replantation, dams and by making the policies. Furthermore, organic agriculture may be an alternative to save our land from degradation. [12] stated that land degradation can be managed by conservation tillage and integrated soil fertility management (ISFM) strategies. The present review focuses on effect of land degradation on agriculture and environment; and how we can manage our lands from further degradation.

Land Degradation

Land is global environmental part that holds natural assets (aquatic portion, flora and topsoil) the natural geography, anthropological and progressions substructure and disbursements that function inside the ecosystem [13]. However, Land degradation can be defined as long-term injury to ecosystem productivity and functioning initiated due to disturbances from which land and its components cannot recover [7]. Before 1000 years ago, terrestrial ruination has accompanied humankind at least consequently the extensive farming implementation [14] and the intensification related populace [15]. The most important causes of degradation are poor farming practices, inappropriate irrigation, overgrazing, urban sprawl, commercial development, and land clearance. Moreover, land pollution includes quarrying of sand and stone and minerals and industrial waste. High density of population is not necessarily correlated with degradation of land [16]. About 50 percent of agricultural land are going to be degraded from moderately to severely. Land degradation effects about 1.5 billion humans globally, 15 billion tons' soil disappears every year, about 12 million ha⁻¹ lost every year due to desertification and drought, about six million km² dry lands leads towards desertification. The Biodiversity of about 27000 species lost annually due to degradation of land, about 110 countries have potentially at risk regarding dry lands, approximately 250 million people are affected and about 1 billion are under risk or threat. Global cost of desertification is \$ 42 million [10]. Principal processes of degradation include erosion by wind and water, chemical degradation (leaching, salinization and acidification etc.) and physical land degradation (hard-setting, compaction and crusting). Some landscape units or lands are influenced by more than one degradation process [16]. There are different causes of land degradation i.e. Deforestation, Livestock grazing Pressure, water logging and salinity.

Effect of land degradation on agriculture

Land degradation is basically a huge worldwide issue due to its antagonistic influence on agriculture efficiency. It also has bad impact on ecological circumstance and nutritional safety. Ecosystem is also affected by degradation, because nonstop degradation has now faraway getting categorizations: it expresses problematic situations for ecological growth, it splits adverse effects on the socio-economic circumstances and agriculture

also [16]. Land degradation is an outcome of regular or atrophic aspects which can cause decrease in production. In framework of production, land degradation marks from a gap among land excellence and land usage [17]. Globally above 20% of agricultural zones, 30% of plantations and 10% of savannas are effected by land degradation, this degradation caused by human actions like unmaintainable land managing and environmental deviations [7]. Furthermore, Recent studies suggest that about 5 to 6 million ha of agriculture land are permanently lost annually due to salinization and soil erosion and many other land degradation practices. Degradation cause yield losses which may develop more significant relation to the yield growth and loss in future, as the yield rates are projected to drop below 1% annually in coming decades. This is more sever in the semi-arid and arid regions because of combined resources; lack of infrastructure and economic factors [10]. About 50 percent of agricultural land are going to be degraded from moderately to severely. Land degradation effects about 1.5 billion humans globally, 15 billion tons' soil disappears every year, about 12 million ha⁻¹ lost every year due to desertification and drought, about six million km² dry lands leads towards desertification. The Biodiversity of about 27000 species lost annually due to degradation of land, about 110 countries have potentially at risk regarding dry lands, approximately 250 million people are affected and about 1 billion are under risk or threat. Global cost of desertification is \$ 42 million [10]. [18] observed that land degradation causes loss of soil nutrients and O.M and then reduction in crop production. [19] reported that the major component that may cause reduction in productivity is physical land degradation within the root zone. The most important reason for increased erosion is urban sprawl industrial, deforestation and agriculture. Usage of tillage implements in agriculture will damage top vegetation and causes erosion [20].

Effect of land degradation on environment

Land degradation is an ecological sensation that disturbing arid lands and effect the economic and nature of agronomic lands [5]. Land degradation directly influenced cultivation, ecosystem, production, environment, nutritional value and biodiversity [21]. It also influences the biophysical environment by distressing the land by anthropological or natural processes. The natural sources contain earthquakes, tidal waves, erosion, overflow of water and cyclone. Degradation through anthropological activities mostly significantly affect the environment [22]. Global estimations of land degradation demonstrated that Asia has extremely affected but Africa, and Europe are slightly influenced [23]. Early historical study demonstrated about nonstop effect of volcanic activity lead to land degradation and has a great impact on the environment [24].

Management of land degradation

[12] demonstrated about land degradation can be managed by conservation tillage because it required minimum employs

and low cost. Integrated soil fertility management (ISFM) deals with the reclamation of problematic lands and make them more productive. Through ISFM efforts we can increase nutrient uptake, improve soil fertility and inorganic nourishments which leads to improvement in land efficiency and productiveness. ISFM services not only increased the crop yield but also recover degraded zones [25]. [26] demonstrated that arid land for the improvement and reclamation of degraded lands the domestic structure must be integrated in all related areas which gives direction for asset in sustainable land management (SLM) and stimulating community response towards SLM. Management techniques such as fencing, fertilizer application, placement of salt and supplements, burning and water development can control overgrazing by animals and leads to improve soil fertility [27]. Irrigation system management can also helpful to reduce land degradation, irrigation must be controlled i.e. drip irrigation to decrease soil and water erosion. Using low and high salt water was the most efficient way for maintaining the clay soil productive capacity. Often heavy irrigation can cause nutrient leach down and top fertile degrade. Management of irrigation water is key factor to improve soil quality [28]. Community-based societies must be recognized at native public level to link conversations among systematic data and specific consumers [29].

Conclusion

Land degradation has many negative impacts on agriculture and environment. Land degradation may be caused by i.e. water erosion, deforestation, soil compaction, desertification, salinization, waterlogging and many more. It became more dangerous because it directly or indirectly effects the food security and environment. So, it is important to minimize the losses caused by land degradation. The present review concludes that the land degradation can be managed by integrated application of organic and inorganic fertilizer, use of drip irrigation and reduce the use of heavy tillage implements. Furthermore, new policies are required to reduce the damage caused by land degradation..

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DOI: [10.19080/IJESNR.2020.25.556157](https://doi.org/10.19080/IJESNR.2020.25.556157)

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