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Land management, Ecology and Degradation in Australia

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Abstract

Land degradation is an idea in which the value of the environment of biophysical is impacted by several associations of human activities affecting the land. It refers to the impairment of natural soil and its components in any ecosystem. It is also seen as a reduction of quality of lend caused by activities of human beings. This has been a major problem since 20th Century and it's still the problem currently. The study has shown that the lands in the world have seriously degraded. Moreover, the main results of degradation of land is a remarkably decrease in the land productivity especially in the agricultural production and environmental ecosystem. The study captured the major causes of land degradation which include: Deforestation, Overgrazing, over irrigation, quarrying of stones or mining, Desertification, Infrastructure and Population density. The study also shows that adversely impacted remarkably large portions of arable land reducing the economy and wealth of the research region. As land reduces its productivity there's increase in food insecurity and competition for the available resources. Therefore, the research provided the mitigate strategies of land degradation so as to reduce poverty and food insecurity at the study area.

Key words: *Land management, Ecology and Degradation in Australia*

1.1 Introduction

Available evidence suggests that land degradation in Australia is substantial (Cork & Eadie, 2015). The forms of degradation vary widely and include: changing soil mineralisation, such as salinity and acidity; soil structure decline and erosion caused by water and wind; and biological changes such as plant and animal invasion, tree decline and the clearance of native vegetation (Metcalfe & Bui, 2017). Several of the most prominent forms of degradation such as soil structure decline and induced soil acidity are site specific and reversible (Xu, Yin, Li, & Liu, 2016). The initial effects of these forms of degradation occur at the individual farm level with few spillovers to adjacent properties and areas. Other forms of degradation such as dryland and irrigation salinity relate to catchment or biogeographic regions and can be classed as reversible, too (Cork & Eadie, 2015). In other cases such as loss of top soil, and loss of native habitats, flora and fauna, the natural repair periods are so long that for practical purposes, damage arising from human activities could be deemed as permanent.

Land degradation is when the value of biological environment is adverse effects caused by any human activities that are undesirable and always causes permanent damage to the soil. Hazards that natural are not included as a source; but activities of human impact can directly impact phenomena like bush fire and floods (Cowie, et al., 2019). Integration of science of ecology and geomorphological is of importance due to geo morphological effects on management of environment. The role of geology is always prominent by the effect lithology in parent material and tectonics in the geofoam of origin of structure. Geomorphology helps in formation of soil by action of relief, time, weathering, morph climatic and morph dynamics.

On the other hand, water holding capacity of the soil is primarily controlled by organic matter and its texture (Webb, et al., 2017). Soils with large articles have smaller surface area while those with small particles have a larger surface thus holding more water therefore is vital to have a maintained proper soil moisture levels because soil acts as a medium for plant growth (Kust, Andreeva & Cowie, 2017). Water and soil have a reciprocal linkage. Soil with nutrients helps plant growth acting as water storage and helps the plant for root anchorage. While plants guard the soil thus reducing erosion and maintaining soil nutrients.

Ecology refers the relationships linking organisms, including their physical environment and humans. Ecology considers organisms at the individuals, population, community, ecosystems, and biosphere level (Gretton & Salma, 2016). Ecology overlaps with the closely related sciences of genetics, biology, natural history, ethology, evolutionary biology and biogeography (Cork & Eadie, 2015). Ecology has direct applications in biology of conservation, management of wetland, and resource that are natural such as forestry and fishing, planning of the city, health of the community.

1.2 Objective

The ever-increasing land demand for development of economies and growing rural and urban population are causing a great impact to the land. Change in land use is causing land degradation, erosion of soil, bio diversity loss, depletion of nutrients, scarcity of water, pollution and loss of biological cycles. This threatens their food, supply of water, lowering the quality of their environment and causing bio diversity decrease. To curb this menace, sustainable land management should be adopted to give a wide range of remedies to control and lower degradation of land.

2.0 Research Methodology

This was a literature based review study. The study focused land degradation and Management in Australia. A critical synthesis of past studies across the globe and in Australia was referred to. Land degradation involves reductions in the productivity of affected lands. The reduction in productivity estimated as the decline from value of production obtainable with current land uses had there been no degradation provides a measure of the production equivalent of degradation.

3.0 Biophysical attributes of land degradation

3.1 Causes of land degradation

Deforestation happen when human being cut tree, shrub lands and woodlands and shrub lands to get firewood, timber and other products—at a pace above the rate of natural regrowth (Hill, et al., 2013). This is always environments of semi-arid, where shortages of fuel wood are always adverse. Overstocking and overgrazing destroys land cover exposing soil/land to agents of soil erosion like rain foods and wind (Conacher & Conacher, 2010). The continuous action of these agents destroys land resulting to extreme land degradation.

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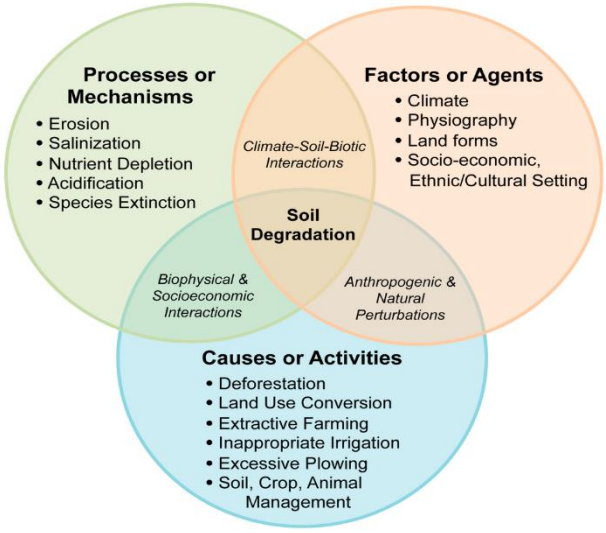

Population pressure also entails other mechanisms. Unsuitable agricultural practices, such, occur only under challenges like the saturation of good lands under high population which leads settlers to do crop farming in too shallow or too steep soils, plough allow land before it has regained its fertility, trial to get plants by watering the unfit soil. Degraded land leads to desertification thus affecting human heath through various ways. There is decrease in food productivity, there is increase in food production in some places drying up of water sources thus making people to move and settle in areas that are not occupied. The degradation of land in developing countries who rely on farming is forcing people who cannot make a living through faring move to urban settings thus causing higher food prices on towns, water shortages, increase in poverty and pollution which will affects biotic and abiotic environment

Infrastructure; the construction of building roads and bridges has to the development of social amenities improving human living standards but also it has led to heavy soil erosion, mass wasting, disturbance of natural drainage system causing deep cuts thus causing excessive land degradation of land near the road, sedimentation as well as unpredictable rainfall pattern

Desertification happens specifically, but not exclusively, in semi-arid areas. In semiarid areas, soil is fragile coupled with bad land use practices, overgrazing and natural phenomenon disturbance. An estimated thirty-three percent of global land area is dessert. Dessert land is degradable and do not support any viable economic productivity particularly crop farming.

Mining; mining on the surface by small-scale leads to removal of large quantities of soil on the top, causing he land to be bare and vulnerable to soil erosion. Moreover, left mining pits by artisans without proper reclamation leads to more degradation of the land.

Excessive irrigation lads to water logging that facilitate the raising of alkalinity and salinity of the soil. Burning of fossil fuel which releases large amounts of greenhouse and carbon dioxide into the atmosphere where heat is trapped thus causing global warming.

Uncontrolled and excessive use of pesticides and fertilizers degrade the soil and may affect the non-target organism. This can damage the microorganism such bacteria and fungi. Soil biomass is also affected and this plays role in soil nutrient element cycle.in order to maintain sustainable ecosystem, there should be a regular assessment of quality of soil and control pesticide application. Replacement of trees by farming in mountainous area can cause increase in run off often caused by land degradation. Sediment pattern and geomorphological p always show a complex anthropogenic role in the degradation of the land.

3.2 Attributes of land degradation

These are indicators of land degradation that are often used to monitor desertification from the global to the local level. These indicators include;

The slope of the land which impacts the soil erosion especially on the steep slopes that leads unproductive land hence poor vegetative growth and water scarcity due to poor water drainage as there's high water runoff.

Soil salinization is an attribute of land degradation that is influenced by water stress that impacts the soil minerals and acidification hence soil salinity. The accumulation of salts n the soils happens through weathering and mass wasting of soils by erosion hence changing the parental materials. In arid areas, soil salinity are formed because of the evapotranspiration and inefficient or no rainfall to flush the soils. Wind also facilitates the blowing of moderate salts into the land hence increasing the soil salinity. When it is untreated, it decreases productivity while salinity can destroy buildings and other structures like roads, pipes and sewers. It can as well destroy habitat for wildlife and kill organisms in the soil

Rain seasonality is impacted by the irregular distribution of rainfall in a year due to deforestation. Degradation affects growth yield by reducing the depth of the root and water As well as nutrients available in the soil. This affects the soil ph, potassium, carbon, nitrogen and phosphorus content as the degraded land will not be able to hold a lot of water thus causing flooding

3.3 Need for conserving natural resource base

The land used for agriculture is now utilized economically and intensely and this means an increase in degradation. In order to manage the growing population and increase food productivity, land policy has to be amended to maintain the natural resource. This will be achieved by making sure that local people are involved in planning and implantation of policies

Lack of actions to reduce degradation of the land will cause an increase in emissions and decrease carbon sinks and is inconsistent with decrease in emissions required to control global warming. Few researchers have particularly managed the effects of proposed policies relate to land degradation (Wairiu, 2017). Many studies have been trying to understand how ecosystem and livelihood are impacted by a specific stressor (Campbell, Alexandra & Curtis, 2017) such heat stress, waterlogging and drought. Vital concepts gaps remain in question on how ecosystems and habitat are impacted by interacting stressors from large implementation of negative emissions. It can impact biotic, water and soil components together with their components.

3.4 Process of land degradation

Interaction between biological, human processes, chemical and physical play a major role in soil degradation biological activity and ecological or human activities triggers the process. While pressure causing degradation of the land are always exerted on particular function of land system such as water, soil ad biotic. Once the degradation has started the components of degradation are affected instantly.

Dry lands are vulnerable to land degradation due to unpredictable rainfall and poor soil.one of the main ways is through erosion such as wind water. Loss of fertility is also common due to loss of soil nutrients like potassium or reduction in in organic component in the soil. there are also other factors considered to be the cause of land degradation shifting in trees and cover the hardening of the soil, wildfire and reduction in water catchment areas through over extraction of water from the ground.

Multiples interaction cause land degradation as well as underlying cause such as demographic, cultural, economic and institutional. Almost every country in Africa is at risk of desertification, but the Sahelien region are vulnerable. reductions in forest cover, changes in forest structure, decrease in mean species distribution, decrease in habitat diversity, changes in abundance of specific indicator species, reduced vegetation health and productivity, are the most common indicators in the vegetation condition of woodland and forest (Stocking et al. 2001; Wiesmair et al. 2017; Ghazoul and Chazdon 2017; Alkemade et al. 2009).

3.5 Indirect impacts on land degradation

This is not easy to quantify due to many conflating factors. The causes of land-use change are not simple, joining biological, physical and socio-economic drivers (Lambin et al. 2001; Lambin and Meyfroidt 2011). One of the driver of land-use change is the degradation of agricultural land, which can lead to negative cycle of natural land being changed to agricultural land to maintain production levels. The intensive management of agricultural land can cause loss of soil function, negatively impacting on the many ecosystem benefits provided by soils, such soil carbon sequestration and maintenance of water quality (Smith et al. 2016a).

3.6 Strategies

Afforestation, Crop rotation and Use of organic fertilizer

It helps in addressing issues related to barren land and soil erosion. Vegetative cover act as wind breakers by reducing the speed of wind and lowering its effect to carry big and large volume of soil particles, and also trees provides hydrological ecosystem hence leading to predictable rainfall patterns. Crop rotation is the process of farming in series of various types of crops in the same farm in a sequence. This enhances in decreasing soil erosion and facilitates soil fertility thus increasing crop yields. Use of organic fertilizer helps in conserving the soil physical, chemical and soil structure. This creates a long lasting remedy.

Contour ploughing

Helps to reduce the effects of landslides and storms as well as floods by lowering soil erosion by half. Increased infiltration, moisture and ration help in increasing soil composition and quality.

Educational awareness and training

This can be achieved through training and teaching of people from each community on how to manage natural resources such as land. Through these, there will enough sensitization thus reducing the damage.

Rainwater harvesting

Eco-friendly method to as it causes an increase in ground water. This is effective as it helps in saving the earth from soil erosion through the impact of rain water droplets and attenuations which causes splash erosion. Use of renewable resources helps in producing gas that has no green hose gas thus reducing air pollution. Renewable sources also help in lowering relying on imported energy.

4.0 Conclusion

Land rehabilitation is a process of reconstructing damaged land structure into its original form. Land degradation often result from bad land us practices like over cropping overgrazing and tree destruction. Important issues when rehabilitating destroyed land include tree planting, soil structure reconstruction and minimizing dumping of pollutants into the environment. Wind breakers both natural and artificial windbreakers such as vegetation reduce soil erosion and wind erosion thus helping in managing land degradation.

Resource use sustenance entails the sparing use and management of resources while ensuring that the environment is protected. However, destructive land use practices that include excessive land barrowing, overgrazing and tree cutting undermines the process of maintaining resource and biodiversity protection. In addition, growing human population globally implies that more resource is required to sustain the human needs including sufficient access to food, safe water for domestic and industrial use. Thus, the ecological system has to be protected for future world generations.

5.0 Recommendation

There also need for revision of land application polices considering that there is equitable resource distribution among the people climate change increases the risk of land degradation, both in terms of probability and results, but the exact attribution to climate change is challenging due to several confounding factors. But because of change of climate enhances most degradation activities, it is obvious that, unless land management is controlled, climate change will always cause land degradation.

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