INTRODUCTION

Land is an essential building block of civilization, it is essential for growing most of the food that the world's ever-growing population needs, and yet its contribution to our quality of life is perceived and valued in starkly different and often incompatible ways. A minority has grown rich from the unsustainable use and large scale exploitation of land resources, with related conflicts intensifying in many countries. The world has reached a point where we must reconcile these differences and reconsideration the way in which we plan, use, and manage the land.

While, land degradation is a global problem, it takes place locally and requires local solutions. Greater commitment and more effective cooperation at the local level are necessary to stop land degradation and loss of biodiversity. Our ability to manage trade-offs at a landscape scale will ultimately decide the future of land resources – soil, water, and biodiversity and determine success or failure in delivering poverty reduction, food and water security, and climate change mitigation and adaptation. Indeed, integrated land and water management is recognized as an accelerator for achieving most important Sustainable Development Goals. Further agricultural expansion, one of the main causes of land degradation, could be limited by increasing yields on existing farmland, shifting to plant-based diets, consuming animal proteins from sustainable sources, and reducing food loss and waste.

Moreover, we are at a critical occasion, fast approaching and in some cases surpassing global boundaries, the evidence presented the Global Land Outlook (GLO), demonstrates that informed and responsible decision making, improved land management policies and practices, and simple changes in our everyday lives, can, if widely adopted, help to reverse the current worrying trends in the state of our land resources.

However, the GLO provides the first in-depth analysis of the multiple functions of the land viewed from a wide range of interrelated sectors and thematic areas, such as the food-water-land interactions, as well as less obvious drivers of land use, notably the nature of economic growth, consumer choices and global trade patterns. It addresses the future challenges and opportunities for the management and restoration of land resources in the context of sustainable development, including:

- Food, water and energy security
- Climate change and biodiversity conservation
- Urban, peri-urban and infrastructure development
- Land tenure, governance and gender
- Migration, conflict and human security

WHAT IS SOIL DEGRADATION?

Many people do conceive the idea of soil degradation but a good number lacks the knowledge of its precise definition. To fill this knowledge gap, soil degradation simply means the decline in soil quality which comes

about due to aspects such as improper land use, agriculture, and pasture, urban or industrial purposes. It involves the decline of the soil's physical, biological and chemical state.

Soil degradation examples include decline in soil fertility, adverse changes in alkalinity, acidity or salinity, extreme flooding, use of toxic soil pollutants, erosion, and deterioration of the soil's structural condition. These elements contribute to a significant amount of soil quality depreciation annually. Excessive soil degradation thus gives rise to immediate and long-term impacts which translate into serious global environmental headaches.

While, soil degradation may occur naturally, it has been highly exuberated by anthropogenic activities. Besides, climate change combined with human activities continues to worsen soil degradation. With the objective of understanding the distinct nature of soil quality decline, here are the causes, effects, and solutions of soil degradation.

CAUSES OF SOIL DEGRADATION

Physical Factors

There are several physical factors contributing to soil degradation distinguished by the manners in which they change the natural composition and structure of the soil. Rainfall, surface runoff, floods, wind erosion, tillage, and mass movements result in the loss of fertile top spoil thereby declining soil quality.

All these physical factors produces different types of soil erosion (mainly water and wind erosion) and soil detachment actions, and their resultant physical forces eventually changes the composition and structure of the soil by wearing away the soil's top layer as well as organic matter. In the long-term, the physical forces and weathering processes lead to the decline in soil fertility and adverse changes in the soil's composition/structure.

Biological Factors

Biological factors refer to the human and plant activities that tend to reduce the quality of soil. Some bacteria and fungi overgrowth in an area can highly impact the microbial activity of the soil through bio-chemical reactions, which reduces crop yield and the suitability of soil productivity capacity. Human activities such as poor farming practices may also deplete soil nutrients thus diminishing soil fertility. The biological factors affect mainly lessens the microbial activity of the soil.

Chemical Factors

The reduction of soil nutrients because of alkalinity or acidity or water logging are all categorized under the chemical components of soil degradation. In the broadest sense, it comprises alterations in the soil's chemical property that determine nutrient availability. It is mainly caused by salt buildup and leaching of nutrients which corrupt the quality of soil by creating undesirable changes in the essential soil chemical ingredients. These chemical factors normally bring forth irreversible loss of soil nutrients and productivity capacity such as the hardening of iron and aluminum rich clay soils into hardpans.

Deforestation

It causes soil degradation on the account of exposing soil minerals by removing trees and crop cover, which support the availability of humus and litter layers on the surface of the soil. Vegetation cover primarily promotes thee binding of the soil together and soil formation, hence when it is removed it considerably affects the capabilities of the soil such as aeration, water holding capacity, and biological activity.

When trees are removed by logging, infiltration rates become elevated and the soil remains bare and exposed to erosion and the buildup of toxicities. Some of the contributing activities include logging and slash and burn techniques used by individuals who invade forest areas for farming, rendering the soils unproductive and less fertile in the end.

Misuse or excess use of fertilizers

The excessive use and the misuse of pesticides and chemical fertilizers kill organisms that assist in binding the soil together. Most agricultural practices involving the use of fertilizers and pesticides often entail misuse or excessive application, thereby contributing to the killing of soil's beneficial bacteria and other micro-organisms that help in soil formation.

The complex forms of the fertilizer's chemicals are also responsible for denaturing essential soil minerals, giving rise to nutrient losses from the soil. Therefore, the misuse or excessive use of fertilizers increases the rate of soil degradation by destroying the soil's biological activity and builds up of toxicities through incorrect fertilizer use.

Industrial and mining activities

Soil is chiefly polluted by industrial and mining activities. As an example, mining destroys crop cover and releases a myriad of toxic chemicals such as mercury into the soil thereby poisoning it and rendering it unproductive for any other purpose. Industrial activities, on the other hand, release toxic effluents and material wastes into the atmosphere, land, rivers, and ground water that eventually pollute the soil and as such, it impacts on soil quality. Altogether, industrial and mining activities degrade the soil's physical, chemical and biological properties.

Improper cultivation practices

There are certain agricultural practices that are environmentally unsustainable and at the same time, they are the single biggest contributor to the worldwide increase in soil quality decline. The tillage on agricultural lands is one of the main factors since it breaks up soil into finer particles, which increase erosion rates. The soil quality decline is exuberated more and more as a result of the mechanization of agriculture that gives room for deep plowing, reduction of plant cover, and the formation of the hardpan. Other improper cultivation activities such as farming on steep slope and mono-cropping, row-cropping and surface irrigation wear away the natural composition of the soil and its fertility, and prevent soil from regenerating.

Urbanization

It has major implications on the soil degradation process. Foremost of all, it denudates the soil's vegetation cover, compacts soil during construction, and alters the drainage pattern. Secondly, it covers the soil in an impermeable layer of concrete that amplifies the amount of surface runoff which results in more erosion of the top soil. Again, most of the runoff and sediments from urban areas are extremely polluted with oil, fuel, and other chemicals. Increased runoff from urban areas also causes a huge disturbance to adjacent water sheds by changing the rate and volume of water that flows through them, and impoverishing them with chemically polluted sediment deposits.

Overgrazing

The rates of soil erosion and the loss of soil nutrients as well as the top soil are highly contributed by overgrazing. Overgrazing destroys surface crop cover and breaks down soil particles, increasing the rates of soil erosion. As a result, soil quality and agricultural productivity is greatly affected.

EFFECTS OF SOIL DEGRADATION

Land degradation

Soil quality decline is one of the main causes of land degradation and is considered to be responsible for 84% of the ever diminishing acreage. Year after year, huge acres of land lost due to soil erosion, contamination and pollution. About 40% of the world's agricultural land is severely diminished in quality because of erosion and the use of chemical fertilizers, which prevent land from regenerating. The decline in soil quality as a result of agricultural chemical fertilizers also further leads to water and land pollution thereby lowering the land's worth on earth.

Drought and aridity

Drought and aridity are problems highly influenced and amplified by soil degradation. As much as it's a concern associated with natural environments in arid and semi-arid areas, the UN recognizes the fact that drought and aridity are anthropogenic induced factors especially as an outcome of soil degradation. Hence, the contributing factors to soil quality decline such as overgrazing, poor tillage methods, and deforestation are also the leading causes of desertification characterized by droughts and arid conditions. On the same context, soil degradation may also bring about loss of biodiversity.

Loss of arable land

Because soil degradation contributes to land degradation, it also means that it creates a significant loss of arable land. As stated earlier, about 40% of the world's agricultural land is lost on the account of soil quality depreciation caused by agro-chemicals and soil erosion. Most of the crop production practices result in the topsoil loss and the damage of soil's natural composition that make agriculture possible.

Increased flooding

Land is commonly altered from its natural landscape when it rids its physical composition from soil

degradation. For this reason, the transformed land is unable to soak up water, making flooding more frequent. In other words, soil degradation takes away the soil's natural capability of holding water thus contributing to more and more cases of flooding.

Pollution and clogging of waterways

Most of the soil eroded from the land together with the chemical fertilizers and pesticides utilized in agricultural fields are discharged into waterways and streams. With time, the sedimentation process can clog waterways, resulting in water scarcity. The agricultural fertilizers and pesticides also damage marine and freshwater ecosystems and the limits the domestic uses of the water for the populations that depend on them for survival.

Reducing deforestation

Avoiding deforestation completely is an uphill task. However, deforestation can be cut down and this can

Best solutions of soil degradation

create an impressive way of reshaping and restoring forests and vegetation cover. As populations grow, individuals can be sensitized and educated regarding sustainable forest management and reforestation efforts. Also, preserving the integrity of guarded areas can significantly reduce demonstration.

Hence, there is a necessity for individuals all over the world to respect forest cover and reduce some of the human-driven actions that encourage logging. With the reduction of deforestation, soil's ability to naturally regenerate can be restored. Governments, international organizations, and other environmental stakeholders need to ensure there are appropriate measures for making zero net deforestation a reality so as to inhibit soil degradation.

Land reclamation

The outcomes of soil erosion and quality decline are widely irreversible. Still, soil organic matter and plant nutrients can be replenished. To restore the lost soil mineral matter and organic content, it would require what is known as land reclamation. Land reclamation encompasses activities centered towards restoring the

previous organic matter and soil's vital minerals. This may include activities such as the addition of plant residues to degraded soils and improving range management.

Salinized soils can be restored by salt level correction reclamation projects and salinity control. One of the simplest but most forgotten methods of land reclamation is planting of vegetation such as trees, crops, and flowers over the affected soils. Plants act as protective covers as they are helpful at making the soil stronger by stabilizing the land surface.

Preventing salinization

Just like the old adage states that "prevention is better than cure," so does the same concept apply in solving the worldwide problem of soil degradation through salinization? The costs of preventing salinization are incredibly cheaper than the reclamation projects in salinized areas. Consequently, actions such as reducing irrigation, planting salt tolerant crops, and improving irrigation efficiency will have high pay offs because the inputs and the labor-demanding aspects associated with reclamation projects are zero. Preventing salinization in the first place is thus an environmentally friendly means of offering solution to soil degradation.

Conservation tillage

Proper tillage mechanisms hold as one of the most sustainable ways of avoiding soil quality decline. This is otherwise known as conservation tillage, which means tillage mechanisms targeted at making very minimal changes to the soil's natural condition and at the same time improving the soil's productivity. Examples include leaving the previous year's crop residue on the surface to shield the soil from erosion and avoiding poor tillage methods such as deep plowing.