The Challenges and Prospects of Sustainable Land Management (SLM) to Combat Land Degradation in Bangladesh

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Abstract

Sustainable Land Management (SLM) is used as a tool in order to ensure the proper use of land resources i.e., animal, plants, water and soil for producing goods with a view to mitigating the increasing demand of humankind. It also ensures at the same time the continuation of the long term productive capacity of such land resources. In addition, the environmental functions of such resources also remain the same without impairing the environment and climate. Thus, it prevents land degradation and so the overall agricultural production may thrive with the use of modern and environment friendly technology. Bangladesh is a very small country in the world map with chronic shortage of land. Moreover, every year the country is facing land degradation due to diverse human and natural causes. In this situation, the country needs some drastic steps to be taken by the concerned authority to tackle the situation and prevent it to be much worsened. Considering such issues in hand, in Bangladesh the sustainable land management system has its inauguration in September 2015 through the 'Decision Support for Scaling up and Maintaining Sustainable Land Management (DS-SLM)' project financed by the Global Environment Facility (GEF) and launched by the Food and Agriculture Organization (FAO) of the United Nations (UN). This paper analyses the challenges and prospects of the initiation and maintenance of the Sustainable Land Management System in Bangladesh and the ways to prevent land degradation to ensure climate sustainability and food safety for the people of this region.

Keywords: Sustainable Land Management, Land Degradation, Food Safety, Climate Change, Environment, Natural Resources

Introduction

Bangladesh is one of the most heavily populous countries of south Asia with a chronic shortage of land. Every year, because of unwise activities of the people of the country, the land is losing its quality to support the food production and healthy life on earth. Land degradation i.e., the loss of quality of land is widespread in the country because of both human-made and natural causes. Even the natural causes are sometimes inevitable; the proper cautionary measures may have the likelihood of minimizing the consequent losses of such natural calamities. Apart from the natural causes, the man-made causes are indefinite. In lure of some ready-made material advantages and gain, we use toxic chemicals and fertilizers in land while growing crops. These unwise activities result in not only land degradation but

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also environmental vulnerability. Also, in the long run land becomes barren field having little or no capacity of growing crops. In these situations, the worldwide concept of sustainable land management (SLM) may become a good solution to combat land degradation and environmental vulnerability in Bangladesh.

Undoubtedly, the SLM is a good solution for the country. But the system being a new concept, has not only some potentials but also some challenges. In this paper, the author tries to give light on the concept of sustainable land management (SLM) at first followed by an overview of the present status of SLM practices in Bangladesh. The author also tries to find out the prospects and challenges of SLM practices in the country for ensuring restoration of degraded land and prevention of any further land degradation.

2. Objectives of the Research

The fundamental objective of this paper is to find out the durable solutions to combat land degradation in Bangladesh through sustainable land management (SLM). To accomplish this basic objective, the following objectives are set which will be covered by this paper:

a) To review the concepts of sustainable land management (SLM) and land degradation and their significance in ensuring sustainable development.
b) To analyze prospects and possible challenges of SLM practice in Bangladesh.
c) To find out the solutions of land degradation in Bangladesh through SLM and other relevant mechanisms.

3. Scope and Limitations

This study is a conceptual analysis of sustainable land management in combating land degradation in Bangladesh. In accomplishing the study no field data was collected. Farmers and end users of land are specifically connected in land use and consequent degradation of land in Bangladesh and so, quantitative study on the subject will flourish the understanding and realization of the SLM in Bangladesh. Also, further studies may be done by the relevant scientists of this field to ease the policymaking for the country.

4. Methodology

The study was accomplished by reviewing different relevant peer-reviewed journals, books, related reports, reliable websites, and some government documents such as the document from Bangladesh Bureau of Statistics. As the concept of SLM and LDN are of international origin, many international reports including relevant

reports from World Bank, TerrAfrica, Food and Agriculture Organization of the United Nations and Germanwatch etc,. No quantitative data was collected in conducting the research. In this way, to achieve the intended objectives of the research qualitative approach is adopted.

5. Sustainable Land Management (SLM) and Land Degradation

Land is considered to be our mother. Like an affectionate human mother, land provides us with protection from disasters, facilitates the smooth mobility of life by fulfilling our basic needs of food and shelter. Thus, we belong to land like mother-son/daughter (Djiniyini, 1985). Since land like a mother gives us social, economic, cultural and many other facilities to ease our existence on earth, we the human folk as good son and daughter also have some duties towards land. We should in no way weaken the land by our unwise activities. If land gets degraded because of some natural or other external causes, we have the sacred responsibility to take proper initiatives to prevent such degradation of land and to restore the degraded land. Because of such noble duty to land the concept of sustainable land management has been evolved to prevent land degradation and to restore degraded land for ensuring the proper use of land without decreasing the health and wealth of land.

The United Nations (UN) in 2015 in its General Assembly set up 17 inter-linked goals which are familiar as sustainable development goals (SDGs). The SDGs are intended to be achieved by 2030. These are inserted in a United Nations General Assembly Resolution which is commonly known as Agenda 2030. The Agenda 2030 includes a set of 17 bold, transformative and universal development goals and 169 associated targets. As sustainable development includes the interconnected development of social, economic and environmental aspects, in the Agenda 2030, an important target of ensuring land protection is inserted. The title of the Goal 15 is life on Land which aims to the promotion, protection and restoration of sustainable use of terrestrial ecosystem, sustainable management of forest, combating desertification, aborting and reversing land degradation and stopping biodiversity loss. The purpose of Goal 15 of SDGs is to ensure a better planet for human kind by preventing land degradation and restoring degraded land through sustainable land, forest and biodiversity management techniques. In this context, SDG 15, target 15.3 points to resist desertification and restore degraded land and soil with a view to ensuring a land degradation neutral world by 2030. Hence, to achieve the SDG 15, sustainable land management (SLM) is being used as one of the major tools. Sustainable Land Management (SLM) has also connection with SDG 1 as through SLM the target 1.4 i.e., land formalization and land security can be achieved resulting in the poverty alleviation from the lot of many people around the globe. SDG 2 may to some extent

be achieved through SLM practices as target 2.3 i.e., securing land rights and land accessibility is somewhat interconnected with SLM practices. Land resource management and protecting land ecosystem is one of the prime concerns of the SLM and so SDG 6 has some connection with SLM as target 6.5 i.e., Land Resource Management, Water Management and Land ecosystem may be fulfilled through SLM practices. SDG 11 aims to ensure sustainable cities and communities. As cities and communities are in fact dependent on the proper use of land SLM practices may ease the way to achieve the goal. SLM in one hand acts to protect degradation of land and use of land in a way fruitful from all dimensions and on the other hand it ensures environmental protection for the overall benefit of the sustainable living on earth. In this way, SLM is also connected with SDG 13 as it has ensured climate action through the practices.

According to the definition of the United Nations (UN) declared in the 1992 Earth Summit, sustainable land management (SLM) has three dimensions. Firstly, all sorts of land resources including water, soil, plants and animals will be used to produce necessary goods that are significant to meet the changing needs of humankind. Secondly, the use of land for the said purpose will at the same time be in consistent with such techniques and tools which will not hamper the productivity of such land rather the use of such land will ensure the long-term productive potential of such land resources. Finally, the use of such land resources will not deteriorate the environmental functions. If land resources are used in this way, the land based economic, social and environmental sustainability may be ensured. Thus the most significant factors of SLM is the critical unification of agriculture and environment by ensuring long-term efficiency of the ecosystem functions (water, land, biodiversity) and by increasing production of the quantity, quality and diversity of goods and services, and especially safe and healthy food (Hossain, 2015). Also, the knowledge of social, economic and ecological dimensions of land uses for growing goods and for services is imperative for sustainable land management (SLM) practices (Helming et al., 2011). Therefore, social, economic and environmental all three dimensions of sustainability should be incorporated into the land use decision (Miah et al., 2018).

According to TerrAfrica Partnership (2005), sustainable land management (SLM) qualifies the land users to receive superlative social and economic benefits from land resources and simultaneously sustains or strengthens the ecology of land. Sustainable Land Management (SLM) is thus pivotal to augment the social and economic benefits from land by lessening land degradation, rehabilitating degraded land areas and ensuring the maximum utilization of land resources for the sake of present and future generations (Hossain, 2015).

The World Bank provides almost a similar definition of SLM. It is thought to be a knowledge-based stratagem. Through this process land, water, biodiversity, and environmental management including input and output externalities are used to meet the changing food and fiber demands while upholding ecosystem services and livelihoods (World Bank, 2006). The purpose of SLM is to sustain or enhance the productivity of the land and to stop land deterioration. Concurrently, it will be assured that in doing so, no natural ecological imbalance will happen. If land is improperly managed, there is high chance of severe land degradation and significant depletion in biodiversity niches, hydrology and carbon sequestration functions of watersheds and landscapes (World Bank, 2006). This situation will eventually make the land a barren field resulting in a new world of desertification.

To prevent land degradation and to get more social and economic benefit from the land resources is one of the primary concerns of sustainable land management. Land degradation generally implies the decrease or loss of quality of land resources in terms of productivity and manageability. According to Article 1 (f) of the United Nations Convention to Combat Desertification (UNCCD) Land degradation is defined as the reduction or loss of biological and economic productivity of land resources resulting from the different sort of land uses for different human activities and habitation patterns including soil erosion, deterioration of physical, chemical, biological and economic properties of land and long term loss of natural vegetation. So, if the uses of land resources are favorable with climate and human activities, it will lead to sustainable resilience. On the other hand, unfavorable use of land resources will result in degradation and vulnerability (Food and Agriculture Organization (FAO), 2013). Hence, Unsustainable land management is one of the major drivers for land degradation.

Because of the ever increasing population growth in the world and their unprecedented consumption of land resources for living and other relevant needs, the land is being degraded. We the human being belong to land and we cannot but use land for so many practical reasons. So, land degradation is a normal, systematic and pervasive matter and it usually occurs all part of the world in so many forms (Barger et al., 2018). But the loss of land degradation takes a huge toll on the world economics, society, and environment and it becomes a crucial hindrance for sustainable development of the globe. In recent past, the World Bank calculates the economic loss of the land degradation and estimates the yearly cost of land degradation USD 85.8 trillion (Reinl, 2019). Almost one-fourth of the total land area has already been degraded. 3.2 billion People are the direct sufferers of land degradation worldwide while many millions are indirectly suffering from food insecurity, food price spiral, adverse climate change, environmental disasters, and the ruin of biodiversity and ecosystem services (Chasek, 2022). Because of unsustainable

agricultural land uses, about 24 billion tons of fertile land becomes degraded every year. If this continues at this pace, 95 percent land area will be degraded within 2050, scientists predicted (Global Environment Facility, 2019).

Land degradation is a troublesome issue that should immediately be addressed for the safe and sustainable existence of human being on earth. If timely action is not taken to reduce and prevent land degradation, untold sufferings in general will be the possible consequence. Immediate concerted actions and implementation of known and proven practices are crucial to prevent or reduce land degradation (Barger et al., 2018). Also, sustainable development will be a far cry if land degradation cannot be prevented or reduced by using different sustainable land management (SLM) and Land Degradation Neutrality (LDN) techniques. Hence, Prevention or reduction of land degradation is imperative to achieve Sustainable Development Goals (SDGs) as enshrined in Agenda 2030 (Barger et al., 2018).

Sustainable land management (SLM) has the prospect to reduce and prevent land degradation and even overturn the adverse climate change caused by land degradation (IPCC, 2020). The implementation of SLM is essential for restricting land deterioration and even for reestablishing the degraded land (Hossain et al., 2020). SLM is in fact a land utilization system involving water, land, crops and users to mitigate the human needs and maintain the balanced ecology. The sustainability and manageability of land is interconnected with land resources, atmosphere and human activities (Rahman & Parkinson, 2007). For preventing or reducing land degradation and ecological resilience SLM is practiced around the globe. SLM is not a single specific practice or method but it is a portfolio of possible techniques, tools, technologies and approaches that are used in a local scale considering the overall conditions of land resources of a given locality (ELD Initiative, 2015). As sustainable land management (SLM) is used considering the local situations of land resources, it requires collaboration between land users, technical experts, scientists and policy makers to work together for the reduction and prevention of land degradation enabling the ecological sustainability (Hossain, 2015).

6. Sustainable Land Management (SLM) in Bangladesh

Bangladesh is a highly populous country in the South Asian region. According to the latest Population and Housing Census 2022, the total population of the country is now 165,158,616 and the population density is 1119 per square kilometer. In the previous Population and Housing Census of 2011, the number stood 144,043,697 and 976 respectively (Key Findings of Population & Housing Census 2022: Statistics and Information Division, the Government of the People's

Republic of Bangladesh, 2022). The rapid growth of population is rocketing the demand for more food production and it is eventually creating pressure on land. On the other hand, agricultural land is being declined because of human settlement, urbanization and industrialization (Food and Agriculture Organization (FAO), 2015). Also, climate change and environmental degradation is a big threat to the use of land resulting in the adverse effect on food security and livelihood activities on land (Hossain et al., 2020). In the Global Climate Risk Index 2021, Bangladesh has been listed in the long-term Climate Risk Index and placed seventh among the ten most affected countries from 2000 to 2019 because of her adverse geographic and climate degrading conditions (Global Climate Risk Index, 2021). Increased salinity on land, rainfall, sea level rising, flood, cycle, temperature fluctuation and ground-water depletion are some of the many climate-induced problems prevalent in Bangladesh. Among the many consequences of this inauspicious situation land degradation stands in the first line. To reverse land degradation and to maintain a food security for the increasing population, the identification and implementation of proper Sustainable Land Management (SLM) is necessary.

Sustainable Land Management (SLM) practice is practicable with concerted efforts from users or farmers of land, the concerned scientists and the policy makers of the country. Land users and farmers should realize the necessity of SLM practice because their unwise activities may become the primary causes of land degradation and adverse climate change resulting in the loss of productivity of agricultural land. In the agrarian society of Bangladesh, it is a common practice to apply cow dung and farmland manure for cultivation since long. This good practice improves the quality of land by improving organic matter status of arable land (Hossain et al., 2020). Different government offices including the Department of Agriculture Extension (DAE) and the Soil Resource Development Institute (SRDI) are also motivating the farmers to carry on such good practices by their advice and written directory documents. Also, the Ministry of Agriculture is in collaboration with the Ministry of Land is working to protect agricultural land from the development of human settlements and industrial infrastructures by proposing timely law and policy including the Agricultural Land Conservation and Land Use Act (Hossain et al., 2020). The government of Bangladesh has formulated a land use policy in 2001 where criteria based usage of land has been emphasized. In the Land Use Policy, 2001, the protection of agricultural land is prioritized among other conservation and usage issues regarding best use of limited land resources in Bangladesh also later in 2016 Conservation of Agricultural Land and Land Use Bill has been placed to implement the policy but nowhere the method of Sustainable Land Management (SLM) which may be a good solution to prevent hunger has been mentioned. Many other organizations, for instance, Bangladesh Agricultural Research Council (BARC), Bangladesh Agricultural Research Institute (BARI), Bangladesh Rice Research Institute (BRRI)

and Bangladesh Water Development Board (BWDB) are actively working in different capacities for crop agriculture and land management (Hossain et al., 2020). But yet the land quality is degrading day by day because of the identification and implementation of appropriate SLM practices suitable for the country.

One of the major purposes of sustainable land management (SLM) is to ensure the prevention of land degradation and to reverse the already degraded land. To prevent the degradation of land and to restore the already degraded land, the concept of Land Degradation Neutrality (LDN) was emerged from the UN Conference on Sustainable Development (Rio+20) in 2012. LDN implies the implementation of some practices and techniques that will make the quality of land stable or even increasing for ensuring ecosystem functions, services and food security (Chasek, 2022). LDN works to weigh that the amount profits from the use of land i.e., production of food, fuel and fiber will be more than the amount of land consequent degradation. Even without further degrading the land resources and sometimes reversing the already degraded land the profits from land use will be intensified through LDN. In this way, the humankind will have a neutral or even positive impact on our finite resource land. Considering this purpose in mind, Land Degradation Neutrality Target Setting Program (LDN-TSP) was established by the United Nations Convention to Combat Desertification (UNCCD) Global Mechanism, with the help of UNCCD Secretariat and numerous bilateral and partner including Global Environment Facility (GEF) Secretariat based on the decisions of the 12th session of the UNCCD Conference of the Parties (COP) in Ankara, Turkey, held on 12-23 October, 2015 (National Report on Land Degradation Neutrality Target Setting Programme: The People's Republic of Bangladesh, 2018). Bangladesh expressed its adherence to be part of the LDN-TSP on 31 December 2015. By joining the LDN-TSP, Bangladesh reiterated to set LDN targets with a view to accomplishing Land Degradation Neutrality by 2030. The LDN-TSP was administered in Bangladesh from December 2016 to February 2018 with the assistance ensured by the Global Mechanism (GM) and Secretariat of the United Nations Convention to Combat Desertification (UNCCD), and various partners. Bangladesh has set six targets to become land degradation neutral country in the world map. Increasing soil fertility and carbon in 2000 km2 of cropland area is the first target. Second target is to lessen land use use/ cover conversion in 600 km2 of forest area. Reduction of waterlogging in 600 km2 area is the third target. To decrease soil erosion in hilly areas in 600 km2 area and to protect non-saline land areas from salinity intrusion in 1200 km2 in coastal zone area are the fourth and fifth target respectively. The sixth and last target is to reduce river bank erosion @100ha/year covering 100 km2 areas. These all are achievable by 2030 ("National Report on Land Degradation Neutrality Target Setting Programme: The People's Republic of Bangladesh, 2018).

In Bangladesh the sustainable land management system has its inauguration in September 2015 through the 'Decision Support for Scaling up and Maintaining Sustainable Land Management (DS-SLM)' project funded by the Global Environment Facility (GEF) and launched by the Food and Agriculture Organization (FAO) of the United Nations (UN). DS-SLM is project aims at halting and reversing the current trend of land degradation in mainstreaming and scaling up SLM for 15 countries. The project results of some of the countries are available in World Overview of Conservation Approaches and Technologies (WOCAT) website but there is no available result of the development and accomplishment of Bangladesh (Wocat, n.d.).

In Bangladesh, for the protection of environment, the primary legislative framework is the Environment Conservation Act, 1995 and the Environment Conservation Rules, 1997. For conservation of any specific area it is declared as Ecologically Critical Area based on some very specific factors (ECR, 1997) In the Act, the controlling of pollution, conservation of environment and sophistication of environment were provisioned. But there is no direct provision regarding the protection of soil, a valuable resource of the ecosystem which must be protected.

Land degradation in Bangladesh is a regular phenomenon. Land degradation occurs due to so many direct and indirect causes in the country. The land management is not sustainable because the SLM techniques are not being applied rather the excessive use of highly chemical fertilizers for the expectation of more crops are prevalent. In the coastal zones, the deterioration of the quality of land because of the increasing salinity in soil water is the result of saline water intrusion from the sea. Land becomes adulterated with heavy metals like lead, chromium, copper, cadmium, mercury etc. resulting in the entrance in food chains and land degradation. Infrastructural development, urbanization, water erosion, river bank erosion, drought and deforestation are some of the direct drivers of land degradation in the country. In Addition, population pressure, poverty and lack of awareness about the land use policy and technology are some of the indirect drivers of land degradation in Bangladesh (National Report on Land Degradation Neutrality Target Setting Programme: The People's Republic of Bangladesh, 2018).

To prevent land degradation and to reverse the degraded land SLM best practices may be introduced in the country by increasing land productivity, improving livelihood and ecosystem and triumphing from three dimensions i.e., preventing land degradation, drought and desertification, adapting and mitigating climate change vulnerabilities and addressing biodiversity (Shoaib, 2018). To implement SLM best practices and to get higher yields there should be a comprehensive national and regional plan in hand. Having the plan in hand, the logical and profitable use of land should be ensured. And finally the identification of proper land will

be needed for producing different crops (Hossain et al., 2020). Land-user-run participatory techniques, interconnected use of natural resources at farming systems levels and ecosystem, multi-stakeholder and multilevel involvement and targeted policy and institutional support, including bettering of incentive procedures for SLM adoption and income generation at the local level are imperative in ensuring SLM in Bangladesh (Hossain, 2015). Understanding land quality, limitations as to moisture, land type, crop suitability and potential and weather and climate conditions being the fundamental drivers of SLM practices, land zoning e.g. land information system, site specific management of arable lands of Bangladesh is necessary to get prepared with a view to SLM implementation by both policy makers and end users of land. Land zoning is also important because the techniques which is suitable for one arable land may not be suitable for another land (Hossain MA and Dewan MKH, 2015). The farmers should be motivated for SLM practices by ensuring appropriate resources, technologies and financial aids, if necessary. The realization of farmers or the land users are pivotal in implementing SLM. The relevant scientists and researchers and institutes should also come forward to find out the best SLM practices for the country's different regions. In addition, the concerned ministries and policy makers should play a significant role in implementing SLM practices for the prevention of land degradation and climate vulnerability in the country (Hossain et al., 2020).

7. Findings and Recommendations

Bangladesh is a small country having a total area of 148460 kilometers with a large population. The density rate of the country is 1119. In these circumstances, the country faces so many challenges ranging from food security to health issues of her population. Since the country needs huge amount of food to feed her ever increasing population, cultivation of different crops are being held every year. The limited agricultural land is being degraded because of the usage of toxic chemicals and fertilizers in the hope of growing more crops. Sustainable land management (SLM) may be a solution for the country to combat land degradation and to restore degraded land by using modern tools and techniques. Considering the above situations, this paper suggests the following:

- At first, the policy makers should come forward to implement sustainable land management (SLM) realizing the long term consequences of land degradation and adverse climate change for the country. The scientists, researchers, universities and institutes of relevant fields should initiate to spread awareness about the best use of SLM practices for the policymakers and for the farmers as well. Since the ultimate users of the SLM are in many circumstances farmers, they should be motivated to use modern SLM technologies for the overall benefits

of the country. Only after ensuring the three levels of participation will make the hope of combating land degradation and restoring degraded land while avoiding adverse climate change come true through SLM practice.

- In Bangladesh, some SLM projects have already been through the 'Decision Support for Scaling up and Maintaining Sustainable Land Management (DS-SLM)' project funded by the Global Environment Facility (GEF) and launched by the Food and Agriculture Organization (FAO) of the United Nations (UN). The accomplishment results along with the used techniques should be preserved for the future research and implementation of SLM in the country. This information may work as good sources of references for future SLM initiative in the country. Further, this may be used to weigh the benefits of SLM in ensuring prevention of land degradation and protection of environment.
- Ensuring food security is an imperative work of the government. The concerned government offices should immediately take action to identify ways to improve food security for the people of the country. SLM practices are possibly a positive way of growing more crops in limited land while securing the land for future cultivation without degrading the quality of land. The concerned government offices should take this into consideration while working for ensuring food security of the country.
- Bangladesh is already a climate vulnerable country. So, we should not do anything which has minimum possibility to affect the environment negatively. If some land is degraded for our unwise activities, we should do something to cure the degradation and even we should try to increase the quality of land so that there always become neutral land resources for us. Land degradation neutrality (LDN) and other relevant techniques should also be taken into consideration along with the SLM practices to prevent climate vulnerability.
- SLM will ease the way to ensure Sustainable Development Goals (SDGs) in so many ways. So, the government should come forward to realize the benefits of the SLM for the country. Combating desertification and land degradation should be a priority for the country to ensure a safe future Bangladesh for all.

8. Conclusion

With limited land resources Bangladesh is to accommodate an unexpectedly huge number of populations. Degradation of quality such land will result in both short term and long term adverse effects for the country. By any means Bangladesh should ensure the prevention of land degradation and fathering the restoration process of already degraded land to make a land degradation neutral country for her own benefits. Also, Bangladesh is already a climate vulnerable country. The country needs to immediately take initiatives to prevent all kinds of activities

having even little chance of changing the environment adversely. Unwise land management is likely to result in both land degradation and adverse climate change. And so, there should be some mechanisms of using land avoiding the degradation and adverse climate effect. In this regard, the sustainable land management (SLM) practices may be a great friend for the country to combat land degradation and climate change. For getting the highest benefit of SLM, the country needs to first identify the best SLM practices suitable for the country with the help of concerned experts, researchers, institute and scientists. Also, the motivation of farmers and end users in adopting SLM practices are another big challenge that should be ensured by providing various incentives for the ultimate good of the country.

Conflict of Interest

The author declares that there is no conflicting interest in the paper.

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