

Review

Land restoration and socio-economic contribution of bamboo in Ethiopia

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Abstract: Worldwide human activities are the driving force for land degradation; these difficulties will worsen without immediate remedial action. This pressing global issue affects mankind, especially rural communities. The indicators for land degradation is mostly reduction in benefits derived from land. Bamboo is a grass type with a very large woody stem. Bamboo forests are important both for land restoration and socio-economic value. This review paper is aimed to assess land restoration and socio-economic contributions of bamboo in Ethiopia. Ethiopia is the leading bamboo resource country in Africa. Assosa, Injibara, Gimbi, Ambo, Gurage, Bale, Masha, Chenchu and Hagere-Selam are the known bamboo producing areas of Ethiopia. Basically, bamboo is considered a good plant for restoring degraded land and soil health. Bamboo has great benefits for income diversification and other socio-economic values. Additionally, bamboo plants have so many cultural and medicinal uses in many parts of Ethiopia. Though a variety of studies revealed that bamboo has a unique ability in restoring lands condition, but less attention was given for its biological soil conservation, so concerned body should create awareness regarding the importance of bamboo for soil and water conservation. Ethiopia has numerous hectares of natural bamboo, known in the African continent. But, the real benefits generated from this subsector is insignificant so, the concerned body should improve benefits obtained from bamboo. Bamboo production and processing provides job opportunities and creates economic and social stability, however, there is little attention given, and so concerned body should give special attention for this sub-sector.

Keywords: *bamboo, land degradation, socio-economics*

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Introduction

Globally, about 25% of the total land has been degraded. Currently, degradation of land is one of the world's most pressing issues and even it will worsen if immediate action is not taken. Worldwide, 3.2 billion people have been affected by land degradation, the impact of the degradation is especially severe for smallholder farmers who heavily depend on natural resources. Mostly land degradation occurs through human-induced livelihood activity and rarely by natural processes. Land degradation mostly expressed as long-term reduction in actual benefits from crops, livestock and ecosystem (Gisladdottir and Stocking, 2005;

<https://www.thegef.org/topics/land-degradation>). Land degradation has been occurring in every corner of the world in almost all agro-ecologies of developed and developing countries. The leading causes for Ethiopia's land degradations are rapid population growth, loss of soil, deforestation and traditional way of crop and livestock management practices (Taddese et al., 2002). Ethiopian agricultural sector that majority of the population gains their livelihood depends on proper productivity of land (CSA, 2015).

Scientifically bamboo is considered as a group of a perennial grass with specific features of large stem and mentioned under the family *Poaceae*, subfamily *Bambusoideae* (Chaowana,

2013). Ethiopia has enormous potential of bamboo which is nearly estimated to be one million hectares and the leading country in Africa. Know a day developed countries utilize bamboo for many purposes, nevertheless bamboos potential to enhance socio-economic and ecological development remains unrealized in Ethiopia (Mekonnen et al., 2014). Ethiopia has two indigenous bamboo that predominantly found in high and low land areas (Yigardu et al., 2016).

Bamboo is considered as a special plant since it plays an amazing role in rapid and large-scale landscape restoration, this is due to rapid growth rate and shallow root system, this makes efficient in maintaining and rehabilitating damaged ecosystems. Variety of studies proved that bamboo is imperative for re-establishing degraded landscapes that deteriorated by mining activities (INBAR, 2015). Additionally, bamboo has a miraculous property for combating soil erosion and degraded land through binding soil structures. Although bamboo is not considered as an integral part of livelihood activity, it has significant contribution for socio-economic and maintains ecological balances in areas where it occurs naturally and grown by individual farmers (Ensermu et al., 2000).

Previous studies showed that Ethiopia bamboo subsector has vast potential for sustaining forest resources, maintaining land degradation and economically supporting rural communities' livelihood; however, less attention has been given by the government. Additionally community's limited knowledge towards better management of

natural resources is among impending constraints in Ethiopian bamboo sub-sector (INBAR, 2006). Therefore, this review paper is aimed to assess land restoration and socio economic contributions of bamboo in Ethiopia.

Overview of Bamboo Production and Distribution in Ethiopia

According to Mekuriaw et al. (2011), Ethiopia's natural bamboo coverage is about one million hectares which nearly equivalent to 7% of the world and 67% of the African bamboo forest. Based on the agro-ecology, there are two varieties of bamboo in Ethiopia; these are highland and lowland bamboos (Embaye, 2000). Predominantly bamboo forest is found in Assosa, Injibara, Gimbi, Ambo, Gurage, Bale, Masha, Chench and Hagere-Selam areas of Ethiopia (Sofia, 2017). The highland bamboo (*Yushania alpine*) commonly grows naturally in the south, south-west, central and north-west highland parts of Ethiopia (Seyoum et al., 2006). Primarily high land bamboo is found in national forest priority areas of Ethiopia (Yigardu et al., 2016). Unlike high land bamboo, the lowland bamboo is confined to the western parts of the central highlands in relatively moist and wet arid agro-climatic zones of Ethiopia. The below Table 1 depicted that Oromia regional state of Ethiopia is the leading region in terms of bamboo forest coverage followed by the South Nations Nationalities and Peoples Region of Ethiopia.

Table 1. Area coverage and distribution of bamboo by hectares in regions of Ethiopia.

Bamboo Distribution Area	Region	Natural stand	Plantation	Total area
Injibara	Amhara	30	2350	2380
Agaro	Oromia	-	1500	1500
Bale Mountains	Oromia	56851	-	56851
Shenen /Jibat	Oromia	1774	2561	4335
Gera	Oromia	36000	1250	37250
Bore	Oromia	-	2460	2460
Chencha	South	2460	3250	5710
Indibir	South	-	1850	1850
Jimma /Ameya	Oromia/south	-	900	900
MizanTeferi/kulish	South	-	1850	1850
Debresina /wofwasha	Amhara	35	-	35
Wushwush/Bonga	South	-	1120	1120
Bonga /Ameya	South	7997	-	7997
Masha	South	18652	-	18652
Munesa shashemene	Oromia/South	4183	-	4183
Total		127982	19091	147073

Sources: Abiy (2013).

Contributions of Bamboo for Land Restoration in Ethiopia

Scientifically forests are diverse biological systems; however, it is at a critical condition due to increasing rate of deforestation, fragmentation, climate change and other environmental stressors that mostly associated with human activities. Forests have been losing its diversity and ability to provide protection for soil, water and other ecosystems. Other than land restoration Bamboo forests have many benefits, scientific studies assured that bamboo has unique functions such as sinking carbon, producing oxygen, controlling soil erosion, providing organic matter, balancing water levels, maintaining biodiversity and beautifying

landscape (<https://www.guaduabamboo.com/guadua/environmental-impact-of-guaduabamboo>; <http://www.riopavilion.org/forest-biodiversity/>).

The below Table 2 summarizes that bamboo has a sophisticated function, to the broadest bamboo helps to reduce the number of other trees utilized, make a wide variety of products, prevent soil erosion and increases soil nutrients. Bamboo can grow in different agro-ecology such as semi-arid and arid. In addition, Bamboo production does not require any agricultural chemicals such as fertilizer, herbicides and pesticides, which is indirectly contributing to reduce land degradation. Moreover, bamboo plays a significant role in water regulation and nutrient recycling.

Table 2. Summary of bamboos characteristics and its sophisticated functions.

Core Features of Bamboo	Details
Renewability	Though it varies with species, on average bamboo takes one up to five years to mature and utilized for different purposes. If we compare with other hardwoods which at least takes forty years to mature and optimal for harvest. Studies show that per week nearly one million acres of forests are diminished worldwide due to deforestation. Bamboo's fast growth rate makes it the only solution to reduce the number of other trees utilized.
Very little waste	Bamboo has diversified uses, nearly every part of the plant is utilized for making furniture's and even its by-products are used for mulch to improve soil fertility.
Independent of agricultural chemicals	Unlike other crops, bamboo is independent of agricultural chemicals to grow and mature. If we consider cotton as an example it needs fertilizers, pesticides and herbicides for optimum growth and good productivity. This artificial chemicals exploit the nutrients in the soil. Bamboo does not add hazardous chemicals to the environment.
Soil protection	Slash and burn cultivation system is mostly followed in many parts of the world. Once other forests are clear-cut it initiates soil erosion and leads to elimination of soil nutrients which has great impacts on lives of people and animals living downstream. Bamboo plant in its nature protects soil even after it burnt and used for farming activity.
Growing conditions	Since bamboo can grow in different agro-ecologies this features enables bamboo to survive in arid regions where droughts significantly affect other crops. However bamboo has a unique root system that helps to with stand life-threatening conditions through maintaining vital moisture in the soil.
Restoring soil health	Bamboo has the ability to reduce soil acidity, increases nutrients that improve soil fertility and increase the speed of crucial ecological functions to be quickly restored in the soil.

Sources: Own summary from <https://www.bamboogrove.com/why-bamboo-save-planet.html> & <https://www.inbar.int>.

Socio-Economic Contributions of Bamboo in Ethiopia

In Ethiopia, rural communities have a strong bond with forest and use for many purposes, and they make use of timber and non-timber forest products

in supporting their livelihoods. Now a day using forest and its product is mandatory and studies show that there will be a very huge demand for wood and wood products. Bamboo can be used to share pressure and substitute other hardwood (Bereket and Daniel, 2008). Bamboo plant has

been supporting rural communities through providing socio-economic and ecological values in areas where it naturally grows and established by man. Bamboos are subsidizing to improve communities' income and employment (KEFRI, 2007). In general, bamboo is used for fences, houses, baskets, beehives, hats, mats, furniture, traditional sticks, and house utensils, for animal feed and agricultural tools. It is also used for medicine (Ensermu et al., 2000; INBAR, 2011).

According to Sirawdink (2017), female and low income community members earn better income from bamboo when compared with their counterparts (male and rich). However, the volume of income was miniature as it is expected since the area is endowed with natural bamboo forest and suitable condition for establishing bamboo plantation. In addition, poor harvesting and processing are the leading factors for low benefits derived from bamboo. Hence, a lot should be done to improve grower's income. Bamboo plants have so many traditional and cultural uses in many parts of Ethiopia and entire world. From this, we can deduce, bamboo has a contribution to household's livelihood though it is very little in amount. Another study revealed that bamboo plantation has both positive and negative economic effects on growers and environments (Oukula et al., 2015; Akwada and Akinlabi, 2018).

However, the positive side overweighs the negative in our country context. Bamboo cultivation creates a room of opportunity for income generation for rural and urban communities. Commercialized bamboo production and processing improve the livelihood of the surrounding dwellers like other investment activities. Another importance of bamboo is its durability and almost comparable with steel, these features of bamboo helps to substitute steel at fair construction costs. Bamboo is also used in manufacturing pulp and paper (Kassahun, 2014; Yigardu et al., 2016). From the above scientific evidence we can conclude that bamboo has great contributions for rural and urban household's livelihood in many parts of Ethiopia where bamboo grows and processed for house furniture's.

Conclusion

Now a day, land degradation is one of the pressing worldwide issues, especially for developing countries like Ethiopia. Bamboo has unique root systems that help to handle soil erosion and other land degradation problems. Scientific review that links land restoration with socio-economic importance of bamboo has not been documented in a sufficient way; therefore, this review was aimed

to address this information gap. This review was aimed to assess socio-economic and land restoration contributions of bamboo in Ethiopia. Ethiopia is endowed with the biggest bamboo resources and considered as a leading country in Africa with large area coverage of bamboo forest. Assosa, Injibara, Gimbi, Ambo, Gurage, Bale, Masha, Chenchu and Hagere-Selam are known bamboo growing areas of Ethiopia. In addition, bamboo plants have so many traditional and cultural uses in parts of Ethiopia. Ethiopian bamboo resources are promising for maintaining land condition and improving rural and urban livelihood though it needs government's special attention.

Recommendations

Based on review made, the following recommendation is forwarded, (a) concerned Government and NGO's should create awareness regarding importance of bamboo for soil and water conservation, (b) local communities and government body should work on improving economic benefits obtained from bamboo, and (c) communities around and in bamboo forest should create awareness regarding cultural values for the coming generations.

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References

- Abiy, A. 2013. *Design and analysis of Bamboo and E-Glass fiber reinforced epoxy hybrid composite for wind turbine blade shell* (Doctoral dissertation, Addis Ababa University).
- Akwada, D.R. and Akinlabi, E.T. 2018. Bamboo application in infrastructure development of Ghana. In *Conference on infrastructure development and investment strategies for Africa*.
- Bereket, H. and Daniel, K. 2008. Study on establishment of bamboo processing plant in Amhara Regional state. *Addis Ababa: AAiT, Post graduate program research*.
- Chaowana, P. 2013. Bamboo: an alternative raw material for wood and wood-based composites. *Journal of Materials Science Research* 2(2): 90-102.
- Central Statistical Agency (CSA). 2015. Agricultural sample survey, report on area and production of crops (private peasant holdings, meher season).

- Embaye, K.Y. 2000. The indigenous bamboo forests of Ethiopia: an overview. *AMBIO: A Journal of the Human Environment* 29(8): 518-521.
- Ensermu, K., Tamrat, B., Alemayehu, G. and Gebremedhin, H. 2000. A socio-economic case study of the bamboo sector in Ethiopia: An analysis of the production-to-consumption system. Addis Ababa, Ethiopia. 41pp.
- Gisladdottir, G. and Stocking, M. 2005. Land degradation control and its global environmental benefits. *Land Degradation & Development* 16(2): 99-112.
http://news.xinhuanet.com/english2010/china/2010-07/18/c_13402777.htm.
<https://allafrica.com>.
<https://www.bamboogrove.com/why-bamboo-save-planet.html>.
<https://www.guaduabamboo.com/guadua/environmental-impact-of-guadua-bamboo>;
<http://www.riopavilion.org/forest-biodiversity/>
<https://www.thegef.org/topics/land-degradation>.
- INBAR (International Network of Bamboo and Rattan), 2006 Annual report, <https://www.inbar.int>.
- The International Bamboo and Rattan Organization (INBAR) 2011 Country Paper.
- The International Bamboo and Rattan Organization (INBAR) 2015 Country Paper.
- Kassahun, T. 2014. Review of bamboo value chain in Ethiopia. *International Journal of African Society Culture and Traditions* 2(3): 52-67.
- KEFRI. 2007. Study on bamboo and rattan research and development in Kenya Forestry Research Institute (KEFRI), INBAR.
- Mekonnen, Z., Worku, A., Yohannes, T., Alebachew, M. and Kassa, H. 2014. Bamboo Resources in Ethiopia: Their value chain and contribution to livelihoods. *Ethnobotany Research and Applications* 12: 511-524.
- Mekuriaw, Y., Urge, M. and Animut, G. 2011. Role of indigenous bamboo species (*Yushania alpina* and *Oxytenanthera abyssinica*) as ruminant feed in northwestern Ethiopia. *Livestock Research for Rural Development* 23(9): 9-14.
- Oukula, O., Mesfin, K. and Lemlem, T. 2015. Physicochemical properties of bamboo (*Arundinaria alpina*) based agroforestry practice in Dawuro zone, south west Ethiopia. *Journal of Biology, Agriculture and Healthcare* 5(9): 104-109.
- Seyoum, K., Tahir, P., Ding, W. and Sudin, R. 2006. The effects of site variability on the suitability of Ethiopian highland bamboo for particleboard production. *Ethiopian Journal of Natural Resource* 8(2): 251- 269.
- Sirawdink A. 2017. Socio-Economic and Socio-Cultural Value of Highland bamboo (*Yushania alpina*) Plant and Its Contribution to Rural Livelihood in Banja District, Awi Zone Ethiopia. An M.Sc thesis Presented to the School of Graduate Studies of Addis Ababa University.
- Sofia, N. 2017. Experimental Investigation of Bamboo as a Partial Replacement of Rebar in Rc Beams An M.Sc thesis Presented to the School of Graduate Studies of Addis Ababa University.
- Taddese, G., Mohamed-Saleem, M.A., Astatke, A. and Ayaleneh, W. 2002. Land degradation: a challenge to Ethiopia. *Environmental Management* 27(6): 815-824.
- Yigardu, M., Asabeneh, A. and Zebene, T. 2016. Bamboo Species Introduced in Ethiopia Biological, Ecological and Management Aspects, Ethiopian Environment and Forest Research Institute (EEFRI) working paper.