The Effect of Shelterbelts on Ecosystem Stabilization and Improvement of Local Communities Livelihood

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Abstract:

Land degradation in the arid, semiarid and sub humid dry areas resulting from various factors, including climatic variation and human activities. This study was carried in semiarid areas both of White Nile State and similar areas north of Gezira area. Rural poor were severely affected by the change in climate and loss of income from agriculture, livestock and land deterioration. The main objective of this study is to investigate the major reasons behind this decline in life standards and think of some pretty good solutions to enhance the whole situation. Four villages were selected randomly from the many villages scattered over all the area.

A questionnaire was distributed to collect answers from the chosen respondents. Analysis was done to the data collected on basis of simple percentages. The main results emerged out are similar almost from all respondents. Land deterioration is the real problem which affects the agricultural production and life stock rearing and hence adversely affecting the life standards. Total family income was meager and very low to support the daily needs. Intervention to combat land degradation is badly needed. Shelterbelts establishment is one of the suitable activities and measures to be adopted by villagers together with the responsible bodies for minimizing land deterioration. Mostly all the communities in the area believe in that shelterbelts establishment helped a lot in raising the standard of living among the rural communities. The study came out with a major recommendation that trees planting must be encouraged in the area together with agro-forestry systems in the agricultural land. A strong extension program should be designed for the people to reach a better degree of awareness and adoption to their lands and the eco-system.

1- Introduction:

The last two or three decades show, as a result of the drought stroke the African countries there was a considerable attention of the world's nationalities towards the importance of forests. Rio declaration on environment and development stated; (the degradation of the land in arid, semi-arid and sub humid dry areas resulting from various factors, including climatic variation and human activities, (UNCED, 1992). Forests, as known worldwide, have environmental, ecological, agricultural and economic value in supporting natural eco-systems and improve human welfare. Forests always stay to exert social and economic importance that affects the livelihood of most the communities in a country. Sudan is one of the countries of different climatic zones, of which desert and semi-desert are the most vulnerable parts. It tolerates lots of human activities that accelerate the process of desertification. Lack of energy is the most prevailing problem in such areas. Dwellers suffer shortage of energy as they haven't yet developed other alternatives for energy provision. Rural communities, as a result of lack of available sources of energy, the poor depend upon forests in providing the daily necessities of fuel wood to most of the dwellers. This is in addition to other examples of forests' role is the provision of fodder for the livestock, main source of other forms of needs of forest products to families such as, building materials and mostly improving the ecosystem for agricultural products for the daily consumption. Shelterbelts would have been one of the many measures that can combat the adverse consequences of the drought to minimize the vegetation cover loss and there foe create some services to the people in the areas concerned.

2- The Problem Statement:

The north white state in general where the study area lies, is a part of the semi-desert area. The vegetation cover of which was noted to be described as forest stands suitable for fuel wood production and deserves more attention for reservation. *Acacia tortilis* and *Capparis decidua* are the most dominant tree species all over the area. Other species like *Calotropis procera* on sandy soils and sand dunes covered by *Panicum tergidum* while the flat clay soils covered by *Leptadenia pyrotechnica* and *Ziziphus*

spinachristi. Generally the areas are susceptible to desert encroachment, together with the quick fast increase in population in rural areas. The climate parameters, temperature, precipitation, wind velocity, and relative humidity influence soil erosion by wind in semi-arid zones. Decades ago semi-arid areas, as stated by Al-Amin (1999), were relatively free from major human influence and activities accelerate desertification process. The daily needs increase annually. Regarding the semi-arid areas characterized by a meager rain fall, lots of problems will emerge out in the local societies. These problems cover fields like:

- Shortage of food as a result of loss of fertile soils and land decrease and degradation.
- Lack of fodder to livestock and then after a decrease of animal productivity.
- The deterioration of ecosystem and degradation continuity.

3- Materials and Methods:

This study was carried out in north White Nile State and north of the Gezira, meant to investigate the situation in the semi-arid zones and other similar areas in relation to land deterioration. Adverse Indicators could be considered as a measure to combat adverse consequences that might occur in future. Four villages were selected in the area to investigate the households' income before and after shelterbelts establishment. This is in addition to the effect of forest trees and shelterbelts on ecosystem stabilization in the area. A direct problem addressing questionnaire was distributed randomly in four villages selected on the basis of the adverse effect of tree cutting and pasture deterioration due to heavy human activities on land use to fulfill the basic needs of life related to fuel wood and building material, Farm crop production, livestock rearing and soil deterioration were focused on by the investigation. Results and data collected and analyzed using the simple percentages calculation. Conclusions were derived from the study, from which some recommendations written down considered necessary for better life in the coming future.

4- Results and Discussion:

A- Ecosystem Stabilization:

Studies showed, as known, forests have ecological, cultural, social and economic value in in supporting natural systems and improving human welfare (Arnold, 2001). World's forests cover, 57% of it is located in developing countries (Fomete, *etal,* 2001). Shelters provide protection to vegetation cover on the lee side, whether farms, crops, or natural grasses. This protection extends to a distance ranges from 10-15 times the height of the trees used in a shelter belt. Almost all the respondents investigated showed a positive response to the presence of shelter belts. This perception amongst the rural communities favored the influence of forests as a good factor that could be used to stabilize the ecosystem. This also resulted in minimizing the illicit cut of trees in the area in favor of cultivation and more farms.

Table (1): Shelter belts Influence:

Village	Shelter belt Establishment		
	Yes	No	%
Village 1	22	0	31.4
Village 2	13	0	18.6
Village 3	15	0	21.4
Village 4	20	0	28,6
Total	70	0	100%

B- Pasture Condition after Shelterbelt Establishment:

Rehabilitation of vegetation cover and enrichment of plants in the area as a result of shelter belts is a good indicator towards soil conservation and therefore stabilization of house-holds income and welfare. Good pastures are the very measure for livestock rearing and rich profitable production of animals. The respondents showed that the condition of pasture is very good as a result of shelter belt establishment, (60%). Still there are some people

within the community (40%) said the situation is good. This of course needs extension program that enlighten the importance of shelter belt in conservation of ecosystem services.

Table (2): Pasture Condition after Shelter Belt Establishment:

Village	poor	Good	Very good	total
Village 1	0	8	14	22
Village 2	0	4	9	13
Village 3	0	7	8	15
Village 4	0	9	11	20
Percentage	0	40%	60%	100%

C- Source of Income:

Many different sources of income indicate the status of families and their living standards. Most of rural communities depend on two main sources of income that is agriculture and animal rearing. Sources other than these two mentioned include; employments, trading in different fields of which is the trading in forests products, while most of rural families depend on immigration to other countries, but that might be considered as unstable source of income. That assure the suitabilities of sources of income rely on agriculture and livestock. Both of which were strongly tied to ecosystem stability. The study showed in table (3) that 36% of the respondents earn their main income from livestock rearing and 33% from agriculture.

Table (3): Source of Income:

Village	Agric.	Livestock	Gov.	Trade	Others	Total
Village1	11	6	4	0	1	22
Village2	3	5	0	1	4	13

Village3	5	6	0	3	1	15
Village4	4	8	0	3	5	20
Percentage	32.9%	35.7%	5.7%	10%	15.7%	100%

It is very important to enlight the fact that income was meager through-out the area. It was found to be as said by the respondents that their income varies between (1000-2000 SDG). Poverty is the prevailing situation in the society, only 7% were found to earn income reaches up to (2000-3000 SDG).

Table (4): Income and the Effect of Shelterbelts:

Village	Income Before Sh.blt		Income After Sh.blt			Total
	1 - 2	2 – 3	2 - 3	3 – 4	> 4	
Village 1	19	3	9	11	2	22
Village 2	12	1	0	7	6	13
Village 3	14	1	0	2	13	15
Village 4	20	0	0	4	16	20
Total	65	5	9	24	37	70
Percentage	92.8	7.1	12.9	34.3	52.9	100

(Income in 1000 SDG)

Many services of the shelterbelts in the semi-arid area were found to be clearly known and appreciated by the respondents. Reduction of plant cover also resulted in lowering the quality of humus in the soil and plant productivity drops further (Adesina, 2008). Open land with litter or no vegetal cover is highly vulnerable to both wind and water erosion (Cao, *et al,* 2008). Investigation showed that after the establishment of the shelterbelts rural were encouraged to be in favor of tree planting. Livestock rearing was activated also farming benefits from trees, after all income increased remarkably. Some families have raised their income to more than

4000 SDG. 53% of the respondents were got to know the influence of trees on farming activities through the increase of farm production. 343 % showed their income increased to (3000 - 4000 SDG).

5- Conclusions and Recommendations:

Shelterbelts are important in restoring the degraded land, providing micro-climate to agricultural activities and provision of fodder to animals. Pascal (2003) stated that; shelterbelts improve the microclimate conditions by the cooling effect of transpiration of the trees and conservation of available water resources. Shelterbelts provide "safe nets" for other plants to thrive through the process of establishment and succession.

- Shelterbelts establishment on land susceptible to degradation is of a high benefit to restore land and prevent sand movement.
- Marginal lands are areas more suitable for shelterbelt to prevent or slow down desertification process.
- Encourage the local poor people to practice agro-forestry and shelterbelt activities to serve as generating income production activities.
- Extension is needed to develop the local knowledge towards soil and vegetation cover conservation and restoration.

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