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Impact of Irrational Cutting of Woody Trees on Fuelwood and Forage Prices in Burbur Area, Sheikan Locality- North Kordofan, Sudan

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Abstract

Irrational cut of trees and shrubs has widely spread as a result of inefficient forest management and absence of the role of social fencing and environment sense among the people. This research addressed impact of irrational cutting of trees and shrubs on fuelwood and forage prices in Burbur area, Sheikan Locality, North Kordofan Sate, Sudan. Primary data was randomly collected through social survey where structured questionnaire was used. Robert Mathon model was followed for determining sample size. A total of 80 out of 102 households were randomly selected and interviewed. Secondary data were collected from relevant scientific publications. Statistical analysis was done where frequencies, averages and percentages were calculated in Statistical Packages for Social Sciences (SPSS) version 16.00. Results showed that charcoal production, wood collection and forage production rate were sharply decreased due to irrational cuttings. The average rate of decrease was 9.63±5.60 Kg/Fed for charcoal production, 3.55±1.61 m3 for wood collection and 74.31±76.18 kg forage production. The interviewed mentioned that prices of charcoal, liquid gas and forage prices were significantly increased as stated by 69.6%, 81.0% and 83.3% respectively. The average rate of increase in prices of charcoal, wood, liquid gas and forage was 7224± 1901.46 SDG/sacks, 1549±603.14 SDG/m3, 17357±7692.80 SDG/6.7lq and 439±196.59 SDG/kg respectively. The study concluded that cutting of trees caused negative impacted on prices of fire wood, charcoal, liquid gas as well as forage prices. The study recommended rationalizing cutting of trees and encouraging reforestation with focus on pre-inhibited tree species.

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Introduction

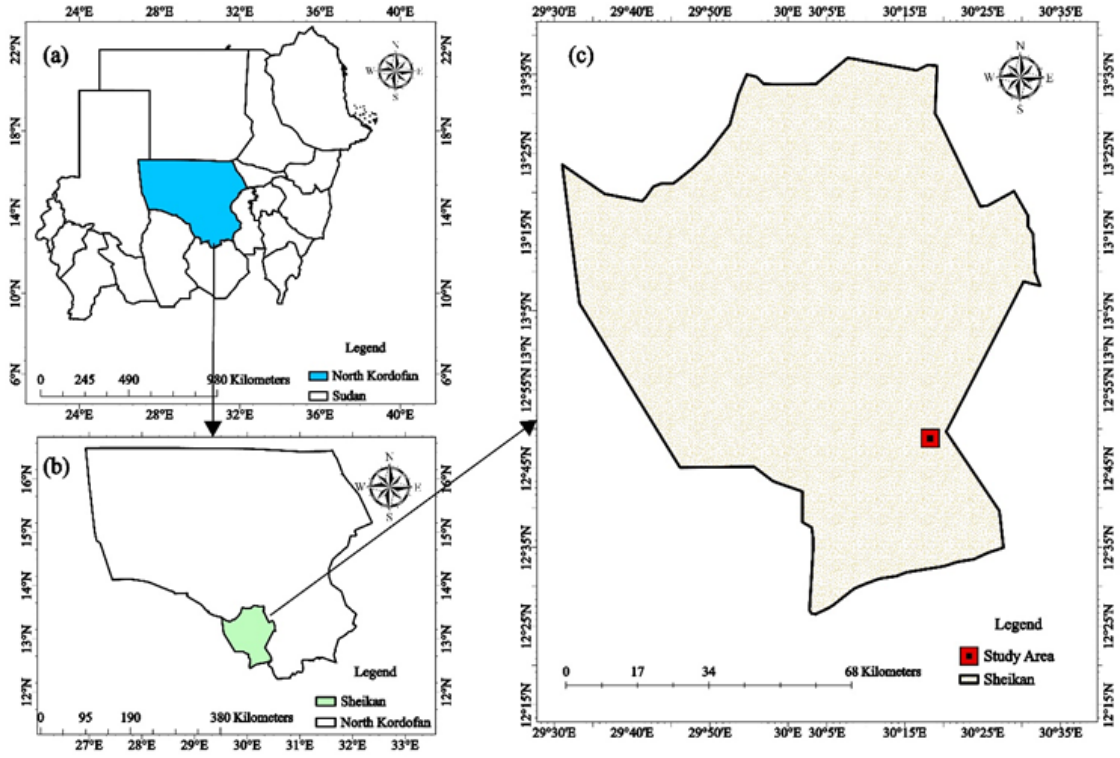
Forest services and functions include the serving of forest as a primary habitat for species (some of which are critically endangered), supporting biodiversity maintenance and conservation, regulating climate and pest activities, and providing food, fodder, energy and other non-timber forest products (NTFP's) for growing population well-being [1-4]. Vegetation degradation refers to quantitative and or qualitative reduction in vegetation from human induced activities and climatic variation such as severe prolonged droughts under poor land resources management [5]. Natural resources, under pressure from human uses, have undergone rapid and extensive change over the past 50 years that have resulted in many of them being degraded; population and economic growth are likely to intensify uses and pressure on natural resource systems [6]. Global climate change, which has impacted natural resource systems across the ground, is adding to the pressures and is expected to substantially disrupt many of these systems and the services that they can provide [6,7]. Natural disturbances act as a key role in shaping our forests as they steer the course of succession and structural development, ultimately altering ecosystem services, biodiversity and regeneration failure in forest ecosystems [8-11]. Anthropogenic disturbances (illegal logging, farming, mining) contributed to the reduced tree species diversity, density of stands and removal of mature trees, which translated into a reduction in the forest's ability to store carbon. More frequent and severe disturbances increasingly open the forest canopy and initiate tree regeneration. Simultaneously, increasing weather extremes, such as drought and heat [12]. The contribution of forest ecosystems to mitigate climate change is of growing interest [13,14], changes in vegetation composition can mitigate disturbance impacts, but also influence climate regulation directly. As a result of a number of interactive drivers (changes in climate, vegetation, and disturbance) and their simultaneous effects on climate-relevant processes processes the future climate regulation function of forests remains highly uncertain [10]. Cultivation of marginal, large scale mechanized farms lands, Overgrazing, wood cutting by cultivators and pastoralists are the main adverse human activities that led to removal of natural vegetation, causes vegetation degradation, deforestation and overexploitation of forest resources and exposed land to both wind and water erosion [6,15-18]. Overcutting of trees and shrubs is severely affecting farmland and increase wind speed [19]. Removal of vegetation cover expose the land to the extreme climatic event and directly affect agricultural production which is very sensitive sector [20,21]. Thus, this research is looking into the effect removing vegetation cover on the environment and forest ecosystem servicers in the study area.

Methodology

Study Area

The study was conducted in North Kordofan state which lies between latitude 10.5˚ and 15˚ north and longitude 27.5˚ and 32˚east, it occupies a total area of about 185,302 km² figure (1). The climate is hot and semi-arid with mean annual rainfall varying from 300 mm in the north to over 900 mm in the south. Rainfall is concentrated in a single short season which increases in reliability and length from north (July–September) to south (May–October). Generally, the rainy season normally extends from June/July to September/October. However, the period between the first and last useful rains is limited to 70 to 90 days only. Average maximum monthly temperatures range from 29.9°C in January to 39.6°C in May with average value of 34.5°C. The minimum average monthly temperatures vary from 13.3°C, in January, to 24.7°C in June with an average value of 20.3°C for the same period. The focus area is called Burbur area. It is one of the most important forested areas to the Forest National Corporation and the communities. It is well known by gum Arabic, baobab, tamarind, ziziphus and falsa cherry shrubs production. These are the dominant tree species in the forest however; tens other species were grown in the forest. Varieties of agricultural crops are grown in the forest including sorghum, sesame and ground nut.

Figure 1: Location of the Study Area



Data Collection

Data was collected through Direct observation and structured questionnaire were distributed randomly among 80 respondents with sampling percent of 78 %. The Robert Mathon model was followed for determining sample size.

$$n = \frac{M}{\left[\left(S^2 \times (M-1)\right) \div pq\right] + 1}$$

Where:
M= The population size
n= sample size
S= (product from dividing standard degree opposite to 0.95 which is 1.96 to error rate (0.05))
P= 0.50
q= 0.50

Data Analysis

Descriptive statistics was done, where frequencies, averages and percentages were calculated. Statistical Packages for social Sciences (SPSS) and Excel was used for data analysis. Results were interpreted in tables and figures.

Results and Discussion

Sociodemographic Characteristic of Respondents

The study presented the important Sociodemographic characteristic of Respondents such as Sex, Education level, Occupation and Family Size Table (1). The majority of respondents 55% are male which consider have more frequent appearance in the forest for collection of timber and nun timber forest products were constitute

forest resource as well. The majority of respondents 42% have only primary education with they not aware enough by the environmental benefits of the trees and cannot take care about the trees were contribute in over exploitation of tree resource and decreasing its population as well. The majority of respondents 33% are farmers were endangered trees and shrubs due removal mass of vegetation cover during land preparation for agriculture. Considerable proportion of respondents 39% with the family size more than 5 persons which have a high demand for forest ecosystem services specially firewood, charcoal and building materials. Thus, the community around the study area have sociodemographic characteristic were making high pressure on the vegetation cover and consequently degraded the area and negatively affects the environment and forest ecosystem services.

Table 1: Respondents at the Study Area

Sex	%	Education	%	Occupations	%	Family size	%
Male	55	Primary	42	Employees	27	1-2 persons	20
Female	45	Secondary	22	Free labors	31	3-5 persons	41
		University	36	Farmers	33	> 5 persons	39
				Others	9	-	-
Total	**100**		**100**		**100**		**100**

Effect of Irrational cut on the Status of Charcoal Production, Fire Wood Collection and Forage Production

The study reviled the effect of vegetation removing vegetation cover on the status of charcoal production, fire wood collection and table (4). The majority of respondents 87.5%, 50% mentioned that the status of forage production and fire wood collection was decreased respectively. While 53.8% reported that charcoal production was increased. Due to the fact that forage production and fire wood was collected from the mature trees and fire wood was produced from the shrubs, that means the proportion of removed mature trees is bigger than the shrubs and therefore, the population of mature trees was decreased and forage production and fire wood collection was decreased accordingly.

Table 2: Effect of Irrational Cut on the Status of Charcoal Production, Fire Wood Collection and Forage Production at the Study Area

Item	Increased	Decreased	Fixed
Charcoal production	53.8	46.2	-
Fire wood collection	47.5	50	2.5
Forage production	10	87.5	2.5

Figure 2: Effect of irrational cutting on the woody land area, Burbur, Sheikan, North Kordofan

Calculation of Change Rate in Charcoal, Firewood, Forage Production and Agricultural Area as a Result of Removing the Vegetation Cover

The results showed that the average charcoal production increase, firewood decrease, forage production decrease and agricultural area decrease were 9.63±5.60 Kg/Fed, 3.55±1.61 m3, 74.31±76.18 tie/fed and 16.32±35.12 fed respectively table (5).

Table 3: Calculation of Change Rate in Charcoal, Firewood, Forage Production and Agricultural Area as a Result of Removing the Vegetation Cover.

Item	Charcoal quantity/40kg	Firewood collected quantity (m3)	Forage production change (kg)	Size of change in agricultural area/ fed
Average	9.63±5.60	3.55±1.61	74.31±76.18	16.32±35.12
Minimum	2	0.2	2	0
Maximum	20	6	300	200
Sum	308	113.7	2378	506

Status of Firewood Cost at the Study Area

Remove of vegetation cover resulted in observable increase in firewood cost as stated by the majority of respondents 66.7% figure (3). That is due to the fact that as the result of continuous removal of the vegetation around the area, the people were collected fire woods from far areas and the price was increased due to the addition of transportation cost.

Table 4: Status of Charcoal, Liquid Gas and Forage Prices at the Study Area

Item	Increased	Decreased	No change
Charcoal Price status	69.60%	29.10%	29.10%
Gas Price status	81.00%	12.70%	6.30%
Forage Price status	83.30%	11.50%	5.10%

Rate of price increase in Charcoal, Fire wood, gas and forage prices (SDG) in the study area

The results revealed the rate of increase in charcoal, fire wood, gas and forage prices (SDG) in the study area table (7). The average increase in charcoal price/40kg, fire wood price/m3, gas price/ SDG/6.7lq and forage prices/tie (SDG/kg) are7224± 1901.46, 1549±603.14, 17357±7692.80 and 439±196.59 respectively.

Table 5: Rate of Price Increase in Charcoal, Fire Wood, Gas and Forage Prices (SDG) in the Study

Item	Charcoal (40kg)	Fire wood (m3)	Gas Price (SDG/6.7lq)	Forage (SDG/kg)
Mean	7224± 1901.46	1549±603.14	17357±7692.80	439±196.59
Minimum	2000	10	5000	100
Maximum	11000	3000	40000	1000
Sum	419000	88310	972000	23700

Conclusion and Recommendations

The concluded that due to hard economic situation of the people in the research area, the majority of the people satisfy their needs through cutting of the woody trees and shrubs. Within no long time, the area has been emptied and no more trees become available. Consequently, the prices of wood, charcoal, forage and liquid gas significantly increased. The study recommended accelerating control over the remaining resources through proper management. Reforestation programs are also encouraged.

References

1. Damptey FG, de la Riva EG, Birkhofer K (2021) Trade-offs and synergies between food and fodder production and other ecosystem services in an actively restored forest, natural forest and an agroforestry system in Ghana. Front For Glob Change 4: 47.
2. Jenkins M, Schaap B (2018) Forest ecosystem services. In United Nations Forum on Forests.
3. Brockerhoff EG, Barbaro L, Castagneyrol B, Forrester DI, Gardiner B, et al. (2017) Forest biodiversity, ecosystem functioning and the provision of ecosystem services.
4. Millennium Ecosystem Assessment (2005) Ecosystems and human well-being 5: 563.
5. Mustafa M A (2007) Desertification processes. Institute of Desertification and Desert Cultivation Studies. UNESCO chair of Desertification, university of Khartoum.
6. Khalifa, Awadelkarim S O (2016) Socio-economic Impact of Climate Change on the Gum Arabic Belt and Adaptation Strategies, North Kordofan, Sudan. Ph.D thesis. Institute of Environmental Studies, University of Khartoum, Sudan.
7. IPCC (2007) Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of workingWorking Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)]. Cambridge University Press, Cambridge, United Kingdom, 1000.
8. Franklin JF, Spies TA, Van Pelt R, Carey AB, Thornburgh DA, et al. (2002) Disturbances and structural development of natural forest ecosystems with silvicultural implications, using Douglas-fir forests as an example. For Ecol Manag 155: 399-423.
9. Barnosky AD, Hadly EA, Bascompte J, Berlow EL, Brown JH, et al. (2012) Approaching a state shift in Earth's bio-sphere. Nature 486: 52-58.
10. Thom D, Rammer W, Seidl R (2017) The impact of future forest dynamics on climate: Interactive effects of changing vegetation and disturbance regimes. Ecological Monographs 87: 665-684.
11. Rammer W, Braziunas KH, Hansen WD, Ratajczak Z, Westerling AL, et al. (2021) Widespread regeneration failure in forests of greater Yellowstone under scenarios of future climate and fire. Glob. Chang Biol 27: 4339-4351.
12. Thom D, Keeton WS (2020) Disturbance-based silviculture for habitat diversification: effects on forest structure, dynamics, and carbon storage. Forest Ecology and Management 469: 118132.
13. Locatelli B, C Pavageau, E Pramova, M Di Gregorio (2015) Integrating climate change mitigation and adaptation in agriculture and forestry: opportunities and trade-offs. Wiley Interdisciplinary Reviews: Climate Change 6: 585-598.
14. Keenan T F, I C Prentice, J G Canadell, C A Williams, H Wang, et al. (2016) Recent pause in the growth rate of atmospheric CO2 due to enhanced terrestrial carbon uptake. Nature Communications 7:13428.

15. Lanly J-P (1982) Tropical Forest Resources. FAO forestry paper No. 30. FAO, Rome.
16. Cernea MM (1990) Beyond Community woodlots Programmes with Participation. London, U.K. Overseas Development Institute (ODI), social forestry network paper No. 11.
17. Ziervogel G, A Nyong, B Osman, C Conde, TE Downing, et al. (2005) Climate Variability and Change: Implications for Household Food Security. In N.Leary, C. Conde, A. Nyong and J. Pulhin, eds., For Whom the Bell Tolls, Case Studies of Climate Change Vulnerability.AIACC Working Papers.
18. Osman-Elasha B, A Sanjak (2008) Livelihoods and drought in Sudan. In N. Leary, C. Conde, J. Kulkarni, A. Nyong and J. Pulhin, eds., Climate Change and Vulnerability. Earthscan, London, UK.
19. Muneer E S E, Ismail M H O (2019) Effects of selective cutting of Gum Arabic tree (Acacia senegal L.) on Farmland based on Respondent's Perceptions in Wad Banda area, West Kordofan, Sudan. International Journal of Novel Research in Life Sciences, 6: 10-20.
20. TNA (2013) Technology Needs Assessment report_1 for Climate Change Adaptation, Higher Council for Environment and Natural Resources. Republic of the Sudan.
21. Nellemann C, MacDevette M, Manders T, Eickhout B, Svihus B, et al. (2009) The Environmental Food Crisis. The environment's role in averting future food crises. A UNEP rapid response assessment. Arendal, UNDP.