

Determination of Community's Perception over the Current Status of Wood Energy: A Case of Matengo Highlands in Tanzania

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ABSTRACT

Community's perception over status of wood energy was determined in Matengo Highlands, Tanzania. Data was collected from a sample of women using semi-structured questionnaires and analyzed using Microsoft Excel and Statistical Package for Social Science software. Results indicated that the source of energy for 88.2% of respondents was firewood, while 11.8% use both firewood and charcoal. About 57% of respondents said firewood was not as available today as compared to the past decade while for 31.6% the accessibility is the same today as that of the past decade. For sustainable utilization, respondents said, the community should plant trees and adopt improved firewood stoves technology. It was recommended that strengthening of woodlots and agroforestry systems is significant for sustainable utilization of wood energy. Also, training the community on appropriate areas to plant exotic tree species is imperative to avoid possible negative impacts to the environment. Alongside exotic trees, the community should be encouraged to plant indigenous trees for procuring wood energy benefits in short run, and environmental conservation in long run.

Keywords: community's perception, wood energy status, sustainable utilization

Mathematics Subject Classification Number: 62P12

Journal of Economic Literature (JEL) Classification Number: Q23

INTRODUCTION

Wood energy is almost or exclusively the only energy highly depended upon by the majority of people in the developing countries. According to EIA (2002) energy use is growing fast in the developing countries up to 2.5 times the rate in the developed countries. In Africa, the dependence of wood energy is not restricted to rural poor but even the urban communities significantly use wood energy in one form or another. Charcoal for example is very much used for cooking and warming in towns, and it outweighs other forms of cooking energies such as biogas and electricity used for the same purpose (Hines, 1991). However, wood energy utilization in rural areas outweighs the utilization of the same in urban areas. High wood energy consumption in rural areas is among others attributed to inaccessibility to alternative sources of energy (Nanyaro, 2007). In Tanzania, for example, with the population of 34,569,232 people (Census, 2002), of which 80% live in rural areas, wood energy consumption countrywide constitutes 90% of total energy, of which 98% is used in rural areas (Sawe, 2005). Since wood energy is highly depended upon by the rural people,

understanding of the perceptions of the rural users over the prevailing status of this renewable resource is imperative as a starting point for sustainable utilization initiatives.

The present study determined the community's perception over the current status of wood energy in the *Matengo* Highlands. Based on the findings from this study, strategies can be recommended for sustainable efficient utilization of wood based energy not only for the study area but also for other areas with similar ecological conditions in Tanzania.

MATERIALS AND METHODS

Study Area

This study was done in Mbinga district. The district is located in southwestern part of Tanzania between longitudes 34°24'E and 35°28'E and latitudes 10°15'S and 11°34'S, and is characterized by highlands reaching an elevation of about 2000 m and a series of low-level hills at lower elevations of between 900 m and 1500 m above sea level (MWARP, 1998).

The district receives rainfall in monomodal pattern from November to May. The annual rainfall is about 1300 mm. Average annual temperatures range from 13°C in the Matengo Highlands to 30 °C on the shores of Lake Nyasa (Mchau, 1993). The natural vegetation in the Matengo Highlands has been cleared and only remnants in some catchment areas are left comprising of afro-montane rain and undifferentiated forest (Kimaro *et al*, 1996)

Data Collection

Data collection was purposely done from women since they are the ones who assume the responsibility of collecting firewood in the *Matengo* society. Random sampling was used for selecting the households for interviews and a total of 60 women were interviewed. Ages of respondents were considered so that opinions from young, middle aged and older women were captured. The ages of interviewed respondents ranged from 21 to 80 years. For each selected household, a woman and a girl(s), if any, were interviewed. When it was necessary men were asked to supplement information given by women informants. Checklist of questions pertaining to wood based (biomass) energy utilization in the study area was administered to the respondents. The interviews covered respondents from Myangayanga, Kidimba and Mundeki villages located in the Matengo Highlands.

Data Analysis

The collected data was coded and entered into the statistical packages for analysis. Both Microsoft Excel and Statistical Package for Social Science (SPSS) computer based software were used for the analysis. Frequencies were computed for various variables and descriptive information was summarized into the meaningful units. Figures were drawn to present the analyzed information.

RESULTS AND DISCUSSION

Respondents' Awareness of Declining Wood Energy

The study revealed that 90% of respondents were aware that woody vegetation has declined in the *Matengo* hills. The respondents attributed the decline to increased demand for cultivation land and firewood. Decline in woody vegetation has in-turn affected the community in-terms of declined availability of wood based products. As remedy to this problem, the respondents uncovered that tree planting could be a solution to reversing this problem. Currently small woodlots of especially exotic tree species are found in the area. Trees, which the respondents prefer for planting, include *G. robusta* and *A. mearnsii* because they are suitable for firewood, they improve soil fertility and they grow fast. Establishment of woodlots is possible on the upper sides of the hills. This land is under the village governments. In the middle areas of the hill there is a land shortage, since all the households' land is under agricultural production for food and cash crops. The governments allocate plots to villagers who wish to establish their own woodlots. Already some villagers have planted *Eucalypts* spp and *A. mearnsii* for firewood, charcoal and timber purposes on this area. Nevertheless, *Eucalyptus* spp, which drains water from the soil, have also been planted even around and in water sources thereby exposing the sources to the risk of drying up due to downwards shift of water table.

As for comparison of firewood accessibility between the past years and today, the study has revealed that there used to be abundant firewood around homesteads in the past years. Today much of forest vegetation has been cleared-off so it takes a significant time up to 4 hrs to collect firewood. About 57% of the interviewed women reported the difficult firewood accessibility in the present years while 3.9% of the respondents said firewood was moderately available (Figure 1). However, in contrast, 31.6% of respondents responded that there is no difference in accessing firewood for the two named periods. The significant percentage of respondents who don't see any difference between past and current wood energy accessibility, imply a necessity of enlightening the community on the serious likelihood of wood energy inaccessibility in future, if efforts are not made to revitalize the situation by inspiring the spirit of tree planting.

Forms of Cooking Energy

The main form of cooking energy is firewood (88.2%). Some respondents (11.8%) use both firewood and charcoal. Charcoal is preferably made from *A. mearnsii*, and is principally used for warming purposes. The respondents who use charcoal reported that they prefer charcoal for warming because firewood produces a smoke which causes eye irritation and suffocation. Reasons for higher preference of firewood as a main form of energy are indicated in Figure 3. According to the respondents firewood is highly used due to the easiness and cheapness of obtaining it (35.5% of respondents), easy accessibility (25% of respondents) and accustomedness to using it compared to other forms of energy (23.7% of the respondents). Besides, other respondents (7.9%) said short time is spent when cooking with firewood.

In spite of the higher preference of firewood however, some problems have been noted as indicated in figure 4. Majority of respondents (40.8%) reported that firewood inaccessibility is the main problem in the present years, whereas 11.8% added that besides inaccessibility, there is a significant accompanied wastage of time estimated at up to 4 hrs for firewood collection, as a result of a continuous tree cutting without replanting back.

For those who collect firewood from remnant natural forests, long distances have to be walked from the homestead than it used to be in past decades. Some villagers who could not collect firewood from the far areas have to give money ranging from Tshs 1000 to 2000, depending on the size of firewood stack, to their colleagues to collect firewood for them. Associated with difficulties in collecting firewood, conflicts among the villagers on the issue of firewood were also reported, and in several occasions some villagers had to be fined following collecting firewood from woodlots, which belonged to others.

Sources of Cooking Energy

Sources of firewood in the study area are presented in Figure 5. The study uncovered that majority of the respondents (48.7%) collect firewood from some remnant natural forest, woodlots and agroforestry altogether, followed by those who collect firewood from both remnant natural forest and agroforestry (27.6%). About 8% of the respondents collect firewood from both agroforestry and woodlots. Yet other respondents collect firewood from remnant natural forest (4%), agroforestry (4%), and woodlots (4%). The implication of collecting firewood from not only the natural forest indicates a great potential of conserving the remaining natural forest through strengthening woodlots and agroforestry systems.

Tree Species Mostly Preferred for Firewood and Reasons for Preference

The species used for firewood in the study area include *Eucalyptus* spp, *G. robusta*, *Cupressus lusitanica*, *A. mearnsii*, Mlengalenga (Matengo name), dry coffee stems, *Bridelia micrantha*, *Treculia africana*, Miya (Matengo name), *Manihot esculenta*, dry cassava stems, *Pinus patula*, *Vangueria infaustia*, *Parinari curatellifolia*, mango trees, *Pericopsis angolensis*, *Albizia gummifera*, *Brachystigia spiciformis*, *Parinari curatellifolia*, *Syzygium cordatum*, *Dombeya rotundifolia*, Mipulu, Miyeye (Matengo names), *Faurea saligna* and *Psidium guajava*. While *Grevillea robusta* and *Eucalypts* spp are abundant, the indigenous tree species are scarce; they are collected from few remnant natural forests.

The study revealed that *G. robusta* and *A. mearnsii* are highly preferred for firewood. While 47.4% of the respondents ranked *G. robusta* first preferred for firewood, 21.1% could not differentiate the preference of the two species (*G. robusta* and *A. mearnsii*) (Figure 6). The local people prefer *G. robusta* and *A. mearnsii* because of high combustion, high thermal energy, long lasting fire and fast growing tendency of the two species (Figure 7). For the two species, the respondents reported that the fire could be glowing from night to the next morning. Besides, *G. robusta* is also preferred in coffee plantations for shade provision, and as a timber. *A. mearnsii* is preferred for being used as construction poles, charcoal making, and for its ease of being propagated through fire and wildlings

Opinions About the Future Firewood Status

Respondent's opinions about future firewood status are presented in Figure 8. It can be observed from Figure 8 that 76.3% of the respondents predicted difficulty of procuring firewood in future if the households would not start or promote their woodlots. In contrast, 7.9% of respondents would not predict any changes of the situation in the coming years (with reference to the present time, whereas 3.9% didn't know/tell how the firewood situation would be. The response that no changes will there be in firewood situation between present and future time implies that training about firewood dynamics is required.

As for what should be done to ensure sustainable utilization of firewood in future (for those who predicted a change), Figure 9 presents strategies to be emphasized to the community in their localities. About 56% of the respondents reported that for sustainable utilization of firewood there is a great need for planting trees. Currently there is a slow pace tree planting in the area. According to the respondents, this is due to too much chore in their households (e.g. water fetching, farming, children caring, and firewood collection). The, 40% of the respondents said improved firewood stoves should be emphasized to the communities to reduce firewood consumption and hence lower pressure on few remaining natural forests. The use of improved firewood stoves has already started in Kindimba village but majority of the households still use the conventional three stones firewood stove, which consumes a lot of firewood per meal cooked. In contrast, 3.9% of respondents said nothing has to be intervened because trees grow naturally, to them the firewood situation will be the same in future as it is today.

CONCLUSION AND SUGGESTION

The Majority of respondents were aware of the declining wood energy status in the *Matengo* highlands in the present years. The respondents backed their responses with the indicator that indigenous tree species are almost unavailable. They uncovered that one of the solutions to this situation is to strengthen tree planting. However, though the respondents acknowledged the serious decline of firewood, their involvement in tree planting is small reportedly due to too much burden they regularly have in their households such as caring for children, farming, firewood collection, water fetching etc. There is a need of enlightening the community on the importance of strengthening woodlots and agroforestry systems to ensure sustainable supply of wood energy. Besides, the community should be further advised about the importance of indigenous trees in conserving open hilltops and water sources and that they should avoid planting trees like *Eucalypts* (believed to drain wetlands) in water sources. Furthermore, training is required on seed collection particularly for local tree species so that women could be able to collect them locally in their areas and raise seedlings for planting in degraded areas, thereby ensuring sustainability of tree planting.

REFERENCES

- Energy Information Agency (2002). *International Energy Outlook*, pages 8-9
- Hines, D. (1991). Energy Assessment for Iringa Town. Paper submitted to DANIDA, Dar es Salaam.
- Kimaro, D.N., Meliyo, J.L, Msanya, B.M., Magogo, J.P. and Wickama, J.M . (1996). Investigation of environmental factors for land management in Litembo village, Mbinga district, Tanzania. Department of Soil Science, Faculty of Agriculture, Sokoine University , Morogoro and National Soil Service, Agricultural Research Institute Mlingano, Tanga Tanzania.
- Mchau, J.M.J (1993). Evaluation of agroforestry adoption in Mbinga district, Tanzania. MSc. thesis. University College of north Wales, Bangor
- Miombo Woodland Agroecological Research Project (1998). *Annual Progress Report*. Faculty of Agriculture and Centre for African Area Studies, Kyoto University, pp. 39.
- Nanyaro, A. P. "Energy Challenges in Tanzania" Industry Insight Article [online], accessed on 13th April, 2007 at http://www.esi-africa.com/archive/esi_2_2006/pdf/64.pdf
- Sawe, E.N. (2005). Rural energy and stoves development in Tanzania. Experiences, barriers and strategies. Pp 1.

FIGURES

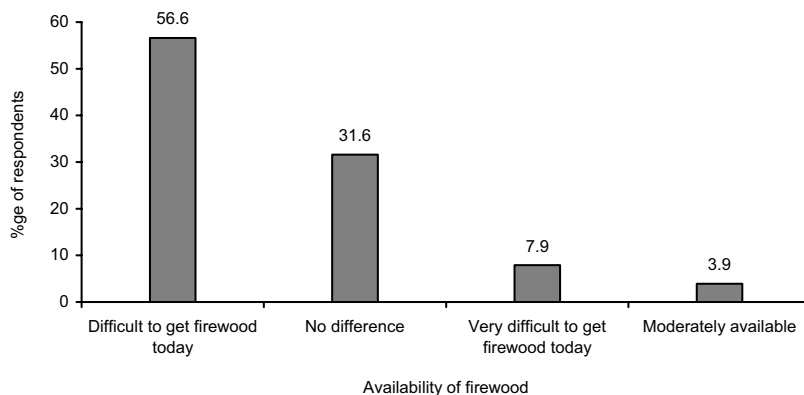


Figure 1: Comparison of firewood accessibility today with the past years

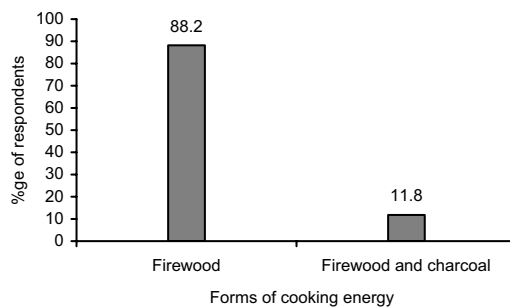


Figure 2: Forms of cooking energy

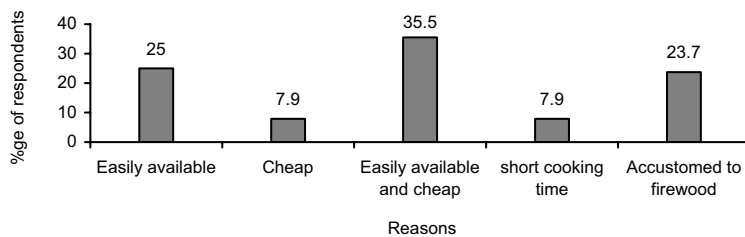


Figure 3: Reasons of preferring firewood as main source of cooking energy

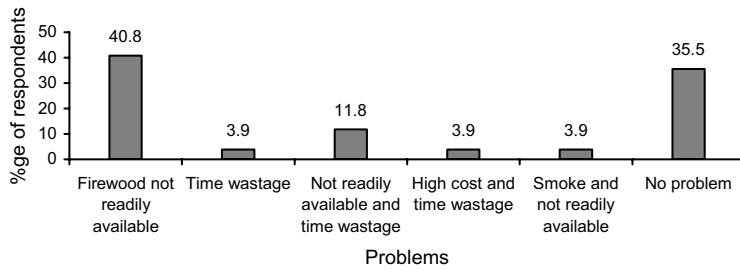


Figure 4: Problems associated with firewood utilization

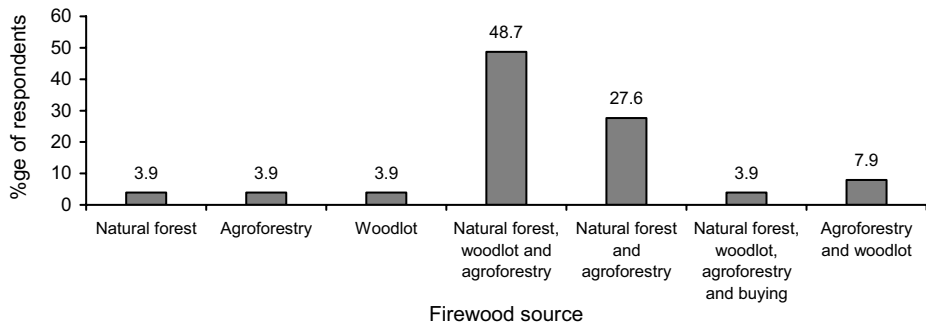


Figure 5: Sources of cooking in Matengo highlands

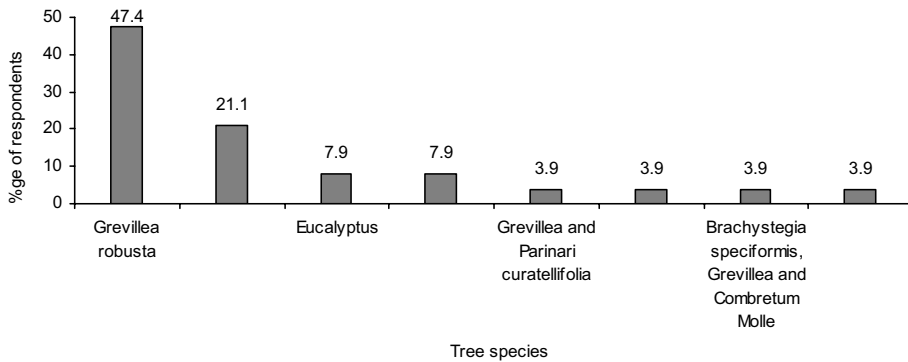


Figure 6: Tree species mostly preferred for firewood

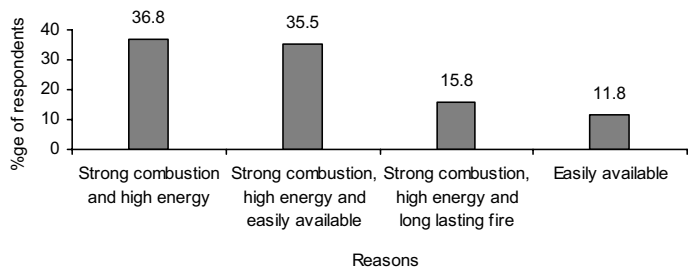


Figure 7: Reasons for high preference of *G. robusta* and *A. mearnsii*

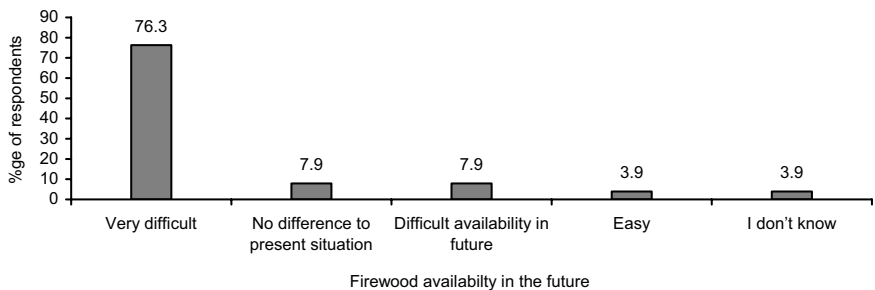


Figure 8: Firewood availability in future years compared to current situation

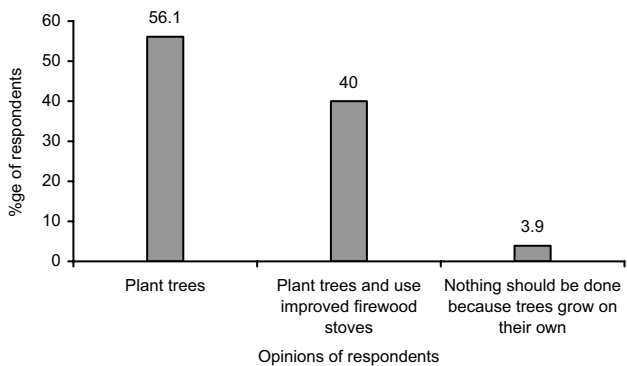


Figure 9: Strategies for sustainable utilization of firewood