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PEOPLES' PERCEPTIONS ON THE IMPACTS OF VEGETATION COVER CHANGES ON HUMAN HEALTH: LESSONS FROM PLAGUE INFESTED AREAS OF WEST USAMBARA HIGHLANDS, TANZANIA

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Abstract. *Human plague in West Usambaras, northeast Tanzania, has been a public health problem for many years. Incidences of plague have been associated with various practices in agriculture, forestry and natural catastrophes. In west Usambaras, due to the reduction of vegetation cover, different ecosystem management practices have been carried out. The impact of these practices on creation of rodent's hiding places and consequently outbreaks of plague and the socio-economic importance of these practices, were not well documented. The broad objective of this study was therefore to investigate the perceptions of local communities on the impacts of vegetation cover changes on human health using lessons from plague infested areas of West Usambaras, Tanzania. Methodologically, Participatory Rural Appraisal (PRA) and individual household questionnaire surveys were applied in data collection. PRA was used prior to questionnaire administration. Primary data from households were collected using structured questionnaires containing both open and close-ended questions. While qualitative data were analysed by content analysis, Statistical Package for Social Sciences (SPSS) was used to analyse quantitative data. The results showed that, planting of guatemala grass (Tripsacum laxum), elephant grass (Pennisetum purpureum), banana, sugarcane and trees, terrace making and zero grazing were identified as ecosystem management practices that were carried out to improve the vegetation cover in the area from the serious deforestation resulted from the over population in the area. However it was also shown that fodder grasses mainly guatemala grass to be affiliated with the provision of shelter for rodents and hence created close contact between human beings and the wild rodents which has been brought about by the dependence of these grasses by both human being for their livestock and the wild rodents as a shelter, the contacts that increased the possibility of spreading of the plague disease in the area. Introduction of ecosystem management education in primary schools, establishment of tree nurseries in schools and villages, emphasis on tree planting by communities and upkeep of zero grazing, were recommended as appropriate measures to be adopted in preserving ecosystem and reduce shelter for rodents close to human settlements.*

INTRODUCTION

Background information. Ecosystems are the functional units that result from

interactions of biotic, abiotic and cultural (anthropogenic) components (CPPC 1996). Despite extensive knowledge of impact of human activities on these ecosystems, the latter continue to be degraded. One possible reason for this is the lack of understanding of the benefits associated with ecosystems. Human well-being is dependent on the ecosystem services and can therefore be considered as an indicator of the overall life supporting capacity to the environment (Rapport *et al.* 1998). Ecosystem degradation has negative impacts on ecosystem health including human health, animal health and plant health.

Human plague has been a serious public health problem associated with ecosystem degradation in some parts of Tanzania especially in West Usambaras. Local communities in this area have been aware of the involvement of rodents and fleas in plague transmission and the high infectious nature of the disease for over two decades. Kilonzo *et al.,* (1997), mentions this disease to have been prevailing in other areas of Tanzania since pre-colonial times. Excessive deforestation for various purposes, overgrazing, over cultivation in various hilly areas in the district, and destructive fires, have greatly reduced vegetation cover and wildlife habitats, thus increasing soil erosion and forcing wild rodents to adopt semi domestic habitats and consequently facilitate rodent-human contacts, which may result in plague transmission (Makundi *et al.,* 2003), further, human activities have caused substantial impacts on the ecology of the West Usambara mountains caused by agricultural encroachment into the natural forest, an activity that has resulted in modifications of habitats, making the latter less suitable for forest inhabiting rodent species(Ibidem). To date, substantial information on the epidemiology of plague, rodent reservoirs, carnivorous carriers and flea vectors in the district is well documented. Furthermore, studies on the ecology and biology of rodents in stable and unstable ecosystems and their effects on plague epizootics and epidemics are being carried out. However, less was known on the local people's perceptions on the impact of land cover changes on the persistence of the human plague in the area and as to why the area has remained the only active plague focus in the country. The study therefore intended to elucidate the perceptions of local people resident to the Usambara highlands on the impacts of land cover change on the existence of human plague in the area.

METHODOLOGY

Study area. The study was carried out in eight selected Villages in Lushoto district West Usambara northeastern Tanzania, which lies between 38^{o} 10' and 38^{o} 36' E and 4^{o} 24' and 5 ^{o} 00' S with the altitude ranging from 800 to 2300 m.a.s.l. (Kaoneka, 1993 and Kerkhof,

1990). Its population is estimated to be 419,970 people of whom 46% and 54% are males and females respectively (NBS. 2003).

Data collection methods. Data on the perception of local communities on the impacts of land cover changes on human plague outbreaks in West Usambaras, Tanzania were gathered using participatory approaches where by two major tools were employed. These included focused group discussions, which involved small group meetings, and time line/ event analysis were used to obtain the information from local communities. As is explained by Coldings et al., (2003) learning from local communities with long-term experience in environmental variability and uncertainty in many parts of the world may yield valuable rules of thumb for managing complex ecosystems such that the resilience and options for human welfare are not reduced.

In-depth interviews with Individual using structures questionnaire was also another method used to gathers the information. This assisted to uncover the perceptions of different individuals at the household level on the impacts of land cover changes on human plague outbreaks in the area. A total of 240 households in these villages were visited and a structured questionnaire containing both open and close-ended questions was used to collect information. While qualitative data were analyzed by context analysis, Statistical Package for Social Sciences (SPSS) was used to analyze quantitative data.

RESULTS AND DISCUSSIONS

Social households' characteristics and plague recorded cases in the area

Ethnic groups. About 45% of the respondents interviewed in the area were from Sambaa tribe, 38% from Pare, 15% from Mbugu tribe and 2% were from other tribes, which included Chaga and Hehe. Most of the areas in the district where the plague disease has been occurring, are dominated by the three major tribes; Sambaa, Pare and Mbugu. The housing patterns have been linked with the outbreak of the disease in this area. It was reported during the group discussion that males who are polygamous and have one story building, used to sleep with their new wives on the top floor and the elder wife who has children occupy the ground floor, which is made of soil. And the floor is also occupied by livestock (cattle, goat and chicken), which make the floor dirty and hence favourable for flea infestation. Moreover, areas around the houses are surrounded by small bushes, which encourages the rodents to move in and out of the house, Consequently, the plague causing bacteria are transmitted to human beings mainly children and women (Taramo pers.com).

Other issue associated with the lifestyle of people in the area is the grain storage (mainly maize grain). After harvesting maize, grains are stored on the roof of the house where the household members reside. Rodents searching for food and shelter move to the roof and in the process-carrying flea with them. The fleas move down to the living rooms thus facilitating the transmission of the plague causing bacteria to human.

The habit of children from closely related families within a hamlet to share rooms or a small house (*Bweni* in Sambaa vernacular) built beside the main house, increases the rate of spread of the disease within the hamlet. It has been a custom in the area that when a child reaches eight years and above is forced to sleep in the common room that they share with other children from the neighbour-hood. Since the children cannot make their rooms tidy rodents carrying flea infest most of these rooms resulting to more infection.

Age structures in the sample villages and sex ratios of respondents. Relatively young people head the households in the sample villages. The greater percentage (46.3%) of the heads of households interviewed in the sample villages were in their middle ages of about 21–40 years old, 42% were aged between 41-61 years. Only 2.5% of the total respondents were from the households headed by people with less than 21 years old and 9.5% headed by people aged more than 60 years old. As regards to sex of household heads interviewed, 81.7% were males and 18.3% were females **(Table 1).**

Table 1. Age structure of the respondents in sampled villages

Age group (years)	Number of respondents			
	Male	Female	Total	%
< 21	4	2	6	2.5
21 –40	87	24	111	46.3
41 – 60	86	14	100	41.7
>60	19	4	23	9.5
Total	196	44	240	100
%	81.7	18.3	100	

Socio-economic characteristics of the households. The survey indicated that 73% of the respondents were in the area for more than 10 years with average of about 18 years. About 85% of all respondents have farm sizes ranging between 0.025 to 3.75 hectares with an

average of 0.85 hectares located up to 10 kilometres away from homes **(Table2).** Eighty percent (80%) of respondents have between 1 and 5 plots. Although 80% of the respondents in the study area average have primary school education, ecosystem conservation and plague control measures are not taught in primary schools, a fact leading to lack of sufficient influence on ecosystem health. While 15.4% of the respondents said they had not been affected by plague at all, 84.6% mentioned that plague had occurred at least once in their households.

Table 2. Socio-economic characteristics of respondents in the sampled households in plague infested areas of Lushoto district, Tanzania.

Socio-Economic characteristics	Range	Average	Modal class	% of average from modal class
Farm ownership (years)	2 - 40	18	>18	72.5
Farm size (Hectares)	0.025 – 3.75	0.85	0.025 – 1.25	84.7
No. Plots owned by the farmer	1 - 10	3.7	< 5	80.0
Occupation	N.A	N.A	Farmers	90.8
Education	N.A	N.A	Primary school	80.0
Farm distance from home (km)	0.2 - 10	2.5	0.2 – 2.0	55.0
Occurrence of plague	N.A	N.A	Once	84.6

Plague recorded cases in Lushoto district, Tanzania from 1980 to 2002

The first human plague outbreak occurred at Mkunki village in Lushoto district in 1980 and involved 49 recorded cases/ suspects of whom 11(22.4%) died (Kilonzo and Mhina, 1982; Kilonzo, 1994). A total of 7,869 cases/suspects of whom 630 (8%) died, were recorded in the district for the past 23 years. The focus expanded from one initial village to a total of 48 villages in the district during the same period (Kilonzo *et al*, 2003).

Perceved reasons for the continous outbreak of human plague in the area

During the meetings with elders, it was revealed that the continous outbreak of the human plague in the area is due to vegetation cover change whereby rodents that were used to stay in the forests have changed their mode of living from the wild lives to semi wild. The reasons for the change in vegetation cover associated to the frequent outbreak of human

plague in the area were mentioned to be the population increase that resulted to forest encroachment either for establishment of new human settlements, i.e development of the villages where most of the plague affected villages have been established from the recent cleared natural forestry. Indiscriminate tree cutting which have been mentioned to have started in 1970s where more land was cleared to open farms due to the increased population resulted into the removal of the wild rodents habitats. Further clearing was a result of timber harvest, which took place intensively in mid 70s and 80s. Elders mentioned sharp decline on the respects to the traditional norms including issues such as unrespect to the sacred forests hence cutting trees that were respected by their fore fathers to have also resulted into the forest clearance hence the habitat for the wild rodents were disturbed. Due to the decline on the vegetation cover, the area become vulnerable to soil erosion where by the government and some other NGOs decided to intevene by encouraging people to plant, trees, banana, guatemala grass, elephant grass, sugarcane and carrying out some other soil conservation practices including terracing.The results from the intervention is the change in vegetation cover, change in landscape which as a result allowed the rodents that were used to live in the forests to look for the shelters on the planted grasses which brought wild rodents close to human being whose outcome is the spread of plague disease in the area.

Common ecosystem management practices in West Usambaras, Tanzania

The common ecosystem management practices identified during the study were planting of trees, banana, guatemala grass, elephant grass, sugarcane as well as terracing. The practices that have been identified by local people in the villages were in consistence with the observations by Shelukindo (2000) who reported several techniques including macro contour lines as well as planting of fodder grass, fodder bushes, leguminous creepers and trees to be applied in order to enhance a sound environment and improve ecological values of the Usambara mountains.

Contribution of ecosystem management practices to human rodent contacts

Local people in the study area ranked management practices according to the level of shelter provision to rodent, which increases the contact between human being and rodents. These are guatemala grass *(Tripsacum laxum)*, improper forest silvicultural practices (i.e. weeding, thinning, pruning, cultivating within the forest plantation in the so called tongya system), planting of elephant grasses, leaving farms under fallow and sugarcane planted farms. **Figure 1** indicates how different practices contribute to close contact between human

being and rodents as ranked by local communities in these villages. From this figure, Guatemala grass was ranked the first to be a good shelter for rodents which favour close contact between rodents and human beings, improper forest silvicultural practices was ranked the second, leaving farms under fallow was the third, planting of elephant grass and shrubs close to human settlement received the least rank, This was because people in the area have been aware that leaving shrubs close to the house where they reside facilitates the close contacts with rodents and hence more possibilities for transmission of plague.

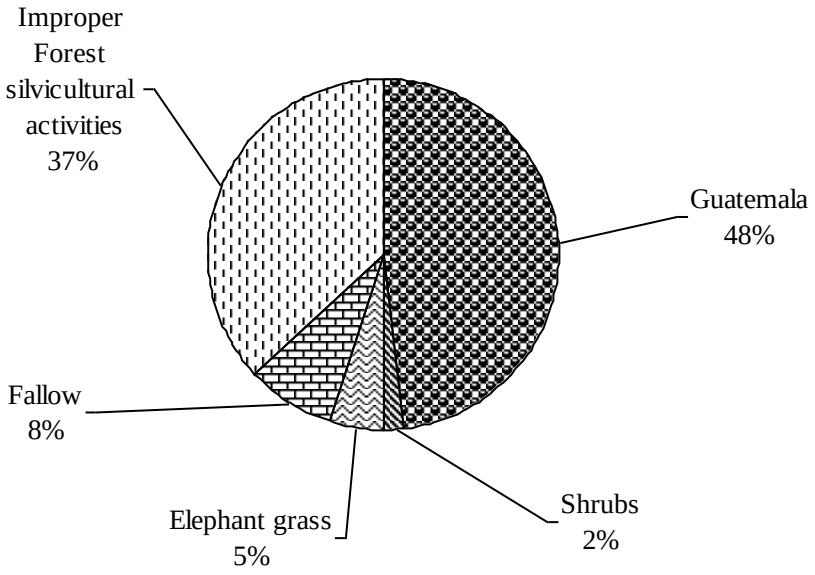

Fig. 1. Ecosystem management practices and their level of provision of shelter to rodents as ranked by respondents in Lushoto, Tanzania.

Community's preference on different ecosystem management practices

Level of preferences by local people on different ecosystem management practices carried out in West Usambara Mountains is shown in **Figure 2**. Generally, ecosystem management practices preferred by the community in the surveyed villages were planting of trees, fodder (both elephant and guatemala) and zero grazing. The implications of the observed preferences are their socio-economic contributions and soil fertility improvement as 85% of the respondents mentioned to prefer these management practices due to their socio-economic contributions including income generation i.e. selling timber, firewood, and building materials from trees and selling fodder as livestock feeds which resulted into

increased milk production and manure which is finally used in high value crop production such as vegetables in the area.

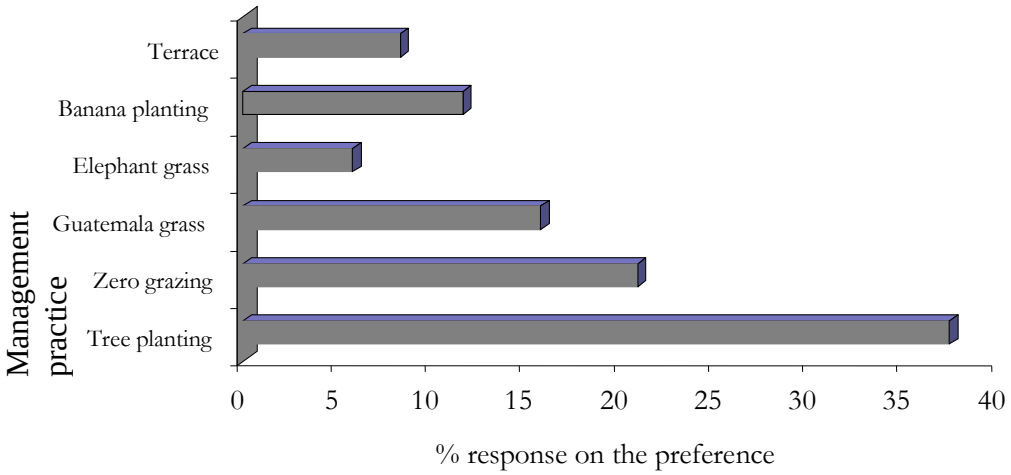

Fig. 2. Community's preferences on different ecosystem management practices

General communities, perception on human plague in the area

Apart for the impacts of vegetation cover changes to the continuous outbreak of human plague in the area, general perceptions of local communities on the existence of the plague were also traced during group discussions. In the meetings with elders, their perceptions on the plague disease were that, in the area people have ignored and do no longer adhere to the traditional norms and practices. They mentioned practices like sacred forests where people were using these forests for sacrifices giving; "*HANDE" (Hande* is a common practice for spraying botanical pest control around all the fields with a brush made of banana leaves. They use the plant called *mkaa* in *Kisambaa* and *utupa* in Kiswahili whose botanical name is *Euphobia tirucalli*) that have been practiced in the area till the end of 1970s assisted in eradicating pests and insects including both rats and flea to be no more practiced in the area.

"As hande gained low and low status in the society, the outbreaks of plague started and it has been occurring continuously" reported an old woman.

In some of the villages, during focus group discussions, elders regarded the plague symptoms with the symptoms of the diseases caused by superstitions. They mentioned the symptoms of plague to be similar to the disease caused by "*Nyungu"* (*Nyungu* is a practice being performed by women in Sambaa, pare and Mbugu tribe to commit suicide when they become aggravated or mishandled within the household and the family. In this practice one

may not die alone as the cases appear to involve the death on many other people in the household i.e. after the death of the wife, the husband or children my follow). The symptoms of *nyungu* associated disease are similar to that of plague and in this society it has been a tendency that when a person is observed to have such symptoms is taken direct to the traditional healer even before reporting the case to the hospital as a result the disease is transmitted to more people which results to many deaths.

Elders also perceived the traditional and cultural practices such as hande to be revived. With reviving hande, trees such as *Euphobia tirucalli* will be planted in the area. This will assist not only eradicating the rodents during their pick season but also the ecology of the Usambaras will be restored.

CONCLUSION

In order to combating human plague problem in West Usambaras Tanzania, understanding of biophysical and socio-economic aspects within context of the communities in question is a prerequisite. It also needs a program that will link different stakeholders from different field of specialization as no ones' field will manage to completely reduce the plague problem in this area. Local communities experience should also be harnessed in developing actions plans toward reducing the impacts on the disease in the area. The case study presented in this paper illustrates the importance of local communities' knowledge and experience in determining the impacts and appropriate ways of combating the problem in the area they reside.

Local communities are aware of the relationship existing between some ecosystem management practices in facilitating the close contacts between human being and rodents and fleas the vector of plague. They were able to link Guatemala grass used as a fodder in the area, improper forest silvicultural activities (including weeding, thinning and cultivating within the forest plantation in the system called tongya), keeping shrubs close to human settlement, abandonment of the traditional and cultural practices (such as *hande*), to foster the resurgence of and continuous outbreak of the plague in the area. People in the area are also aware of the problem of not reporting the plague cases, which results to the wider spreading of the disease as an immediate action, Guatemala grass could be replaced with other fodder grasses such as Seteria, Napier and grass that will not provide shelter for rats and hence reducing the close contacts with human being. Awareness creation on plague cases reporting should also be done in order to reduce spreading of the disease in the area. Studies on the

ways of improving design of residential houses, which are rodent proof, and their pattern is also recommended.

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REFERENCES

Colding J., Elmqvist T., Olsson P., 2003. Living With Disturbance: building resilience in social-ecological systems. In: Navigating Social-Ecological Systems. 163– 185, ed.F.Berkes, J. Colding, C. Folke. Cambridge University Press.

CPPC 1996. Committee on Pest and Pathogen Control. Report on Ecologically Based Pest Management. National academy press, Washington D.C. [http://www.pest.cabweb.org/journals/BN117-6/newbook.html

Kaoneka A.R.S., 1993. Land use planning and quantitative modeling in Tanzania with particular reference to agriculture and deforestation. Some theoretical aspects: A case study from West Usambara Mountains. Unpublished Ph.D. thesis. Department of Forestry, Agricultural University of Norway. 170p + app

Kerkhof P., 1990. Agroforestry in Africa. Panos Institute, London, UK.216 pp

Kilonzo B. S., Lwihula G.K., Kwesigabo G., Lyamuya, E. F., 2003. Interim report of Ecosystem Health Project on Plague (Tanzania) for the period January 2002 – January 2003. i.e first year of implementation. 37pp.

Kilonzo B. S., Mvena Z, S, K., Machang'u R. S, Mbise,T.J. 1997. Socio-cultural factors affecting persistance and continued outbreaks of plague in Lushoto district Tanzania. ACTA Tropical 68: 215 – 227.

Makundi R. H., Kilonzo B. S., A.W.Massawe, 2003. Interaction between rodent species in Agro-forestry habitats in western Usambara Mountains, north-eastern Tanzania, and it potential for plague transmission to human. In: Proceedings of Rats, mice and people. Eds. Grant, R. Singleton, Lyn, A. Hinds, Charles, J. Krebs and Dav M. Spratt. Australian International Agricultural Research Cariberra. 20-24.

NBS. 2003. Population and Housing Census 2002. National Bureau of Statistics. Dar- Es Salaam, Tanzania

Rapport D. J., Costanza R., McMichael, A. J., 1998. Assessing Ecosystem Health: North and South. Journal of Ecosystem Health. March 5(1): 49 –57.

Shelukindo H., 2000. Sustaining Land Resource: A prerequisite for sustainable agriculture production: A case study presented at the 9th short course on MNRSA, 14th April 2000. Sokoine University of Agriculture Morogoro ,Tanzania. 19 pp

ХУРААНГУЙ

Р. Шемдо

УРГАМЛАН БҮРХЭВЧИЙН ӨӨРЧЛӨЛТ ХҮНИЙ ЭРҮҮЛ МЭНДЭД НӨЛӨӨЛӨХ НЬ: ТАНЗАНИЙН ВЕСТ УСАМБАРАГИЙН ЖИШЭЭ

Зүүн хойд Танзанид байгалийн гамшиг, ой ашиглалт болон газар тариалангийн үйл ажиллагааны улмаас дэгдэж буй халдварт өвчин тахал нь олон жилийн турш нийгмийн эрүүл мэндийн том асуудал байсаар иржээ. Эндхийн Вест Усамбара мужид экосистемийг тэнцвэржүүлэх зорилгоор ургамлан бүрхэвчийг сэргээх янз бүрийн арга

хэмжээ явуулж байгаа бөгөөд эдгээр арга хэмжээний нийгэм эдийн засгийн ач холбогдлыг хангалттай судлаагүй байна. Энэхүү өгүүлэлд, ургамлан бүрхэвчийн өөрчлөлт хүн амын эрүүл мэндийн байдалд хэрхэн нөлөөлж байгаа талаарх нутгийн оршин суугчдын дунд явуулсан санал асуулгын дүнг харуулжээ. Судалгааг “Оролцоот үнэлгээний” болон асуулгын аргаар явуулж чанарын мэдээллийг “агуулгын анализын” аргаар, тоон мэдээллийг SPSS программын тусламжтайгаар боловсруулжээ. Судалгааны дүнгээс харахад нутгийн оршин суугчид нь гватемала өвс (Tripsacum laxum), заан өвс (Pennisetum purpureum), банан, чихрийн нишингэ тарих, гудамж зам засах, бэлчээрийн өвсийг богино хадах зэргийг хүн амын хэт нягтшилаас үүдэн ой устсан бүс нутагт ургамлан бүрхэвчийг сэргээх экосистемийн менежментийн арга гэж үзсэн байна. Гэвч үүний зэрэгцээ, гватемала өвс зэрэг тэжээлийн ургамал нь мэрэгч орогнох байр болдгоос хүн болон зэрлэг мэрэгч амьтдын хавьтлыг нэмэгдүүлэн тахал дэлгэрэх боломжийг өсгөдөг гэж үзжээ. Иймээс бага сургуульд экосистемийн менежментийн хичээл оруулах, сургууль болон тосгодод модон саравч барих, мод тарих, бэлчээрийн өвсийг богино хадах зэрэг нь экосистемийг тэнцвэртэй байлгах, хүмүүсийн орон гэрийн ойролцоо мэрэгч орогнохоос сэргийлэх тохиромжтой арга хэмжээ болохыг зөвлөсөн байна.