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Have the Tsetse Clearings in the Babati District, Tanzania, Influenced the Spread of Agriculture Land?

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Abstract

The clearing of woodland to eradicate the tsetse fly in the Babati district, Tanzania, was a governmental initiative. The clearings were mainly carried out in the mid 20th century and managed to reduce the tsetse fly by a great amount. The clearings opened up remote areas and made it possible to access areas that had previously been unavailable for humans. The clearing also had an enormous impact on the environment. This is a case study on five different areas in the Babati district that have all been subjected to tsetse clearings. The studied areas are Bonga, Kiru Erri Kiru Valley, Magugu and Mamire.

The fieldwork consisted of semi-structured interviews and transect walks. The purpose was to study if the clearings have had any influence over the spreading of agriculture land that were not cultivated before and to inquire into the most significant environmental impact that the clearings had.

Different outcome in agriculture land spreading due to the clearings could be seen in the five studied areas. In Bonga and Kiru Valley no agriculture started after the clearings, but in Kiru Erri, Magugu and Mamire some of cleared land is nowadays used for agriculture. The result of the fieldwork indicates that the clearings have had noticeable influence over the spreading of agriculture land but there were also other important driving forces. These were increase in population, land degradation, land shortages and the politic agenda. The most important negative environmental impact due to the clearings was erosion.

Key words: eradicate, cultivated land, erosion

Table of contents

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1 Authors comment



This picture was taken by me outside the village Magugu during my fieldwork. The man in the picture is Mr Mkanwa, the tsetse specialist who was incredibly helpful to me. He acted as my guide for one day and took me to tsetse cleared areas that I would not have been able to find on my own. He is standing in an area that was cleared in the 70s, which was left to re-

grow on its own after the clearings. It is now more or less wilderness area and we even found an untouched ebony tree there.

I would like to thank Mr Mkanwa, as well as my field assistant, Elia Mushi. Without you two I would not have been able to carry out my field work. I would also like to thank all the informants how took time out of their schedules to talk to me. My time in Tanzania did truly give me an experience of a life time.

And thank you, Stefan Burström, for helpful feedback and assistants with all sorts of computer issues that persistently seems to come my way.

2 Introduction

In Tanzania, as well as other parts of Africa, the tsetse fly has been a big hurdle to tackle for the people. The fly transmits trypanosomosis, a devastating disease for both human and their livestock (Mr Mkanwa, pers. comm). In the beginning and in the mid of the 20th century, clearings of woodland were conducted on initiative of the government to eradicate the fly. Clearings continued in the 70s and 80s in areas that were still infested. The tsetse fly was successfully reduced and the purpose of the clearings can therefore be said to have been fulfilled. But the clearings were massive, vast woodland areas were stripped and this had an enormous impact on the landscape (Simonsson, 2001). This event is probably the most severe human land-change conducted ever in this area (Strömquist et al, 1999). The clearings turned unavailable and inaccessible land to open area and remote areas were now possible to reach. Did the clearing help the spread of agriculture land that was not cultivated before? The impact of the clearings on the environment was probably mostly negative. But what environmental consequences can be traced back to the tsetse clearings more specifically?

The field work was carried out in the Babati district, Tanzania, in February and March in 2009. Semi-structured interviews with locals and experts were conducted and transect walks were performed at the sights.

The aim of the thesis is to answer one main research question: “Have the clearing had the subsequent effect of spreading agriculture land that was not cultivated before?”. The attendant question “Which are the most important environmental consequences from the clearings?” is also studied.

The thesis purpose is to study the tsetse clearing-process to see if it had any influence on agriculture intensification and spreading, or if there were other, less obvious, factors that had more important influence over this development. Furthermore, such a big operation as the tsetse clearings will have subsequent and cumulative effects (Simonsson, 2001). These effects

were not clarified before the clearings due to lack of resources (Mr Manga. pers. comm). The most important environmental effects from the clearings is therefore reviewed.

3 Theoretical context

3.1 Former research

3.1.1 The history of human population in Tanganyika

Humans have been a part of Eastern Africa's environment for a long time. There are findings in East Africa of the primitive primate stock that it is believed that humans originated from. The earliest discovered genus of Homo, Olduvai Gorge, is found in Tanzania as well as his or her cousin Zinjanthropus. Later stages of cultural evolution are also found in East Africa and Tanzania, there are numerous findings of sites existing of what is called "Middle Stone Age Cultures". There are also about a hundred sites with prehistoric art between Kondoa and Babati. Agriculture increased gradually as the population of man grew larger and a 300 year old stone terraces are found north of Lake Manyara (Simonsson, 2001).

The population in Tanganyika was relatively stable in the 19th century. Most of the agriculture system was permanent and an substantial cattle economy existed (Kjekshus, 1977). In the mid 19th century semi-arid Tanzania consisted of scattered settlements, surrounded of a mosaic of open grasslands, deciduous thicket, small cultivated clearings and dry woodland of miombo trees. The miombo woodland was still present into the later half of the century (Christiansson, 1988). Under the 19th century caravan trades started and these passed through the more intensely cultivated areas. This increased the pressure on central parts of Tanganyika. The many travellers added to the demand of natural resources such as food and firewood and previously unexploited and uncultivated land was now being used (Simonsson, 2001). Babati and its surroundings were during this time still uncultivated with the exception of Mama Isara (Loiske, 1995).

In Tanganyika, colonialism started with German rule during 1885-1918, but the colonial power was limited by the world uncertainties such as war and uprisings. When World War I came to an end, the British took control over Tanganyika. The British authorities encouraged African farmers to grow cash crops and this led to fragmentation of the rural areas. Colonial efforts were made to stop degradation of the environment but these floundered. The aim for this conservation work was to preserve nature as wilderness, which was not a realistic goal.

In 1961, Tanganyika was finally made independent. Since the independency the country has received aid from foreign countries. The help has primarily been directed to the rural areas and the main focus has been to improve agriculture, water and land degradation (Simonsson, 2001). In 1964, Zanzibar and Tanganyika were joined and the state Tanzania was born (Lindberg, 1996).

3.1.2 The Babati district, Tanzania

The Babati district is a part of the Manyara region and it covers 6069 km². It is divided into four divisions, Mbugwe, Babati, Bashnet and Gorowa, 21 wards and 81 villages (Lindberg, 1996). It is located in the north-central part of Tanzania in the Northern Highlands, at 900-2,000 meters above sea level. It is a part of the eastern branch of the Great Rift Valley.

Babati town is the district's capital, it is a lively town with a never ending flow of people and traffic passing through. Babati town serves as a hub for travellers to and from Arusha and the inland of Tanzania (Simonsson, 2001). Before 1969, the Babati district was a part of the Mbulu district (present-day Babati, Hanang and Mbulu districts) (Loiske, 1995) and when the first tsetse clearing started, this was the case (Simonsson, 2001). Since this thesis discusses events from that time, there will be mentions of the Mbulu district.

There is indication of long-term human land-use in the Babati area. Fossil erosion has been detected as well as signs of ancient over-grazing (Simonsson, 2001). Pastoral production system has been active for over 2000 years on the plains of northern Tanzania (Koponen, 1988). But in the early 20th century, the Babati area consisted mostly of wilderness with game, there

were few inhabitants and therefore almost no livestock (Simonsson, 2001). The Great Rinderpest swept over the area in 1880 and after that a smallpox epidemic followed. This weakened the human population in the area as well as their capital of livestock (Loiske, 1995). The tsetse fly could therefore invade the area unperturbed. The consequence of this was outbreaks of sleeping sickness in the remaining inhabitants and the tsetse fly also made it impossible to use the land for grazing (Simonsson, 2001).

Kjekshus (1977) stresses that Tanganyika managed to keep an ecological balance in the 19th century even though the people had to struggle with intertribal warfare and slave raiding. According to him, the tsetse fly invasion is a recent, 20th century phenomenon, which is due to the imbalance of the ecology that started during this time (Kjekshus, 1977). His study has been blamed for romanticising the pre-colonial conditions, but it still emphasises the important linkage between ecology and political economy (Simonsson, 2001). It is worth to mention that ecologist of today does not share Kjekshus idea about balance in nature, the prevailing view states that no natural balance have ever existed in nature. Ecosystem are dynamic and variable and that is what they have always been (Townsend et al, 2003).

The Babati district has had an distinct growth of population in the 20th century (Simonsson, 2001). This is due to both immigration and a high birth rate (Lindberg, 1996). In 1928 the district was inhabited by 95 411 people and in 1957 there where 193 199 people living in the area. In 1988, the area was populated by 208 000 people (Simonsson, 2001) and in 2002, 302 253 people lived here (Tanzania National Census, 2009). There has been an additional increase in population since then but it is impossible to say how many people that lives in the area today.

Farmers that had to move because of land-shortage as well as from degraded land, has come to the district. These immigrant have come from all different directions and distances. Because of this, there is a mixture of different people living side by side. Up to six unrelated language groups is represented and over 100 languages are spoken in the district (Simonsson, 2001). The majority of the inhabitants are agro pastoralists. There are still some people that are able to support themselves by pastoralism, the ethnic groups the Maasai and the Barabaig.

Although nowadays, it is common among these groups to also cultivate land (Lindberg, 1996).

According to Mr Mkanwa, about sixty percent of the total area in the Babati district that is good for agriculture purpose and keeping livestock is still infested by the tsetse fly. But the fly's population density is lower than it was before the clearings, and the risk of getting the disease is not as high nowadays as it used to be.



Figure 1. Map over Tanzania with the Babati district highlighted (Google Maps, 2009).

3.1.3 The tsetse clearings in the Mbulu district and the Babati district

Between the end of World war I and the end of the 50s, the tsetse invasion served as the one most important hindrance for immigration in the area. In the beginning of the 1930s 9,000 out of 15,000 Gorowa, an ethnic group, had moved from their homes in the Mbulu district to the Kondo district to escape tsetse. Two thirds of the Mbulu district was infested with tsetse in 1948 (Lindberg, 1996). The tsetse eradication started in the end of the 20s with minor clearings of bushes and trees (Loiske, 1995). But it was in the 1940s that the British administration

introduced a massive tsetse eradication policy and people were evacuated from tsetse infested land (Simonsson, 2001).

However, according to Lumley (1976) there were substantial clearings in the 30s as well. He states that extensive clearings around Madukani and Kiru Valley in the Mbulu district, were carried out by the British administration in 1935. These clearings had double purposes. Those were to create a tsetse free road for cattle between Kisangaji and the markets at Babati and to provide settlement areas. 500 families were moved by force to the new premises. If they did not move, they were prescribed with a penalty of three months imprisonment for disobedience. The Barabaig land in the Mbulu district, were also having problems with tsetse. The Barabaig were pastoralists (Lumley, 1976), which they still are (Lindberg, 1996), and their cattle were in danger of getting infected. A tsetse free grazing area was therefore needed and this was the only reason for clearing this particular land. The clearings in Barabaig land were also conducted in 1935 and it was done by paid workers. The workers did not however include Barabaig, for whom the area was cleared. The Barabaig were too proud to conduct manual labour. Instead, people from the ethnic groups Iraq and Wanyaturu, executed the clearings. The Barabaig moved to the opened areas after the clearings, but no cultivation followed due to their pastoralist lifestyle (Lumley, 1976).

Loiske (1995) states that the main clearings started after the introduction of the “Mbulu Development plan”. The plan was launched in 1948, its aim was to open up new areas for living premises, reduce the number of livestock in the Mbulu highlands and to reform land-use in the agricultural areas through soil conservation (Loiske, 1995). The tsetse clearings started and within a decade a substantial amount of bush and forest were manually cut down. In 1945, miombo trees were ring-barked in Babati and Ndareda and in 1948 to 1951, 750 km² of woodlands were cleared in the Mbulu District. Later on, 240 km² were re-slashed (Simonsson, 2001).

According to Kjaerby (1979), the government encouraged people to move to the newly opened land. They offered people credits and generous land opportunities, to raise their inter-

est for the new land (Loiske, 1995). In the end of the 1950s, people started to re-settle and immigrate to the cleared land (Lindberg, 1996).

During the last 40 years, humans have altered 81 % of the land area in the Babati district from forested conditions to open farmland (Newman and Rönnerberg, 1992).

Several scientist have noted land degradation, mainly soil erosion, as a consequence from the tsetse clearings. Whether the degradation is solely due to the clearings is not belayed however, the clearings were often followed by increased population and that has probably had a significance as well (Loiske, 1996).

3.1.4 The tsetse fly and the eradication methods

The tsetse fly is a bloodsucking insect, depending on blood as its only meal. There are 23 species of the tsetse fly (*Glossina spp.*) and all of these spreads the disease. In the Babati district, five of these are represented (Mr Mkanwa, pers.comm).

The tsetse fly is a vector for the protozoan parasite *Trypanosoma brucei*. The protozoan causes the disease Trypanosomosis, sleeping sickness. When a human or animal gets bitten by the fly, the protozoan is transferred to the victim and the parasite starts to propagate in the bloodstream. This is the early stage of the disease and it is signified by nausea, fever, and lethargy. If left untreated, the parasite crosses the blood-brain barrier and the late phase starts. The classical symptom of sleeping-sickness now occurs; disruption of biological rhythms, inappropriate and irregular sleep patterns, and loss of concentration and coordination. If the disease is still not treated the infected will die. The prognosis varies from acute, death occurs between 6-12 month, to chronic, when death occurs between 5-20 years.

There are few effective medicines for the disease and there is no vaccine. The lack of vaccine is due to trypanosome ability to undergo antigenic variation. The possibility to develop a universal vaccine is therefore extremely limited (Hide, 1999). Instead, eradication of the vector has been the solution for obliterate the diseases. Clearing of the fly's habitat for eradication was the first solution introduced. After that, ground and aerial spraying of insecticides was

used. Nowadays, traps, targets and bait technology is the used method. Cattle is dipped in Trypanocidal drugs and Trypano-tolerant breeds of livestock have also been introduced. None of the methods has proven to be sustainable and there is still a problem with tsetse in Africa. Integrated control of the fly is of growing interest and the hope is that this can lead to a more effective and sustainable control. The opinion today is that tsetse control and disease management is a more realistic goal than eradication of the vector (Holmes, 1997).

3.1.5 Other possible reason for agriculture land spreading in the area

What other factors than land opportunities, in this case land openings due to tsetse clearings, can lead to the spreading of agriculture land? Factors that could be meaningful for this is reviewed below.

A change in the physical living environment and land-use could be a result of social or environmental processes or events, such as the tsetse clearings. But it could also ensue from passing thresholds or from adjustment to former events. The most visible and obvious reason does not always give the full explanation of a past event. To be able to study the development, different temporal, spatial, and professional perspectives must be used (Strömquist et al, 1999).

A study by Turner et al from 1993 discusses how population growth have influenced agricultural change in Africa. It concludes that a high population density most likely leads to intensification of the agriculture (Turner et al, 1993). In Turner et al's study, the driving force seemed to be the population pressure and not land opportunities. However, it is not true to say that intensification of agriculture always is a product of population growth. Variables that are not obvious can have a substantial significance and therefore a study of the actual process is necessary (Börjesson, 2004).

According to Börjesson (2004), agriculture intensification is partly its own driving force. More food is produced; therefore more people can survive which leads to that even more food need to be produced. Pursuant to this approach, it is necessary to name synergies, self-reinforcing processes and incremental changes to explain the process of intensification and spreading of agriculture. These factors drive the process together and not one primary independent or external driving force (Börjesson, 2004).

3.1.6 The Ujamaa and The Operation

An important event in Tanzania's history is the Ujamaa. This event is also likely to have had importance for the agriculture development and spreading in the country, therefore it is mentioned here. The Ujamaa, or the Villagization Program as it was also called, started in 1967 and was the beginning of a socialist development in the rural areas. The aim was to create rural development and management of the countryside. The scattered dwellings were to be replaced by concentrated villages, located in strategical areas. And the villages were also organised into co-operatives (Simonsson, 2001). The intention was to create kolkhoz villages, i. e. villages where the agriculture was conducted in a collective way (Lindberg, pers. comm). The farmers were rarely approached about their view on either practical matters or on the suitability for agriculture on the new land (Simonsson, 2001).

In the beginning of the 70s a severe drought, the oil crisis and internal political decisions sent Tanzania into a deep crisis. The food production needed to be reformed and therefore a campaign to achieve this, "Operation Villages" or just the abbreviation "The Operation" was launched. The key part of the operation was a land reform or settlement scheme. Other intentions were to reform health care, schools, electricity and water in the villages. To do this it was considered to be a necessity to concentrate the villages, and people were told to resettle closer to the town centre. The Ujamaa villages were no longer preferred, the cost put in the Ujamaa villages in terms of mechanisation, fertilisers etc had not been giving satisfactory results. The Operation was partly successful in terms of increasing agriculture production. Increased use of oxen-plough made the ploughing more efficient but the introduction of fertilizers did not have the same success due to the information as how to use them was lacking (Lindberg, 1996).

Since the Ujamaa is also referred to as the Villagization Program and sometimes only as the Villagization, it can be mistaken for the Operation Villages. These two events also occur at adjacent times. But the main intention with the Ujamaa was to create kolkhoz villages and the Operation Villages intention was mainly to conduct a population move and to implement a land reform (Lindberg, pers. comm).

During this time Tanzania also underwent another process, the country increased its collaboration within its border and started to integrate more with global political and economic systems. Representatives from other countries started to be visible at the local scene in the shape of donor agencies, co-operatives and businessmen. And they began to be a part of local decision making (Lindberg, 1996).

4 Method

This thesis is based on 12 days of field work conducted in the Babati district, Tanzania in February and March 2009. Five areas were visited; the villages Magugu, Kiru Erri, Bonga and Mamire and an additional site in Kiru Valley. These areas were chosen as representatives for the entire district. The villages were chosen due to practical reasons because of their accessibility relative to Babati town from where the field work originated.

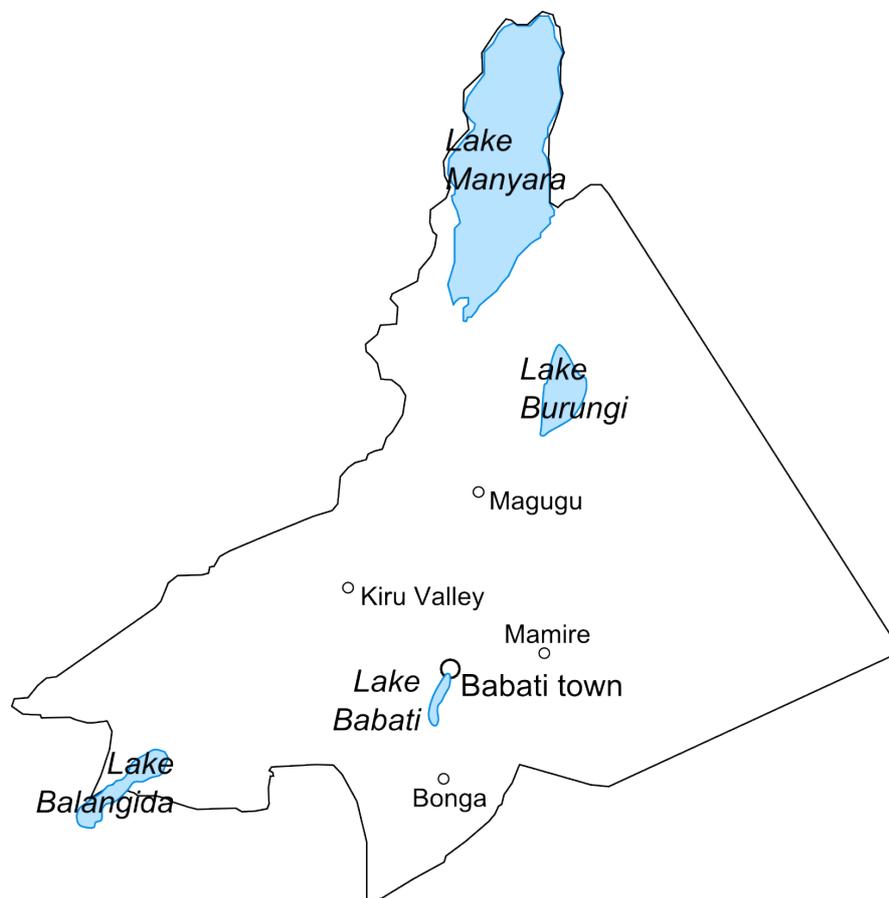


Figure 2. Map over the Babati district with the studied villages marked (Lindberg, 1996, Google Maps 2009).

This is a case study that reviews the tsetse clearings, a grand event with several substantial impacts. However, the fieldwork was concentrated to five specific areas and a qualitative method approach was used during the fieldwork. For a study of this kind it is not possible to conduct a quantitative method, the limit in time and resources prevents a more extensive study. The qualitative method allows for deeper studies of the questions at hand in the selected areas.

The qualitative methods in the fieldwork consisted of semi-structured interviews and transect walks. I used a map from Tanganyika Tsetse Survey and Reclamation Department from 1949 in order to find tsetse cleared areas, (see appendix 1). But I found the map to be inadequate for the task at hand and I contacted locals for support instead. My field-assistant, a local by the name Elia Mushi, was helpful with this part of the work. He introduced me to Mr Mkanwa, a tsetse specialist. Mr Mkanwa was helpful with locating tsetse cleared land and also acted as my guide for one day. Elia Mushi were also assisting the interpretation from Kiswahili to English during the interviews.

The remaining parts of the thesis were compiled in Stockholm, Sweden, after the return from Babati. Secondary data has been used to get a broader perspective as well as more knowledge of the issue at hand.

In preparation for the fieldwork, relevant literature was reviewed to create an understanding for the area and the thesis research question. Difficulties with finding similar essays was detected, instead general literature about the area, tsetse clearings and other pertinent literature was reviewed.

4.1.1 Interviews

A perception study was carried out through semi-structured interviews. Semi-structured interviews were chosen because I wanted to establish a discussion with the informant. The informant was given open questions and therefore the chance of finding new interesting issues and approaches appeared (Jacobsen, 1993). The informant was free to highlight question and information that he (the informants consisted of men only) found to be crucial for the subject.

In total, eight interviews were conducted. Following informants were interviewed: a) three farmers how cultivate land that had been tsetse cleared, these farmers had lived in the area a long time and knew about the history of the areas, b) one elder how lived closed to tsetse cleared land and remembered how the area looked like before felling and how it was used, c) a Tsetse specialist, d) a Forester, e) a Forester and community developer and f) a man how worked with tsetse clearings in the 70s-80s.

4.1.2 Transect walks

Transect walks was conducted in two different types of areas. These two areas were: a) areas that have been subject to tsetse clearings and are now cultivated and b) areas that have been subject to tsetse clearing and are not cultivate. At the transect walk an understanding for the area were created by studying following questions (McCracken et al, 1988):

1. What kind of landscape was presented: open land, cultivating, forest etc?
2. What vegetation was visible?
3. Was there any erosion?
4. What other effects from felling could be observed?

The information gathered in Babati was compiled and subedited in Stockholm, Sweden. The field studies was combined with secondary data and the final layout was constructed.

4.2 Critical review of chosen method

Due to unexpected practical hurdles, which often can be the case in Africa, less information then expected was obtained. A longer stay in Babati for the conduction of field studies should therefore have been favourable. Due to this, the gathered information can be lacking but it is still possible to acquire knowledge about the observed issues.

A baseline on the studied areas, that states the species diversity and the areas utilisation before the clearing, would have been helpful to conduct. This would have given a better understanding for the tsetse clearings impact on the environmental. But lack of time and information

made this impossible to conduct. If this had been possible to do, other environmental impacts, due to the clearings, would probably have been discovered.

At the transect walks an ocular survey was conducted. The transect walks could have been more investigating and more focus could have been put on what kind of vegetation and fauna that was possible to find. But the intention was to create an understanding for the area and not to complete a species determination at the sights.

The semi-structured interviews were done in both English and Swahili. When English was spoken no interpreter was used. But since my first language is Swedish and the informants first language was Swahili misunderstanding could have occurred. In the cases where the informants only spoke Swahili an interpreter was used. Since a third translation step was added, the risk of misunderstandings increased in these interviews. But the risk of misunderstandings is still regarded as little. The interpreter's knowledge in English was good and he also had a good understanding for the purpose of this thesis.

5 Results

A summary from the field work is given below. The data is sorted under each village and divided into interviews and transect walks. The interview questions can be found in appendix 2.

5.1 Bonga

In this village, a non-cultivated area that has been subject to tsetse clearings is found.

According to the informant Mr Shawishi, the clearings were conducted in the 30s by force from the Government. No payment was given to the workers who conducted the clearings, it was done by force labouring and the only compensation they received was food.

There was one reason for the felling, and that was eradication of the tsetse fly. No settlements followed after the clearing. The cleared area was a forest reserve, both before and after the clearings. There were no human activities, like tree felling, grazing of livestock, collecting firewood etc, allowed in the forest reserve. But the eradication of the tsetse fly was regarded as important enough to deviate from this prohibition. After the clearings, the prohibition prevented settlement. No replanting was done, the forest has regrown on its own and is similar to the one before the clearing. However, the informants think that there is not as many wild animals in the area as it just to be.

The informant thinks that there has been a lack of rain and longer dry season, he believes that this has to do with the clearings. There has not been so much soil erosion, that is due to the lack of rain according to the informant.

He thinks that they should have used Thiodan, an pesticide used today in Tanzania to spray tsetse flies, to spray the forest with instead of the clearings. But since Thiodan was not avail-

able at that time, there was no other option than clearing. But he believes that using Thiodan would have been better for the environment. He does not know of any bad side effect caused by Thiodan.

Nowadays there is no problems with tsetse, therefore there is no need to use any precaution at all.

A summary from the transect walk gave that the area consisted of a forest on a mountain side. The forest consisted of bigger trees and bushes. No erosion problem was visible. The informant thinks that the forest now looks the same as before the clearings.

5.2 Kiru Erri in Kiru Valley

In this village a cultivated area that has been subject to tsetse clearings is found. A non-cultivated area that has been subject to tsetse clearings is also situated within the village.

A group interview was conducted in the villages square. Approximately ten informants were present. According to them, the clearings were conducted in the 70s, on the government initiative. The clearing was done by people that today constitute the villagers. They originally came from Mama Isara. Some of the informants were here during the clearings, other came after the clearings.

Two reasons to conduct the clearings was stated, to eradicate the tsetse fly and to get agriculture land. There was not enough land for everyone in Mama Isara. The informants did not mention the Ujamaa as one reason nor did they mentioned forced re-settlement from the government.

Before the clearings, this area consisted of bush land. There was giraffe, different kind of antelopes, buffalo and some elephants here. A few people lived here and their livelihood was agriculture. About 600 people live in the village today.

There are still some tsetse flies in the area but not many and it is not a big problem nowadays. They use tsetse traps and dipping of the cattle to prevent Nagana, which is animal sleeping sickness.

Erosion was mentioned as a problem due to clearings. The village has received help with a project called the “Tasaf project” to reduce the erosion.

A summary from the transect walk gave that the area was mainly an open area with cultivating. Different crops were grown, mainly maize, pidgeon peas, sorghum, sunflower. There are signs of erosion problems, but the erosion was less visible than in some of the other studied areas.

5.3 Other parts of Kiru Valley

In this valley a non-cultivated area that has been subject to tsetse clearings is found.

According to the informant Mr Ally Msuya, the clearings were conducted in the 70s. This was initiated by the Government and the clearings were done by paid workers, he was one of them. They didn't use protective clothing. If they got infected with sleeping sickness they were taken to the hospital but there were no safe cure. Sometimes they got well and sometimes they did not. They did not receive any compensation if they were infected. People wanted the job anyway, because there were not many jobs around at that time.

There was only one reason to clear the area, which was the tsetse fly eradication. The area is now reforested on its own, and it is not cultivated. A problem with soil erosion exists.

A summary from the transect walk gave that the area had vegetation consisted of shrubs and smaller trees, maximum 3 meters. One dikdik, one of Africa's smaller antelopes, was spotted. There was visible erosion almost everywhere, the soil cover had been completely washed away at areas. No replanting of the trees had been conducted, the areas has regrown on its own.

5.4 Magugu

In this village a cultivated area that has been subject to tsetse clearings is found. A non-cultivated area that has been subject to tsetse clearings is also situated within the village.

According to the informant, a man who lived at the site, the tsetse clearings were done in the 70s on government initiative. Before the clearings, the area consisted of bush land, shrubs and trees that were not higher than 5 meters. The land was not inhabited by people, game like elephants, lions, antelopes and other animals lived here. The Ujamaa forced resettlement from Lake Burungi, there was not enough land for everyone in Burungi. The clearings were conducted by people who got the land that they cleared to cultivate.

The clearings made it possible for people to live there, but it also increased the soil erosion. Since there are no trees nowadays there is a problem with too little shade, the crops are too exposed to the sun. The villages do not practice Agroforestry, a cultivating system where trees are incorporated into the cultivating area (Nair, 1993), because of the problems with elephants in the area. The elephant destroys even more if there are trees in their way. But the informant thinks that they need more trees in the area because “trees make it rain”, as he framed it. According to him, the clouds are attracted to the trees evaporation. The clouds gather over the trees and the rain starts.

He feels torn towards the environmental issues, it was not so good to just cut down all the trees; it had a major impact on the environment. But it was needed so that they could get more agriculture land and to get rid of the tsetse fly. These were the two reasons for the clearings, mentioned by the informant.

Today there is no need for more clearings to get land, they have enough land. There is still tsetse in the area and they use pesticides to keep the fly away.

A summary from the transect walk at the cultivated area gave that there was visible erosion at the sight and gullies existed. It was also dry, dryer than the non-cultivated land. The crops consisted of maize, simsim, sunflower, peanut, watermelon and others.

A summary from the transect walk at the non-cultivated area gave that it consisted of bush land. The vegetation consisted of shrubs, bushes and smaller trees. The highest trees were 4-5 meters but mainly the area consisted of smaller trees, approximately 3 meters. The area had not been replanted; it had regrown on its own.

5.5 Mamire

In this village a cultivated area that has been subject to tsetse clearings is found.

According to the informant, Mr Salimu Nondi, the clearings where conducted in 1945 by people who were paid, it was a good salary and he was one of the workers. Settlements came after the clearings. He mentions three reasons for the clearings, eradication of the tsetse fly, to make the area safer from Barabaig, an ethnic group that rage the area, and to get agriculture land for people from Dodoma. The land in Dodoma was in bad condition and there was not enough land for everybody. People in Dodoma were commanded to move to Mamire but they did not mind because they thought that the move would improve their lives. Before the clearings the area was know as “Barabaig land”. It was used by others for livestock grazing, but this was dangerous because of the Barabaigs. The informants mentioned erosion and less rain as problems due to the clearings.

A summary from the transect walk gave that this was an open area, with only cultivating. The crop raised here was mainly maize, pidgeon peas, sunflower and beans.

5.6 Summary from interviews with officials

5.6.1 Mr Mkwana, Tsetse control specialist

Mr Mkwana has worked with tsetse eradication for 31 years, he is now retired. His title was Tsetse specialist and Principal Livestock Field Officer. He means that the clearings have had mainly negative effects on the land; the two most obvious effects are erosion and water loss. The clearings were not a good way to eradicate the fly since it destroyed the land. But it did reduce the tsetse invasion. It would have been better to use the pesticide Thiodan as they do nowadays, but this pesticide was not available in those days. Thiodan does not have any bad side effects that he knows of, it only kills the tsetse fly.

Today dipping of livestock in pesticide and tsetse traps are the main tools used to struggle the fly in the Babati district. Tsetse traps is produced by blue cloths, these are hanged out in the forest, about 150-200 m apart. The cloths attracts the fly which is especially attracted to the blue colour. The fly comes to sit on the cloth and the pesticides that the cloth is impregnated with kill the fly. But a unforeseen problem with the tsetse traps had arisen. The traps were taken by the villages to make school uniforms from. The skirts and shorts that the children were to the school in some areas in Babati are dictate to be blue, the same blue as the tsetse traps is made in. If the cloth is impregnated with pesticides this can be harmful for the child.

According to Mr Mkwana, the clearings have influenced the spread of agriculture land but the land that was made available was degraded due to the clearings.

5.6.2 Mr Kavishe, Forester and Community Developer

The cleared areas in the Babati district were wilderness area before the clearings. In the 50s the colonial advice was to clear trees to eradicate the fly. It was mostly miombo trees that were slashed; these trees take a long time to grow which means that the impact of the clearing will be on a long term basis. In the 70s agriculture started to develop and new land was needed for cultivating. More clearings started and the major part of the tsetse fly population was driven away. From the 70s to the middle of the 80s the crop harvest was good and no fertilisers were needed. It took about 10 years before problems with the land started, and measures for that had to be taken.

At the time, clearings were their only option; therefore he does not think the clearing was a bad idea. But the clearing was uncontrolled and no precaution was taken. There was no need to cut down all the trees that was slashed. No trees were kept, which they could have been. No good record of the tsetse clearing is kept, and there are no maps from the clearings.

5.6.3 Mr Maanga, Forester

According to Mr Maanga, the clearing was conducted by locals on the demand of the Government in the 40s and in the 50s. A survey was done by a specialist on a mission from the government. This survey was the foundation for the clearings; the survey was a research study of the tsetse fly and its habitat. It concluded that there were a couple of tree species that the fly preferred. If these trees were taken down, the fly would get extinct. But the communication lacked between the ones performing the clearings and the government, and when the clearing started, all trees in the area were slashed. Bad communication, the hazard of the work (the possibility to get infected, wild animals and other dangers linked to the forest) and the extra time consuming that it would take to type the trees, made the workers clear entire areas and no trees were spared. A big problem with the clearing was that it was uncontrolled and unsupervised. As far as Mr Maanga knows, no real follow-up has been conducted.

In the mid 20th century the reason for the clearings was only to eradicate the fly, not to get agriculture land. But later when the clearing started again, in the 70s, the second reason was to get agriculture land as well.

5.7 Analysis

In Bonga and some part of Kiru Valley and Magugu, the reason for the clearings was only to eradicate the tsetse fly and no cultivating on the newly open land started after the clearings. But in Kiru Erri, Mamire and another part of Magugu the reason for clearing was not only to eradicate tsetse but also to make new land available. Therefore it can not be said that it was the clearing it self, that helped to spread new agriculture land in the Babati district. Instead it was a mixture of different social and physical factors such as problems with the tsetse fly,

population growth, land degradation and land shortages that drove the need for new land openings. It was this combination of things that spread agriculture land in this area.

All the informants mentioned erosion as an environmental problem due to the clearings. The severest erosion was discovered in Kiru Valley, but all the studied villages had problems due to erosion. The erosion was not as severe in Magugu as it was in Kiru Valley, which can possibly be due to the flatter land in Magugu. Magugu is a vast area of old lake beds. This area was formerly covered by Lake Manyara (Simonsson, 2001). In Kiru Erri, the “Tasaf project”, a project to lessen erosion, had been successful according to the informant. None of the other informant mentioned any project to lessen the erosion. This can be due to that there were no projects of this kind or that the informants had not learnt about them. Another reason for not mentioning them could be that the project was not perceived by the informants as a scheme to lessen the erosion. For example, it could instead be perceived as an agriculture enhancement since erosion prevention also can have a positive effect on agriculture. The soil quality improves when the top soil remains, this is beneficial for cultivated land as well as for uncultivated land (Pimentel et al 1995).

In Bonga, Magugu and Mamire the lack of water, due to lesser rainfall, was also mentioned as an important environmental problem that has arisen after the clearings. The rain-shortage is a problem for the villages and the general belief is that it is due to lack of trees which is a consequence from the clearings. In Tanzania a common view is that trees makes it rain, just as the informant from Magugu stated. But according to Sandström (1998), forest does not provide water. Excess of rainfall over evaporation and the possible addition of water from of exogenous sources is what provide water in the landscape. But it is establish knowledge that spring tends to dry out in the tropics following deforestation. This is due to the many aspect of comparative hydrology. The impact of deforestation on the local hydrology is locally specific. Careful analysis of the specific site and the various process at work is therefore needed (Sandström, 1998). This thesis has not had the capacity to review if the rain-shortage is a consequence from the clearings or if it is due to other factors. But since the field work in this thesis is constituted on a perception study, the rain-shortage can be considerate as a problem due to the clearings, even though the problem has not in fact been linked to the clearings.

The informant in Magugu stated the Ujamaa (see section 2.1.6.) as the reason for their move from Lake Burungi to Magugu. In Kiru Erri, the clearings were conducted at the same time as in Magugu. The villagers, who now live in Kiru Erri, came from Mama Isara. These people had to leave their former homes, due to the same reason as the people in Magugu had to leave Lake Burungi. It is therefore likely that the Ujama forced the re-settlement to Kiru Erri but none of the informants stated that. The informant in Mamire said that they were forced to re-settle by the government, but he did not mind because he thought that the move would improve his life. The Ujama started in 1967. This means that the Ujama did not have any influence over this informant's move since his move occurred in 1945.

Bonga is described in Lindberg's dissertation from 1995 as "a green village". The village still lives up to that description. But it is likely that there are lesser species present in the forest reserve than there were before the clearing. The informant thought that the forest did look the same nowadays as it did before the clearings, but today there is no problem with tsetse in Bonga. If the forest were back in its original shape, it is likely that the tsetse would be back since there is neighbouring fly-belts in adjacent locations (Mr Mkanwa pers. comm). Even though tsetse is not a key species, the lack of tsetse indicates that the forest now constitutes from lesser or other species, both in the flora and the fauna, than before the clearings. In any case, one lesser species: the tsetse. But there is also not as much wildlife in Bonga as before, according to the informant. This was the case in all of the studied villages. And this has influence over the tsetse population since the fly feeds on the wild animals (Hide, 1999).

The clearings in Bonga were conducted at the same time as the clearings around Madukani, in some areas in Kiru Valley and in Barabaig land in the Mbulu district. These clearings were performed by people that got paid for their work (Lumley, 1976), in contrast to the workers in Bonga (pers.comm. Mr Shawishi). It was the same administration that was responsible for all of these clearings but the conducting was thus different. This can be due to differences in management by the district officer and overall differences in the local policy. It can also be due to that the administration were successful in forcing people to work uncompensated in Bonga, but not in the areas mentioned by Lumley. Another possible alternative is that Lumley and or Mr Shawishi could have a partial recollection of the events. If this is the case, then the given information could be doubted.

The informant from Mamire moved there in the 40s and worked with the clearings at that time. According to Lindberg (1996), most of the tsetse clearings in Mamire were conducted in the end of the 1950's and in the beginning of the 1960's and the majority of the inhabitants moved there after these clearings (Lindberg, 1996). It was mostly people from Gidas, a nearby village, who moved to Mamire (Strömquist, 1999). These people were mainly from the ethnic group Gorowa. The flow of immigrants continued for about 20 years. The area was in Gorowa chiefdom and anyone wanting to settle had to ask permission from the Gorowa chief, Mzee Amri Dudu Beo. This was mostly formalities and some time after the clearing the chief stated that anyone who wanted to, may settle in Mamire. There was still a problem with tsetse during this time and both humans and cattle were infected (Lindberg, 1996). This information suggests that the informant from Mamire is not a representative for the majority of the village. But his statement that Mamire was Barabaig land before he came there is supported by Lindbergs research. An old and feared Barabaig "witch doctor" lived up on the mountain close by and there were scattered dwellings in the surroundings (Lindberg, 1996).

The impact on the environment from the clearing will be on a long term basis according to Mr Kavishe. There are no good records kept from the clearings and no comprehensive follow-up has been conducted. If a follow-up was conducted the result from that could be used to frame a program of action to reduce the negative effects due to the clearings. It could also be used as an event history for possible future action of this kind. According to Mr Maanga, the clearings would not have had to be so extensive, but the clearings were uncontrolled and unsupervised and there was a lack of communication. A better conduct could have reduced the clearings to the minimum that was needed and this could still have declined the tsetse fly population in the same extent.

The land has been degraded as a result from the clearings and this started to get visible about ten years after the event. For example, fertiliser and erosion control is nowadays needed. This is likely due to exhausting of the land. Agriculture land has to be handled correctly to give a good yield on a long time basis (Pimentel et al 1995).

It is also worth to mention some basic fact about Thiodan[®], which was referred to by two of the informants. Thiodan[®] is an insecticide, it is a registered trademark of Hoechst Ag. Its ac-

tive agent is endosulfan [Hexachlorohexahydromethano-2,4,3 benzon dioxa thiepin]. In the western countries it is used to control insects on fruit, vegetable and ornamental plants. The pesticide is highly toxic to especially aquatic animals but also to birds and other wildlife. It may also be fatal to humans if swallowed, inhaled or absorbed through skin (Southern Agricultural Insecticides, Inc., 2009). None of the two informants who recommended Thiodan[®] to be used for tsetse control instead of clearings, could state any negative effect of Thiodan[®] when asked. According to them, Thiodan[®] was only toxic to tsetse flies and did not affect other species. It is of concern that the informants were not aware of the highly important side effects of the product.

The general opinion about the clearings was that it was good because it made it possible for people to acquire new land which was needed in some of the studied areas, Kiru Erri, Mamire and Magugu. It was also good since the problem with tsetse was dramatically reduced. But it was not entirely good, the clearings lead to land degradation and this concerned all of the informants.

6 Discussion

As stated in section 1.3 there are subsequent and cumulative effects as a result of such a big operation as the tsetse clearings. These effects were not clarified before the clearings (Mr Maanga pers. comm). These effects are important and also intriguing to review. This knowledge can be helpful when similar operations needs to be carried out. It is often hard to foresee subsequent and cumulative effect due to lack of knowledge of all components. In retrospect, it is easier to clarify which events that were connected to the clearings (Strömquist et al 1999). This thesis could not review all events and effects that the clearings fuelled since it would be too big of a task for a bachelor thesis. Its aim was to study an historical event that has had an impact on the landscape evolution and review its importance for agriculture land spreading. Historical reviews of this kind is seldom carried out in Africa, as was noted when information for this thesis was gathered. Nor has there been any good records kept from the tsetse clearing event. It is important to inquire into past events to understand why resent development has taken its current course. It makes it possible to avoid undesired development an promotes the desired development instead.

In the Babati district, the statement of Börjesson (2004) seems to be applicable (see section 3.1.5). It was not just land opportunity, i. e. one primary driving force, that spread agriculture land. Conclusion of Turner et al. (1993) seems to be applicable as well. The land opportunities from the tsetse clearing did to some extent spread agriculture land. But it was mainly the increase in population, land degradation and land shortages that was the driving force. The line of policy at the time also helped with the spreading. Both the Ujamaa and the Operation had important influence over were peoples settlements should be.

This thesis did also inquired into the most significant and visible environmental effect of the clearings. To study the real environmental effects due to the clearings, a combine biogeophysical, social and historical review should to be conducted. All of these processes need to

be taken into consideration to understand the effects that a happening of this kind can have (Simonsson, 2001). This thesis has not deeply inquired into these processes, especially not the biogeophysical factors. The perception study that was carried out does take the social and historical aspects into consideration, and the review of the secondary information was also helpful for those aspects. The transect walks as well as the secondary information gave some answers to the biogeophysical environment, but this material was not extensive enough to draw any conclusion from. However, the result of the field work indicates that erosion and water loss are the two major negative effects that have followed the clearings. The erosion is most likely a consequence from clearings, since there was no longer any vegetation cover to sustain the top soil. But this thesis can not answer if the issue with water loss due to rain-shortage is in fact a consequence of the clearings. The water loss could also be a perceived consequence from the clearings. To established this, a rain patter study that includes factor that affect this process, is suggested.

It would have been interesting to study the turn out in environmental effect if pesticides would have been used instead of the clearings. It is possible that this could have had an even more profound effect on the environmental since chemicals have proven to have unexpected negatives effect. But it is also possible that a good management of an appropriate chemical would have had lesser environmental impact than the clearings. The use of pesticides was mentioned by some of the informants as a better alternative and it is nowadays used. If the possible future effect of the pesticides has been investigated is unknown to me, but there are reasons to believe that this has been done. Environmental Impact Assessment, EIA, is nowadays a common tool to use to foresee environmental effects that will follow an event. EIAs are often used by International Development Aid Organisations and Non Governmental Organizations, NGOs. According to Mr Mkwana, parts of the tsetse-control program are nowadays sponsored by these kinds of organs. This leads to that the impact of the pesticides has probably been investigated. But naturally this is of concern for Tanzania's government as well; therefore it is also likely that they have done their own investigations. It is however, of great concern that neither Mkwana nor Mr Shawishi were aware of any bad side effect of the pesticide Thiodan®, which they both recommended to be used for tsetse control. But it is unknown if this is in fact so or if they did not want to state the bad effects.

No thorough follow-up of the clearings has been conducted; this is due to lack of resources (Mr Kavishe pers.comm). There is a need for living in the present in Tanzania, the county have other problems to tackle which are regarded as more important than an historical review of the landscape. Furthermore, sleeping sickness is not the illness in focus any more, instead HIV and malaria are nowadays being given the main attention. According to Mr Mkanwa, there have been problems with patients who have been infected with sleeping sickness and have been misdiagnosed, often with HIV. The sleeping sickness has more or less fallen into oblivion. For example, my field-assistant Elia Mushi, who grew up in Babati and now lives in Arusha, had heard of sleeping sickness but was not particularly familiar with the illness. And he had no idea that sleeping sickness was fatal if not treated, nor did he know that there were still tsetse in the Babati district.

The tsetse fly population has declined after the clearings. If this is due to clearing of the fly's habitat or if it is due to the fact that the fly's wildlife hosts has reduced in numbers has however been debated. The wild animals that the fly feed on have reduce in numbers and/or have migrated because their habitat has been cleared, as well as the fly's habitat (Reid et al 1999). Nowadays the most common opinion among scientist is that the decline in tsetse population is due to the decline in the wildlife population. However, the prevailing opinion in the Babati district was that the decline in tsetse was due to habitat clearing. This was also the most common opinion earlier. The opinion in Babati can be a result from failure to update with new knowledge. But it can also be due to failure to communicate this information. It is also hard to change once accepted knowledge. Further more, the decline in wild animals were one environmental impact that was not mentioned by any of the informants. This has a profound meaning for the biodiversity and therefore it should be regarded as an environmental impact. It is however, not only the clearings that have made the wildlife decline, but it is likely that this have had a substantial effect. A reason for not regarding this as a problem due to the clearing is that it is instead regarded as a problem due to population growth and spreading.

It is also worth to mention that tsetse is regarded by some to be a natural protector of the game as well as the environment in Africa. This is due to that the fly prevents people and their livestock from over-using vast areas, the fly reduces the possibility to immigration to infected areas (Reid et al 1999). Tsetse can infect the wild animal, but humans are a bigger hazard for the

animals and the environment. If the tsetse had not existed it is possible that the African continent would have been more exposed to human than today.

It would have been preferable to find maps over the areas. It would have been helpful to conduct a map comparison with maps that denote settlements before, and after, the tsetse clearing in the studied areas. The map from Tanganyika Tsetse Survey and Reclamation Department was found to be inadequate for the purpose of this thesis and no other map of the area was possible to acquire at site in Babati. It is possible that map records exist but access to these was not derived. It is however more likely that maps of this kind do not exist in Babati. Tanzania was a British colony during the more intense tsetse clearings (Loiske, 1995), therefore maps could possibly be found in London. But the time limit for the thesis made it impossible to conduct a trip there to find out.

For further studies on this issue a comprehensive follow-up of the event is suggested. The clearings have led to long term impacts on the environment and no real follow-up has been conducted. This is needed to get the full picture of the impacts of the events. In order to do a more extensive history review of this event, it is necessary to find maps of the cleared areas. But since there are no good records kept this will be a challenge. However, this could be done by thorough archive work in other location than in Babati. Records could possibly exist in headquarters in London, Dar el Salaam or Dodoma.

7 Conclusion

The tsetse clearings in the Babati district opened up new land which could be used as agriculture land. In some areas the newly accessible areas were used for this, in other places it was used for pasture. Some of the cleared areas were not used at all, it was left to re-forest on its own. The clearing did to some extent help with the spreading of agriculture land but it was foremost the increase in population, land degradation, land shortages and the politic agenda at hand that were the driving forces.

The most important environmental impact caused by the clearings was erosion. Water loss due to rain-shortage has also been mentioned as a problem due to the clearings, but whether the water loss is due to the clearings has not been establish by this thesis.

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10 Appendix 2

Questions asked during the semi-structured interviews with Mr Mkwana, Mr Kavishe, Mr Mangaa and Mr Shawishi in Bonga.

1. Name
2. Sex
3. Age
4. Education
5. Title
6. How much do you know about the tree felling to eradicate the Tsetse fly ?
7. What the land looked like before the felling?
8. How was the land used before the felling?
9. How did the felling effect the land?

If necessary, try to specify the answer by asking following-questions.

- a) Mainly positive or negative?
- b) If negative, which were the negative effects?
10. How is the land used today?
11. Has the clearing had any influence on agriculture starting in areas which were not farmed before?
12. If there are no cultivating in the area,
What do you think should be done with the land today? Is it necessary to do soil conservation?
13. Do you know about any other factors that have affect the land?
14. What do you think of the felling of trees to eradicate the tsetse fly?

Questions asked during the semi-structured interviews with farmers how cultivate land from tsetse clearing.

1. Name
2. Village
3. Education
4. For how long have you (or you're family) lived here?
5. What do you know about the tsetse clearing in this area?
- 6 a) Have you're family moved here because of the land opportunity due to the tsetse clearing?
If so,
 - b) From where?
 - c) How did you're family support themselves there?
 - d) Do you know if there were other places that your family consider to move to instead of here?
7. Do you own this land?
8. What do you cultivate?
9. a) What properties does this land have that makes it good for cultivating?
b) What does the land lack?
10. What did the landscape looked like here before the tsetse clearing?
11. How was the land used before the clearings?
12. Had the tsetse clearings any important environmental impact on the land in this area?
13. What other important influence did the tsetse clearing have on the land in this area?
14. What do you think of the tsetse clearings?