

TOWARDS A SUSTAINABLE LAND-USE PLAN FOR THE LAKE FUNDUDZI CATCHMENT AREA

Submitted by

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CHAPTER ONE: INTRODUCTION

1.1. OVERVIEW

This research project aimed to develop a sustainable policy for Lake Fundudzi and its catchment as such that the area can be zoned for conservation. Lake Fundudzi is considered a Heritage site by the Venda nation and consequently needs to be conserved from degradation, exploitation and any action that will reduce its natural value and longevity. A lake can only be conserved if the whole catchment area is conserved (Birkheard et al. 1997).

Sustainable land-use planning and development integrates, development, agricultural practices and conservation in order to minimise degradation on natural resources and the environment. Sustainable development plans to ensure the long-term availability of natural resources and to optimise the output from these resources without negatively impacting ecosystem services and functions. Consequently sustainable land use does not cause degradation of the natural resources found in an area or compromise long-term productivity. The plan also focused on the long-term preservation of Lake Fundudzi as a potential resource in the catchment area.

The catchment area covers different vegetation and soil types. One of the characteristics of a mountain catchment area is the degradation of the environment and the production base (Yanhua et al. 1992). Therefore some areas are suitable for certain types of development that may not be effective in other areas. There are frequently emerging unsustainable patterns of resource use and production encountered in mountain catchment areas (Yanhua et al. 1992). An integrated approach to the development of a sustainable policy for catchment management was adopted in order to benefit areas where the ecosystem had already been degraded. The plan included areas below the catchment as buffer zones. These areas are distant from most villages and their population densities are relatively low.

The community way of life in the catchment area was assessed and documented. This was done using a questionnaire to assess existing practices, to determine their impact on the environment, make recommendations for the implementation of improvements. Variables evaluated included agricultural practices, local resources that the residents use such as fuel wood and the disposal of community waste. Findings indicated that if certain recommended actions were adopted and applied by all community members, they could improve the environment. The generation of garbage for example, can only effectively be reduced with the full participation of all residents.

The study highlighted that the catchment area's conservation is also important for the improvement of water quality and quantity, the preservation of cultural heritage associated with the lake and the protection of scenic landscapes. The catchment area could also act as a sanctuary for fauna and flora found in the area as development and urbanisation takes place in surrounding regions.

1.2. BACKGROUND INFORMATION ON LAKE FUNDUDZI

Lake Fundudzi is one of the few natural fresh water lakes in the southern hemisphere. The Venda tribe considers the Lake sacred, especially the Vhatavhatsindi clan who act as the custodians of the lake. The Vhatavhatsindi Royal Family practice their religious rituals and burial customs in and around the lake. These traditional practices gave the lake and the surrounding area a status that limited exploitation by surrounding communities for many years. However these traditional beliefs and taboos associated with the lake are no longer strictly enforced, and this has resulted in the increased utilisation of resources and areas that were not previously exploited.

The catchment area still contains pristine areas with limited human impact. The mountains are also of significant scenic value. The potential locked up in the preservation of catchment areas should not be limited to the study area as the whole Soutpansberg mountain area forms a chain of scenic beauty that can be used to enhance conservation efforts in the region. However, it is also of paramount importance to conserve Lake Fundudzi and the river catchment area in its own right. The conservation of the catchment area, cannot successfully be accomplished without commitment from the regions stakeholders. The conservation of the lake may be promoted by its scenic qualities, the lake's unique formation, the cultural beliefs historic value that the local people attach to the lake and the economic potential it can generate for the local communities. Other features such as the caves, waterfalls and the sacred forest all enhance the area's ecotourism potential.

Agricultural and settlement activities in the catchment area need to be planned taking into consideration the long-term sustainability of the lake and the environment. At present, planning is done by individual chiefs with no or little effective co-ordination from the Department Agriculture, Land and Environment (DALE). This has created problems due to the lack of necessary expertise to complete a sustainable land-use plan for the region.

1.3. ROTIONALE

During the past twenty to sixty years the Lake Fundudzi catchment area has been subjected to, afforestation, human settlement and dry land cropping. Population increases in the catchment area (Birkhead et al. 1997) and the need for agricultural lands have placed considerable pressure on the resources harvested from the mountain catchment area. Forest lands have been replaced by crop lands (Jodha et al. 1992) and orchards. Overuse of resources or irrational use of resources accelerated the process of land degradation. The availability of land is continuously declining due to population increases while the traditional ways of production can no longer meet the increasing demands (Jodha et al. 1992). All these factors have

contributed to the apparent degradation of the catchment and increased sedimentation of the lake (Birkhead et al. 1997). This negative, human-induced impact directly affects the long-term viability of the lake and the river ecosystem. In a holistic study the contribution of traditional and modern ways of living, as well as technology, have been investigated in order to determine the best options available for reducing the negative human impacts on the resources and the environment.

1.4. PROBLEM STATEMENT

Lake Fundudzi is a sacred place surrounded by five Vhamusanda (Chiefs) under the (*Thovhela*) higher chief Tshivhase. Of these five chiefs, only the custodian of the lake together with members of his tribe, worship and practice religion at the lake. Traditionally there was consensus concerning the places that could be accessed and the practices that could be performed in the vicinity of the lake. The chiefs and the community in all the villages surrounding the lake observed these practices. Increasing population pressure and a general collapse of traditional ways of life presently threaten the lake and its surrounding environment. The catchment area is under tremendous pressure to support and sustain all the villages with the associated escalating requirements.

The catchment area is characterised by high rainfall with the average annual rainfall being between 1000mm to 1500mm per annum (Jackson 1961, Midgley et al. 1990). Mountain environments are characterised by being ecologically fragile and inaccessible (Jodha et al. 1992). Most afro-montane forest remains are at burial sites (*zwitaka*) or areas that are difficult to access. In the catchment area there is an increasing number of people involved in farming practices such as the planting of orchards and keeping livestock. The supply of electricity is not well developed. Numerous people depend on wood collected in the catchment area for fuel. Due to the increased population pressure, wood is becoming scarce. This results in the cutting of living trees. There is high unemployment, which in turn forces unemployed people to depend on the natural resources for survival. Typical use of the natural

resources include small scale commercial fishing, tourist souvenirs or crafts made from the indigenous wood, hunting, subsistence dry-land agriculture and diversion of the streams to irrigate vegetables.

Lake Fundudzi is facing an increased supply of sediment and other pollutants from its catchment area. This is mainly the results of an increased human settlement and agriculture in the catchment area. A large portion of the catchment area has been converted from its initial mountain grassland into commercial forests. The Vhamusanda of the area have planted small forests of blue gum trees (*Eucalyptus*) to supply building materials to their villages.

Poor planning of infrastructure such as roads have increased the susceptibility of soil to erosion. Agricultural activities along the rivers are close to the high water mark. A portion of the lake that is covered by the water during the rain season is used for vegetable production during winter months. Communities in the catchment areas are dependent on annual crops and these require regular ploughing. This continuous cultivation loosens the soil, increasing its susceptibility to erosion. The catchment area is situated in steep and rocky slopes which makes the uses of machinery for ploughing ineffective. Farmers therefore keep livestock (cattle or donkeys) to assist in the cultivation of their lands. In the summer livestock graze in mountain areas and feed on straw and maize remnants during winter months, decreasing the ground cover required to stabilise soil. Depleted ground cover reduces penetration of water during rain, consequently increasing soil erosion.

1.5. STUDY APPROACH

There are limited numbers of studies conducted in the Lake Fundudzi catchment area. To date no scientific studies of the aquatic life found in the lake have been conducted. It is not yet established if there are any endemic species either in the lake or in the catchment area (van der Waal, personal communication). Consequently conservation planning will not be directed towards the preservation of specific

species. The focus is therefore on the preservation of the catchment area's ecosystem, from the head waters of the tributaries to the Mutale River and Nzhelele River, including the lake as "a heritage to the nation" and the scenic mountain terrain. The conservation of this area will benefit the watershed, prevent soil erosion, stabilise the flow of the Mutale River and continue to preserve vital ecosystem services and functions.

It is against this background that a formal land-use plan and strategy for the management of the catchment area is urgently required. The proposed plan was developed and drafted in consultation with the local community, and was investigated using existing traditional avenues of information disseminating. The plan tries to achieve the following goals:

- to promote the sustainable use of the region and its resources by the local communities.
- to apply for the declaration of the area as a natural heritage site, nature reserve or protected area with limited human activities.
- to prevent further loss or degradation of the biological resources in the catchment area, or soil degradation, which impacts on the longevity and value of the lake through sedimentation.
- to identify indigenous knowledge that can be customised for use in other areas.
- to suggest a restoration and rehabilitation plan for the catchment area with the objective of decreasing community poverty levels and reducing negative environmental impacts.
- To develop a balanced approach where close attention is given to decisions designed to achieve a sustainable integration of economic development, protection of resources integrity, whilst meeting social norms and the expectations of the catchment people (WRC report 1996).

Throughout the research process the communities that were directly affected were involved as intimately as possible. The use of the traditional communication channels, such as visiting the chief and the gota before any discussions were

conducted with the community members, was a form of communication acceptable to the community.

1.6. THE PHILOSOPHY OF SUSTAINABLE DEVELOPMENT AT LAKE FUNDUDZI

Having established that the fundamental approach is sustainable development, the concept needs to be examined closely. Constructing a sustainable development plan begins with recognising the community's cultures and their way of life. This must be followed by increased service provision, empowerment (including their cultural practices) and through the creation of employment opportunities, thus reducing the community's immediate dependence on natural resources. Decreasing exploitative utilisation of natural resources within the catchment areas improves the maintenance of vital environmental services and functions. This could lead to the abandonment of certain practices that are deemed to be degrading to the environment when practised in the catchment area. The losses to the community should be compensated by those who ultimately benefit either by the use of water at the lower lying area or others. Such compensation could make the utilisation of the resources by the communities in the catchment areas more sustainable and reduce their dependency on the natural resources.

Integrated Catchment Management is aimed at deriving the optimum possible mix of sustainable benefit for future generations and the communities in the area of concern, whilst protecting the natural resources which are used by these communities and minimising possible adverse social, economic and environmental consequences (WRC report 1996). It recognises the need to integrate all environmental, economic and social issues within a river basin into an overall management philosophy, process and plan. Therefore the approach used by the ICM will also be applicable in this case.

Sustainable development, as defined in 1991 by the World Commission of Environment and Development, should strive to address the needs of the present without compromising the ability of future generations to meet their own needs. This is meant to improve the quality of human life while living within the carrying capacity of supporting ecosystems (IUCN/UNEP/WWF, 1991).

Sustainable development should also incorporate the following principles in order to make an impact in rural areas (see Caldecott, 1996):

- In the development of Integrated Rural Management systems, active involvement and participation is needed of rural people through their recognised organisations, such as farmers organisations, traditional leaders' structures, civic structures, farmers' co-operatives, informal groups, traditional healers' structures.
- relieving pressure on natural resources by investing in the improvement of services delivery, rehabilitation, restoration and conservation of the natural resources.
- promoting alternative off-farm job (livelihood) opportunities in rural areas. This will reduce the migration of skills into urban areas (Den Bosch Declaration, 1991).
- creation of a market structure for farm products and mechanisms for surplus rural production to be processed and value added before produce is being sold.

Sustainability does not mean that things do not change or people should return to their traditional way of living. It means that communities are always exploring ways to improve their lifestyles by strengthening their links to the economy, environment and society. Sustainability should also mean that, when problems arise, the community has a way of finding a solution that takes into account the environment, economy and society rather than finding a "quick fix" in one terrain and subsequently causing problems in another (Hart, 1996).

Successful land-use planning and development in an area will only be possible if local communities, who normally use the land, forest, water and soil are compensated for foregone benefits. Human development forms part of sustainable

development, particularly the development of the poor and vulnerable. The United Nations Development Plan (UNDP) Report of Human Development Declaration Report (1996) states that development includes the protection of the life support resources and opportunity of future generations and the natural systems on which all life depends.

The approach to sustainable development should also cover the following aspects:

- assessment of the state of the natural resources utilised by the community in order to formulate guidelines that will regulate their use;
- development of the local community's ability to access and to fully utilise their natural resources with minimal negative impact on the environment;
- development through training of local people to add value to products from resources of the area before being sold;
- prediction of the behaviour of the system, such as how the system will respond to human impacts like pollution, urbanisation, change in agricultural practices, building of structures which confine or change natural movement of water through the system and the implementation of management actions (WRC report 1996).

CHAPTER TWO: THE HISTORY OF LAKE FUNDUDZI AND THE SOCIO-ECONOMIC STATE

2.1. HISTORY OF LAKE FUNDUDZI

Lake Fundudzi is found in the Northern Province of South Africa (fig. 2.1). It is the only natural inland fresh water lake in Southern Africa. It is believed to have been formed by a mountain landslide, which blocked the passage of water creating a lake in the upper part of the river (fig. 2.2). The lake is approximately 3 km long with a surface area of about 144 ha and a maximum depth of 27m at an elevation of 865m ASL (van der Waal, 1997). The lake is fed by three main rivers from a catchment area of approximately 6000 ha. Water filters through the debris of rocks and emerges at the lower part of the lake forming the Mutale River.

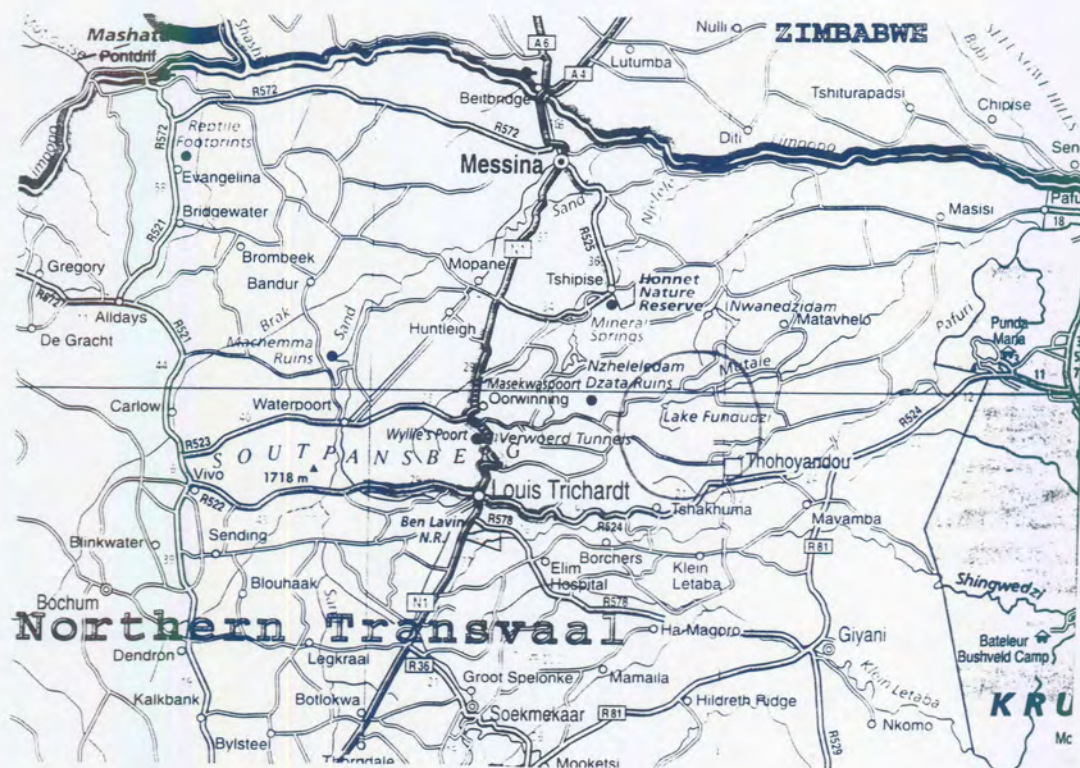


Figure 2.1. The location of the lake in the Northern Province of South Africa.



Figure 2.2. The rock fall of boulders that is blocking the flow of the rivers creating the lake. Water slowly seeps through the rocks coming out 500m downstream to form the Mutale River.

2.2. BARRIERS

In the past, lake conservation was enhanced by the belief of local communities that the lake is sacred. Special permission was required from the Vhamusanda Vho-Netshiavha before a visitor could visit the lake. This tradition is now vanishing because of the adoption of a western lifestyle and the increasing number of access roads from different points to the lake. As custodians of the lake the Netshiavha Royal Family wishes to continue controlling access to the lake. The system was historically acceptable and was allowed to continue in accordance with traditional and cultural beliefs. The Royal Family and the Tshiavha people enjoyed privileged access to all sites and they wish to retain exclusive access to particular cultural sites such as burial sites.

Conditions for the development of the area must be negotiated with the relevant chiefs who live around the lake and consensus must be obtained from the Tshiavha Royal Family. Full co-operation by the relevant chiefs in developing an acceptable management policy will likely be the pillar of success for any project in the area.

The lake is surrounded by five independent chiefs, under the rule of King Tshivhase. Each chief has full authority over his area, which may not be questioned by the other chiefs. For example, the allocation of residential stands or farming lands is done by the chief of the area. Four of the chiefs have no direct claim to the lake. They accept the Tshiavha people's custodianship and the practice of their religious custom in the lake and its surrounding areas. The weakness of this traditional system is that not all Tshiavha cultural practices are common to the rest of the people and their chiefs. Consequently chiefs could adopt activities which negatively impact on the lake and there is no avenue for questioning this decision. For example a member of the chief's family decided to establish a farm on the lake's silted areas. This was objected to by the Tshiavha Royal Family and they were forced to request the intervention assistance of the Department Agriculture, Land and Environment (DALE) authorities.

Access to the lake is possible from four different villages. One access route is from the Netshiavha's royal homestead. It does not give a good view of the lake for the first time visitor. A more scenic access is from the cliff side through Phungoni village. It gives a clear view of the lake and the Mutale River running through the lake. The silted areas at the mouth of the Mutale and Gondoni Rivers are clearly visible from the top of the cliff. From there you can descend to the bottom end of the lake where the water filters out into the Mutale River. The third entrance is through Tshiheni village. This entrance leads to the common mouth of the Govha and Gondoni Rivers on the western side of the silted areas. This entrance is frequently used by outside visitors who want to touch the water of the lake or fish. The main reason for the popularity of this route is that you can reach the water by vehicle. The last access point is through Tshitangani village, and leads to the Mutale River mouth at the lake.

This entrance is also accessible by vehicle. From this entrance, one can walk to the lower edge of the lake. All these entrances cater for a variety of human needs and it would be difficult to limit access to a single entrance. People that intend to fish, picnic or camp close to the water will prefer the Tshitangani and Tshiheni entrances. Tourists passing by, will in turn prefer the cliff view.

Since tourists may pass through different entrances when approaching the lake, benefits derived through a specific entrance should benefit that local community. One possible approach is that a portion of such an income be reserved for central administration purposes of the lake and the cost incurred by management.

2.3. EMERGING SOCIO-ECONOMIC AND POLITICAL STRIFE

2.3.1. Between Department Agriculture, Land and Environment and local communities

The provincial Department Agriculture, Land and Environment (DALE) recognises that the lake needs protection. They usually send their staff members to inspect the lake and the surrounding areas. There is no formal written policy to guide local conservation officers in the management of Lake Fundudzi and the mountain catchment area. The activities of the conservation extension officers are more aimed at controlling the exploitation of the natural resources found in the area. The extension officers visit the lake to inspect the size of fish being caught or to check whether anglers have fishing permits. This creates poor relationships between the conservation authorities and the local communities who view the uniformed extension officers as a threat to their activities.

The DALE is in the process of developing a policy document to be used in an application to declare the lake and its surrounding areas a heritage site. The local chiefs and the University of Venda, with the assistance of the DALE and Heritage Society, have formed a committee that will prepare all required documentation for the application.

Previous management by the Department Agriculture, Land and Environment (DALE) depended on the co-operation of the local chiefs. The conservation authorities could only function properly if they had the local chiefs permission. These chiefs would implement law enforcement in their territorial areas. This system is falling away due to the increased resistance towards certain aspects of the traditional ruling systems. Local communities no longer fully recognise and subject themselves to the tribal rules and obligations. Chiefs are no longer seen as authoritative as they were in the past. Poor communication between DALE and the traditional leaders is one of the reasons that created the problem. This is now being exploited by the chiefs' subjects who have realised that there is no agreement about most decisions taken by the chiefs. Recommendations made by chiefs are not followed resulting in the chiefs being reluctant to repeat such recommendations in the future, lest the same happen. In this way the chiefs' subjects are able to manipulate the parties for their own gain at the expense of the environment.

2.3.2. Conflict within Department Agriculture, Land and Environment

The Department Agriculture, Land and Environment (DALE) nature conservation section is seen as the main form of law enforcement that prohibits people from harvesting wet wood, hunting and cultivating steep areas or riverbanks. The Department of Agriculture has adopted a softer option to encourage local communities to farm with little or no emphasis on conservation or any sustainable practices. The agricultural extension officer's main objective is to advise on the latest production practices available in order to maximise production. Therefore when people are clearing the land (natural forest) for agricultural purposes, even if it is in a steep area or close to the river or any other sensitive area, they will still receive advice from agricultural extension officers with no warning about the environmental hazards their actions may create.

The mismanagement of the Fundudzi catchment has been promoted by the DALE section of Environment and Nature Conservation with very little or no co-ordination with the Agriculture extension officers or Agricultural Development Corporation extension officers. The Agriculture and rural development extension officers seem to ignore conservation, possibly due to a lack of relevant knowledge.

In a normal situation, the conservation of the catchment area should be co-ordinated from a provincial ministry. All sectors of the department are therefore expected to abide by the department's objective in performing their duties.

2.3.3. Changing land-use patterns

The Venda people are dependent on natural montane areas for harvesting food and gathering fruit, roots and bulbs. These foodstuffs are still used as a supplement to diet and as medicine. There is an increasing number of orchards being established along the catchment areas. The traditional way of harvesting wild resources such as plants and animals was aimed at sustainable utilisation. It was believed that if a tree was killed during the process of harvesting or collecting of medicine, the medicine would not function. The collection of roots or bark was done from one side of the tree only or in opposite direction allowing the tree to regenerate. Traditional healers did not keep or store of medicine. Medicine was collected only when it was needed. Sometimes, the sick person had to collect the plant part required and bring it to the healer for brewing and mixing. With increased urbanisation, more people are keeping their own medicine at home. However, there is no physical evidence of excessive use, such as ring-barked trees in the village or along the path to the lake. This does not include specific trees used for certain functions that may be excessively utilised while non-target trees remain intact.

Plant parts (wood) have been used for different purposes. Vendas use plants for the decoration of their homes (mupfunda) or to channel access into the homestead. This was usually done by cutting wet young shrubs and placing them in a row on top of

each other as fences around the houses. These structures also serve as a storage of wood close to the home for use during difficult times like during summer seasons when people are working the fields. With the increased settlement of people in one area, the availability of wood close to the settlement has declined, resulting in the removal of trees. Local communities still have very strong beliefs that fruit trees should not be cut for wood as they provide food.

Local communities use soil for painting and decorating their houses. Paintings are done on walls and on floors between houses. This is done using soil collected in specific areas for its colour or strong texture. Each village has its own collecting area. The collections of soil removes the ground cover leaving the soil bare and susceptible to soil erosion. Communities will need to be educated on the consequences of removing topsoil. Management practices should be developed that can be followed when people collect soil to reduce soil erosion. An alternative source of soil (coloured lime) could be used to decorate the homestead should also be investigated.

2.3.4. Concerns from the local chief

In the past, strong concerns and suggestions have been raised by the local chiefs as custodians of the lake. Their concerns are based on previous experiences the local community has gained in working with researchers and explorers who visited them. These include the collections of burial materials and exploitations of areas assumed to be sacred by the local communities and chiefs. Chiefs have difficulties in accepting proposals even if it is clear that the intentions are for their benefit. Many of the scientist who have studied the area have not provided any feedback on their findings or, in many cases, openly questioned local communities beliefs (personnel communication Chief Netshiavha). This resulted in the local community not benefiting from studies and from their participation in such studies.

It is important that any consultation process to develop the area should be done in co-operation with all the chiefs in the area and the Netshiavha Royal Family. This will

limit the controversy and enhance joint responsibility for the management of the area.

The local chiefs, who wanted to secure a reasonable consensus before any type of development or conservation is done in the area have raised the following concerns:

- No development of any kind concerning Lake Fundudzi should be considered without the consent and approval of the Netshiavha Royal Family;
- Any meeting to discuss aspects that affect the lake should be done with the approval of the Royal Family;
- No commodity of any kind will be removed from the Lake and the surrounding areas without the consent of the Royal Family;
- There will be some sacred places where visitors would not be allowed to go. This would apply to any normal walking visit, or any other visit such as by parachute, or plane or cable connections above the sacred areas;
- If developments want to sell the history of Lake Fundudzi, an interpreter with a historical background of the Lake should be a member of the Netshiavha family;
- Developers should not be given a deed of grant over the Lake or its surroundings;
- Developers should improve the infrastructure. Any development should enhance the easy access of the local community to clean water, electricity and health facilities;
- Tourist buildings or buildings of any kind should be erected on the Tshiavha side of the Lake;
- Members of the local community should be given preference when employment opportunities arise;
- Bursaries for environmental education and conservation studies should be provided for school children from the area. This would empower members of the community to develop the area themselves;
- Fishing, collection of firewood and sand should be prohibited;
- The development of the lake should be a joint venture between the community and the Royal Family;

- Publication of any information including media statements should be done with the consent of the Royal Family;
- The Royal Family wishes that the link between their tribe (Vhatavhatsindi tribe) be maintained in the initiative to promote the conservation of Lake Fundudzi. This initiative should therefore be linked to the Mutavhatsindi Reserve created for the protection of Mutavhatsindi tree (*Brackenridgea zanguebarica*) on the North Eastern side of the lake;

There is a strong feeling by the Netshiavha chief that any kind of infrastructural development brought about around the lake should be done on their land first. This will include the construction of camps and access roads to the lake.

CHAPTER THREE: LAND–USE PATTERNS IN THE CATCHMENT AREA

3.1. Introduction

The present land-use patterns in the area were assessed in order to determine their effect on the environment and compatibility with conservation, sustainable utilisation and water quality and quantity objectives. Interviews were conducted with representatives from the forestry department, nature conservation, local communities and the chiefs of the area. In addition, sites such as a peat bog area, maize fields and eucalyptus woodlots were inspected to assess their state of degradation.

3.1.1. Dry-land agriculture

The catchment area is characterised by dry land agricultural farming with a small but increasing number of orchards, commercial forestry and settlement areas of properly demarcated residential stands. Agricultural activities are also being practised at the mouths of the Gondoni and Govha Rivers above the high water mark. There are noticeable diversions of river water through mud canals to supply water to vegetable gardens along the river valleys.

Most people have been staying in the area for three or more generations. They have been moved from one area to another during the creation of the formal settlements in which case they retain the right to use their previous residential areas in order to ensure that they can take care of their ancestors by cleaning the graves or performing of rituals. Burial sites are found in the ruins of the old homesteads. When new residential areas are created, the owners are allocated land (plot) for ploughing. If an owner moves to another village, the ownership of the plot is handed to the new owner of the residential stand. Therefore individuals cannot claim ownership of the farming plot if they no longer belong to the village. The land becomes attached to the residential stand.

When a resident intends establishing an orchard, the following procedures are followed: He applies to the gota (village headman) indicating a specified area that he intends to use as an orchard. If the place is not yet allocated to someone else the application will be referred verbally to the chief by the gota, with the gota's approval in the absence of the applicant. A formal application is drafted from the chief to the land affairs office. When the application is successful, the local DALE's extension officer will demarcate the area in the presence of the chief or gota and the applicant. Since the local extension officer is not involved during the initial application process, problems arise when the area granted is considered by the government to be either too steep, rocky, close to the river or otherwise considered too sensitive for orchard development.

In some instances, farmers apply to establish an orchard in forest areas with the intention of harvesting wood. Some proposed orchards were cleared between five to ten years ago and are still not planted. It would seem that the original intention was to harvest and sell wood. Individuals in the communities may use the agricultural development agency by applying for orchard development loans, which covers fencing, the purchase of plants and even water pumps and engines. The development agency requires that the applicant have permission to occupy (PTO) as proof of land ownership. In the loan application, there is no requirement for an environmental impact assessment of the area. Only when a proposed project is to be developed by the Agricultural and Rural Development Corporation (ARDC) will there be a need for an impact assessment (Ramaite, 1998). The Agricultural and Rural Development Corporation requires only a feasibility study, which does not cover an assessment of the impact that conversion of forests to orchards will have on the biodiversity and environmental services.

At the Tshitangani village, for example, the clearing of land for cultivation also resulted in someone claiming ownership of the particular plot. This creates problems,

as more people will be encouraged to clear land for their personal use and to secure ownership.

3.1.2. Forestry

The state forest called Thathe Vondo was first planted in 1956 along the escarpment and in the Lake Fundudzi catchment. It is situated at the headwater of five major rivers draining into the Limpopo River on the western side (Nzhelele) and the Luvuvhu River to the East (Mutale and Mutshududi). Before conversion into commercial forests began, the area consisted of mountain grassland with indigenous forest along the cliffs and along steep edges of the mountains.

Plantation management has adopted a policy of removing all blue gum trees (*Eucalyptus*) from the catchment area regardless of whether it is inside or outside the plantation since the blue gum trees reduce the stream flows. They are also removing invasive species along the Soutpansberg Mountains. According to the new policy trees will not be planted or replanted closer than 50 meters from the river. All blue gum trees (*Eucalyptus*) plantations will be removed after harvesting and be replaced by species that consumes less water (personal communication Ramugonddo).

Along the Mutale River in the forestry plantation there are a number of peat bogs. In one area the peat covers approximately 12 meters on both sides of the river from the river's edge for distances of 70 - 100m long. According to the plantation manager there were many peat bogs in the area when the plantation was established. They use the peat soil to pot nursery plants for the establishment of forests (personal communication Ramugonddo).

A site inspection to the peat bog area indicated that there was limited excavation of peat. There was also a soil profile dug by Madzivhandila Agricultural College students for demonstration purposes. The pine plants have been cut down and the area was covered by grass although there was regrowth of pine trees that were four to six years old.

The government plantation is selling peat soils and all unused logs with deformed structures as well as thin pine that cannot be used by the mills as a form of generating income.

Peat acts as a sponge that absorbs water during the rainy season and releases the water slowly during dry periods, stabilising the flow of the river. If the peat is removed, the stabilisation effect will be lost while the soil along the river will be more susceptible to erosion.

3.1.3. Woodlots

During the 1980's chiefs were encouraged to plant blue gum trees for construction wood by DALE. This resulted in the clearing of some natural forest to plant blue gum trees close to the chief's residential site. Such blue gum plantations can be found at Thononda where the natural forest below the mountain, above the chiefs Palace, has been removed. In addition, the steep embankment of indigenous forest was removed for plantation of blue gum trees along the mountains at Tshiavha. This plantation belongs to and is managed by the chief.

There is a general acceptance by plant scientists that *Eucalyptus* consumes more water than indigenous forest (Dye et al. 1997). It will be difficult to convince the beneficiaries (chiefs and local community) of blue gum forests to convert the land either to indigenous forest or to plant other species that consumes less water if the benefits are less than what they are generating at present.

During an Arbour day tree planting ceremony DALE officials gave the Tshiheni School at Hakhakhu blue gum trees to plant along the school fences as ornamentals. This is in direct contradiction to what they are doing at the state forest.

3.1.4. Local use of the lake and the surrounding areas

The culture of the Venda people is changing as traditional taboos are becoming acceptable. Traditionally Vendas did not eat fish from the lake, river or from canned sources. Presently they are harvesting fish from the lake for consumption and for sale using line fishing and, to some extent nets. Fish are mostly harvested during the summer with minimal fishing activities along the rocky outcrops during the winter. Because rocks heat faster and retain heat, fish move to the bottom end of the lake during cold months. The top portion of the lake that is already silted is used for stock grazing during the winter since it retains its green plants while the other areas are dry (fig. 3.1).



Figure 3.1. Cattle grazing on the silted areas along the Mutale River mouth to the lake.

The catchment area is being used mostly for dry land agricultural purposes. This is dominated by annual crops like maize intercropped with pumpkins and beans. Most of the residents either have a big yard that includes a field or a separate area for the cultivation of crops (fig. 3.2). Most of the fields on the figure have some form of

contour while others have none. This is an indication of the different management practised by the local communities. The maintenance of the contour depends on the owner of the plot.



Figure 3.2. Fields used for the production of maize in summer.

Most areas in the catchment are steep and not easily accessible by vehicle. This results in the local people keeping livestock such as cattle and donkeys to be used for ploughing. Cultivation of these lands is thus done by animals. Areas that are not cultivated due to rocks or steepness are used as grazing areas for livestock during certain times of the year.

The catchment area provide food (fruit), meat, medicine, building material, materials for handcraft and animal fodder. Local residents have free access to these materials. These materials can be exhausted if utilised in an unsustainable way that allows them to regenerate.

3.2 Conclusion

The process of orchard application in the catchment area needs to be stream lined and be done by environmentally knowledgeable people or institutions. Leaving it in the hands of the chiefs will result in the allocation of areas that are not sustainable for the specified purposes. However there should be co-operation between the institution and the local chief so that areas considered sacred can be retained according to the local tradition.

The increasing demand on the land for orchard development will reduce the area left for those who cannot afford to buy or are no longer able to sustain themselves at the standards they used to.

The excavation of the peat is an environmental disaster for the long-term survival of the river systems. The practice whether it is too small or a large degree be discouraged as the ecological benefits of the peat is well documented. Harvesting of peat in the head waters will reduce the quality and quantity of the water that reaches the lake.

The lack of co ordination by the DALE in encouraging small-scale maize producer to keep maintaining their contours is regrettable. The practice seems to have been adopted at one stage by all farmers and later fell apart.

Although it is clear that the local people prefer maize a study on the most applicable production principles, either of maize or any other higher yielding crops should be conducted.

CHAPTER FOUR: LAND-USE, POPULATION AND CULTURAL SURVEY

4.1. QUANTITATIVE QUESTIONNAIRE ON CATCHMENT AREA COMMUNITIES

The project included a house to house questionnaire in villages found in the catchment area including: Tshitangani, Tshiheni, Thononda, Hakhakhu, Tshiavha, Phungoni, Mademeni, Tshifume, and Malili. Questions were asked to the people found specifically in their homes. Homes were selected randomly in the above mentioned villages. The questionnaire was an adaptation of the one used by Prof. Van der Waal in his studies of the area in 1987-1989. The objective of that questionnaire was to assess and document information on the life styles, agricultural practices (old and new) and general perceptions of the local communities towards conservation issues. This information would be coupled to observations of the lifestyles used in the area.

Villages in the catchment area are distributed around the lake with some of the villages being inaccessible by vehicle. A total numbers of 88 people were interviewed randomly in all villages over a period of two months during July-August 1998. Although the above indicates numbers of people, it actually reflects the number of households as respondents were visited in their households and only one questionnaire was completed per household. As this was a quantitative questionnaire method, people in the same village were interviewed until their answers converged, indicating specific trends. The questionnaire was not designed to test the number of people with different opinions but to gather the different ideological opinions on the status of the lake from the respective catchment communities. The above number of respondeds therefore represent the most divergent communities views captured during the interviews. The interviews were conducted by the researcher using local language.

The style of the questionnaire was modified before the interview with the chief since it is traditionally unethical to ask them structured questions. Issues that related to traditional leadership were raised and chiefs were allowed to speak on their history and their traditional practices as freely as possible. This also allowed the researcher to pick up issues that were not included in the questionnaire. As a result, the chief of Thononda demonstrated the process of terrace construction as illustrated in chapter five. They also gave a detailed historical account of their involvement in terrace construction in the area.

When visiting a village, the researcher would report to the local headman or “gota”. In order to explain the whole rationale of the visit and ask for clearance to interview the residents. With the support of the “Thovhela” it is usually a formality to introduce the researcher to the gota.

4.2. METHOD AND APPROACH

The following procedure was followed in requesting permission to conduct a study at Lake Fundudzi. A letter requesting permission to study the lake and the catchment area was written to chief Netshiavha. The chief referred the author to Thovhela Tshivhase as the overall ruler of the area. The application letter was presented during the khoru. It was agreed that the research should be conducted, although it was requested that the results of the study must be formally presented to chiefs.

Lake Fundudzi has numerous secrets, rituals and myths. It was not the intention of the study nor the researcher to verify whether the beliefs were true or not. When it comes to the secrets and ritual related customs of the chiefs, a close relative of the Tshiavha Royal family frequently had a different perception from the rest of the community. What are considered myths and hearsay are realities to the Tshiavha Royal family derived from cultural experience. This should not create an impression that they are likely to divulge any of this information to researchers.

4.3. HOUSEHOLD PROFILE

4.3.1. Overall respond

Fifty-eight percent of the respondents were female while 42 percent were male. Interviews were conducted during the week and two Saturdays to target working persons. The high number of female respondents could be attributed to the fact that most of females are unemployed and at home during the week. Two group discussions were held with people at Tshiheni and Phungoni. The group discussion at Phungoni coincided with the traditional meeting (khorro) at the church which also acts as crèche. The elders in the gathering agreed to participate as a group with the gota taking a leading role.

4.3.2. Household size

Figure 4.1. Indicates the average household sizes in the catchment areas. Forty percent of the population interviewed in the area have extended families (families with more than one generation, e.g. grand parents staying with their children and grand children) or families with between four to six members. Ten percent of the families interviewed have household sizes above 14 people. Most of the extended family depends on one working member of the family. Most families are still using thatched mud houses compounding their need to use thatch grass.

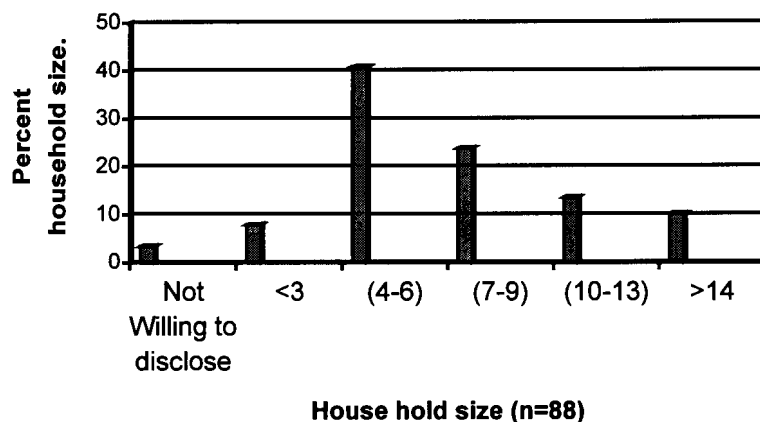


Fig. 4.1: House hold size

4.3.3. Age

The highest number of interviewed respondents were in the age group 31-40 years (fig. 4.2). It is also interesting to note that more than 28% of the interviewed respondents were above the age of 61 years. The working group (41–60 years of age) composed only 11% of the respondents since most of the men in this age group class in the area are working in urban areas. Surprisingly, there were old people who were not interested in disclosing their age. The Venda cultural belief is that the older you become the more valuable you become because of the experience you gather. Other members of the community (not the Royal Family) did not want to talk about beliefs and rituals that they see attached or owned by the Netshiavha Royal family. They would gladly refer the researcher to the Netshiavha Royal family.

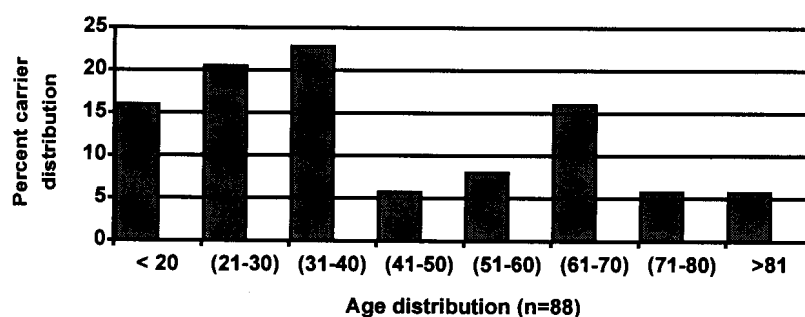


Fig. 4.2: Age distribution of the interviewees

4.3.4. Employment

The interview took place during school holidays, resulting in twenty-four percent of interviewees being school pupils. Twenty-two percent of the people interviewed were within the working age group but were not employed. Most of the employed people were teachers and government employees fig. 4.3. Self employed people were artisans, builders, repaired shoes or radios or were traders selling goods from their homes and at schools. Some of the self-employed did woodworking when there was a demand.

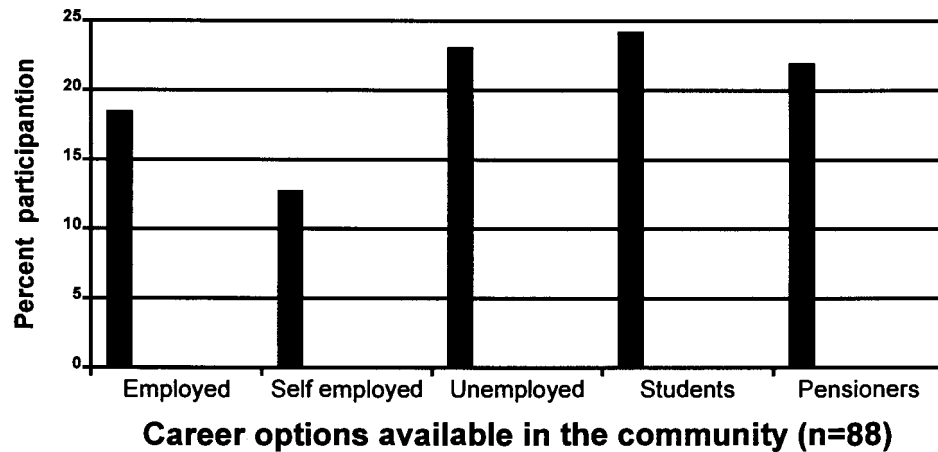


Fig. 4.3: Career distributions in the area.

4.3.5. Qualifications

The highest numbers of respondents were literate, although they have not passed matriculation examinations (fig 4.4). More than thirty percent of the interviewed were literate people who left school between standards 6 and 10. The majority of people that had no formal education were the pensioners. Those who had passed matriculation continued with their education until they completed a higher qualification.

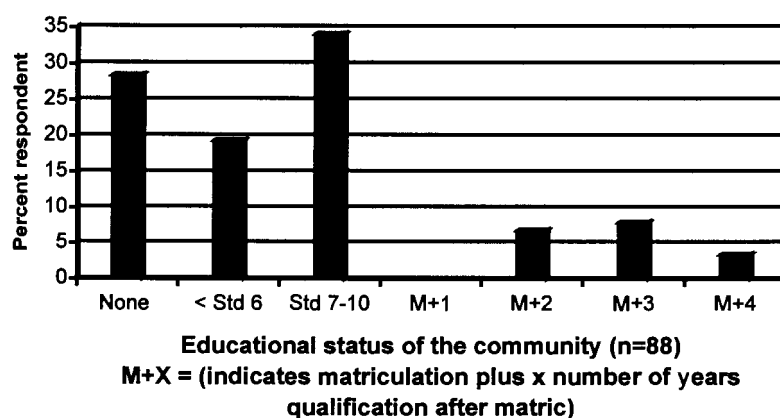


Fig. 4.4: Educational Status of the community.

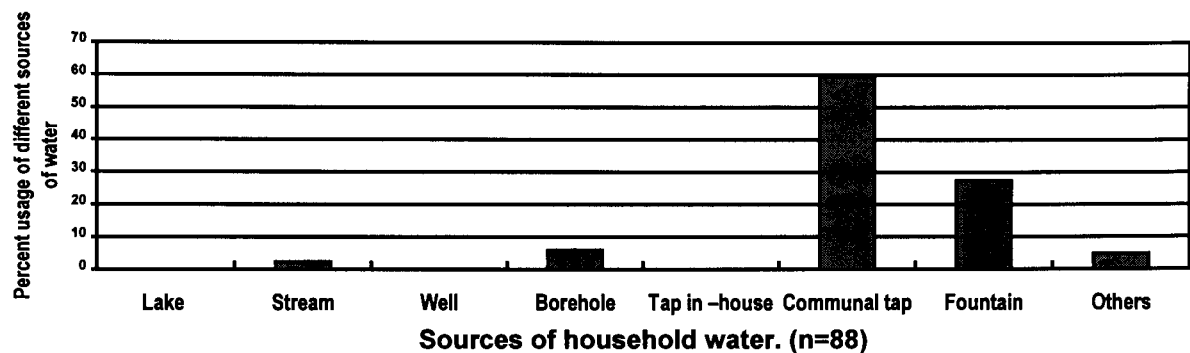


Fig. 4.5: Sources of household water.

4.4 AVAILABILITY OF WATER

4.4.1. Water sources

There are three villages with communal water taps at the corners of the stands. People in these villages use the water for most of their household needs (fig. 4.5). Communal taps are connections of pipes from a stream, borehole or fountain, distributed downward by gravity or pumped to a storage dam at the top part of the village. The water is then redistributed to the villages through pipes and taps to the street corners.

The maintenance of the pumps and pipes is the responsibility of the central provincial government. When pumps are broken this create a problems due to delay in repairs. The old community water sources are either neglected when taps are functioning or are no longer functional due to the depletion of supply required by the tapped water. In some villages, like Tshitangani, locals are dependent on the Mutale River water for household use. They collect their water directly from the running rivers without any form of purification. The river does however, run through a forestry area which is unpopulated and the water is therefore reasonably clean. Some families in the Hakhakhu areas have their own boreholes. At Phungoni there is a fountain diversion to supply water to the family. Most of the respondents indicated an increasing

demand for the lake water to be used for medicinal purposes by people from outside the catchment area, specifically the churches and spiritual healers.

4.4.2. Distances from water sources

The introduction of communal taps has reduced the amount of time spent collecting water. Up to sixty-nine percent of people interviewed spend less than 30 minutes per day fetching household water (fig. 4.6). In areas where there are no communal taps the fountains or the rivers are usually close to the houses. Nine percent of people interviewed still spent more than an hour a day collecting household water, specifically at Tshiheni and Tshitangani. In areas where there is no tap water people still bath and wash in the rivers. Taps are also recent developments which people are not completely used to. More than sixty-one percent of people interviewed still wash and bath in the river even though taps are close to their homes (fig. 4.7). Rivers act as a gathering place for the women where they socialise while they are washing.

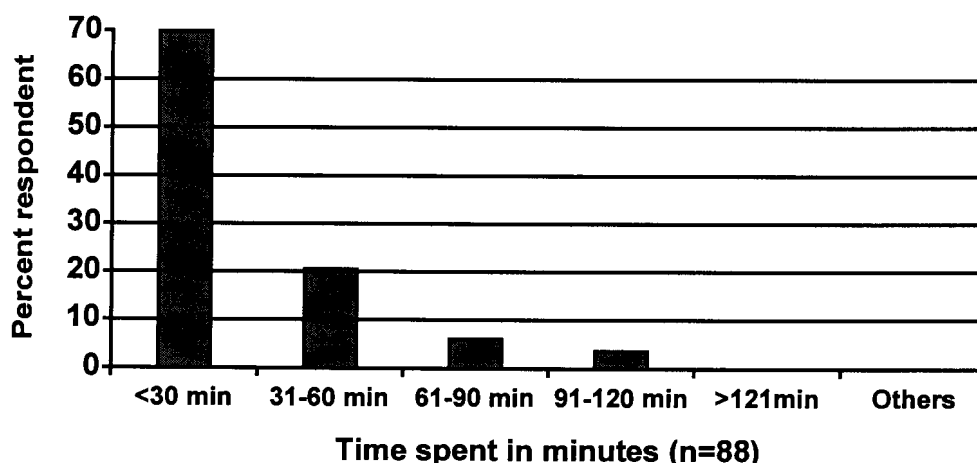


Fig. 4.6: Time spent in the collection of household water.

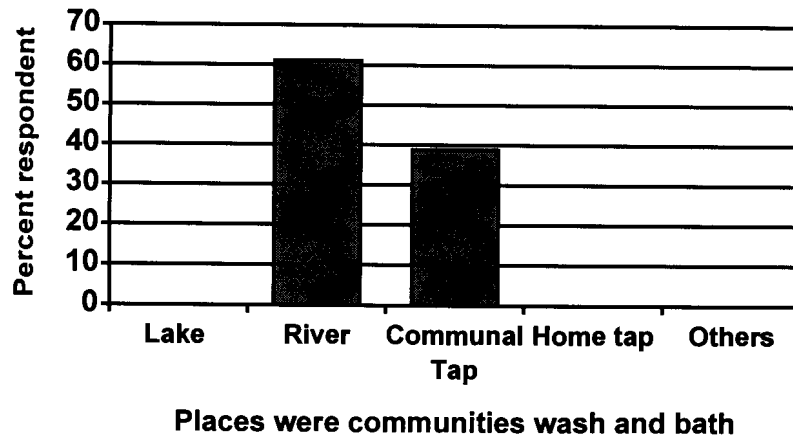


Fig. 4.7: Places where communities wash and bath.

Powdered soap is preferred to soap bars in the catchment area especially for people washing in rivers. Only seventeen percent of the population interviewed used soap bars. This implies that with a large number of people using the river for bathing and washing there will be traces of soap pollutants that reach the lake. It is common practice to find people washing in the rivers in their residential areas that eventually lead to the lake (see fig. 4.8).



Figure 4.8. A stream less than 10 km from the lake with women and children washing clothes.

4.5. WASTE GENERATION

Households produce a mixture of organic and inorganic waste. Of all the waste produced more than sixty-seven percent of the waste generated was organic matter (fig.4.9). This could be due either to the fact that markets are rural, or that items were harvested from the fields directly. There is an increasing tendency for inorganic waste such as cans and plastic to be generated due to packaging and purchases from the malls or wholesale shops. The disposal of the organic waste is usually in an open pit in the yard during summer (fig. 4.10). Pits are cleared before summer and the compost is distributed in the yard as organic material before cultivation. Inorganic wastes are collected and dumped in areas where there are no houses (bushes, gullies and cliffs).

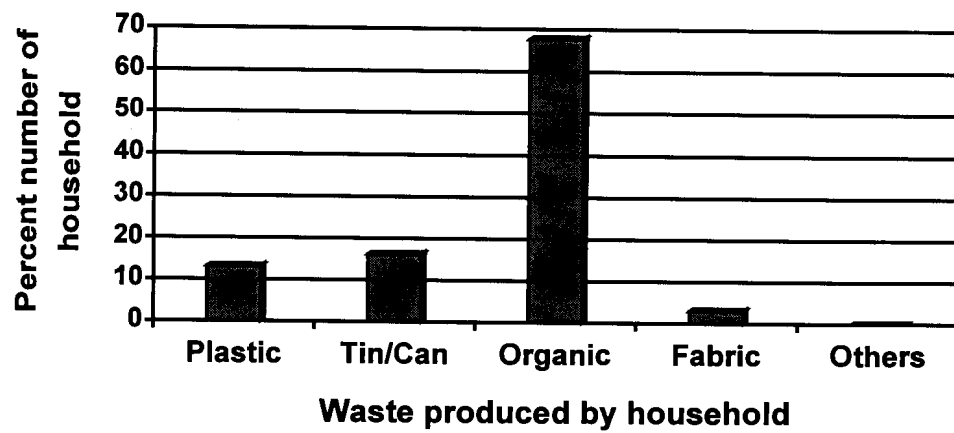


Fig. 4.9: Waste produced by household.

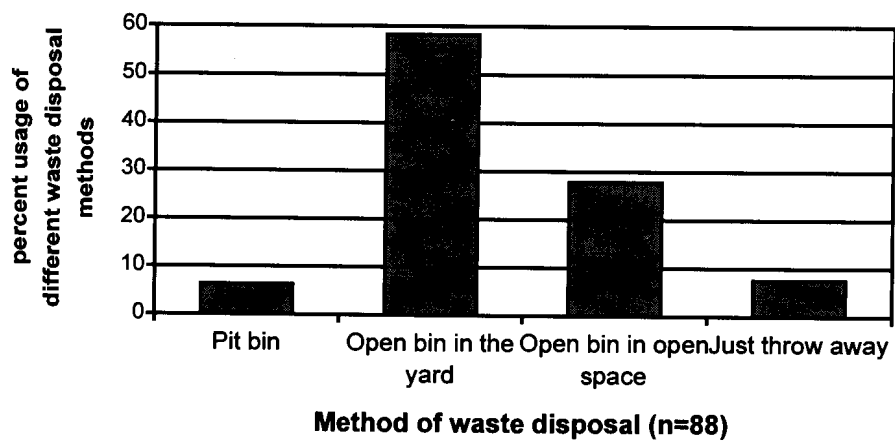


Fig.4.10: Method of waste disposal.

Cold drink cans and plastics were observed on the lake shores, washed out of the lake on the high water marks, indicating that pollutants are not properly stored or dumped within the catchment area and eventually land up in the lake.

The majority of residents use pit toilets (fig. 4.11). There was usually some form of toilets, except in the Tshitangani area, where there was no toilet in the whole village. Residents used bushes as their toilet facilities. In formally settled areas households without toilets used their neighbour's toilets. At Tshiheni the community was given an ultimatum to by their chief to build a toilet per household before the rainy season or be fined. The response was good as many households without toilets had the pits dug and were preparing bricks for building.

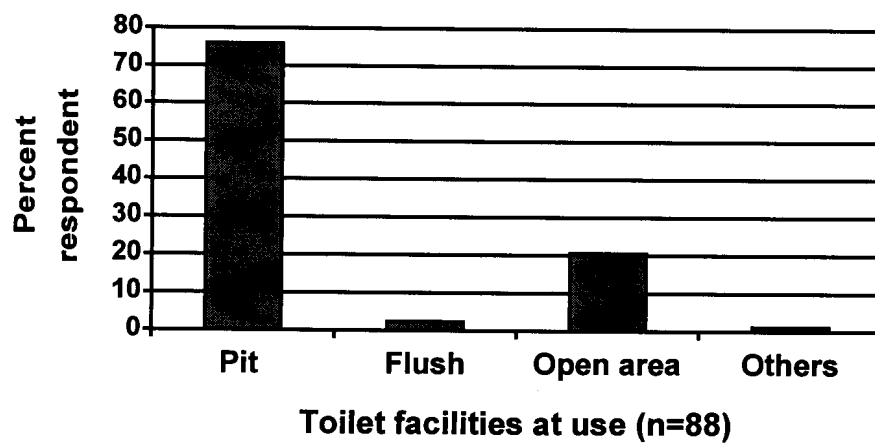


Fig. 4.11: Toilets facilities in the area.

4.6. USE OF WOOD AS FUEL

More than ninety-two percent of the respondents used wood as source of fuel (fig. 4.12). Electricity is being incorporated into certain areas. Some of the families with electricity e.g (Hakhakhu, Thondoni) continue to use wood for cooking and only use electricity for lighting due to difficulties experienced in changing all their appliances to ones compatible with electricity. Thereby saving money and purchasing compatible items after a number of years. Ninety percent of the people interviewed collected their own wood while the remaining purchases either from the coal yard or directly from the state forestry, Thathe Vondo. Of those who collect wood, fifty-seven percent collect fire wood from the surrounding natural forest (fig. 4.13). The remaining were either purchasing or collecting from other natural forests close to their villages.

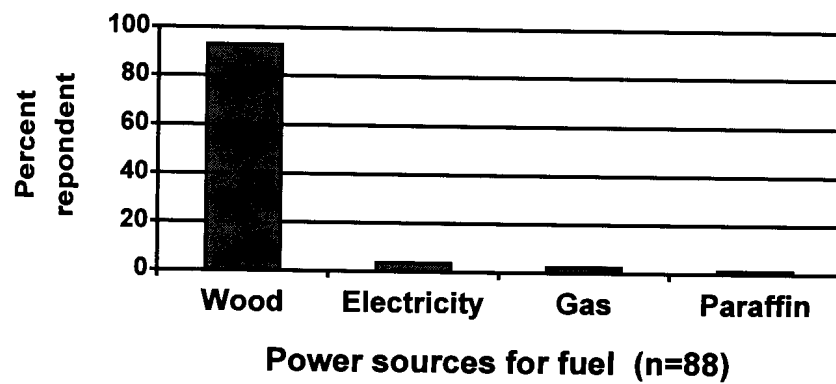


Fig. 4.12: Power sources for fuel.

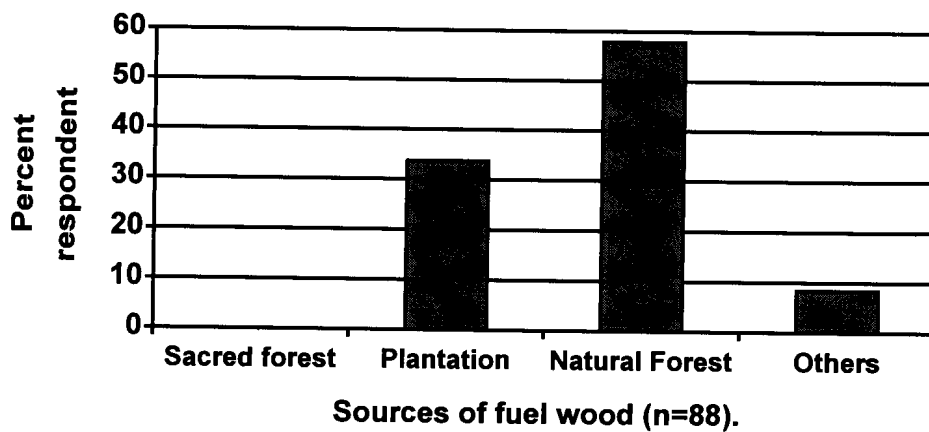


Fig. 4.13: Sources of fuel wood.

Families close to the state forest are allowed to collect wood from the plantation on certain days of the week as long as they carry it themselves.

More than seventy-two percent of the people interviewed used more than two hours per day to collect fuel wood (fig. 4.14). This should be expected: as fuel wood close

to their homesteads become scarce, longer distances must be covered to collect the same amount of wood.

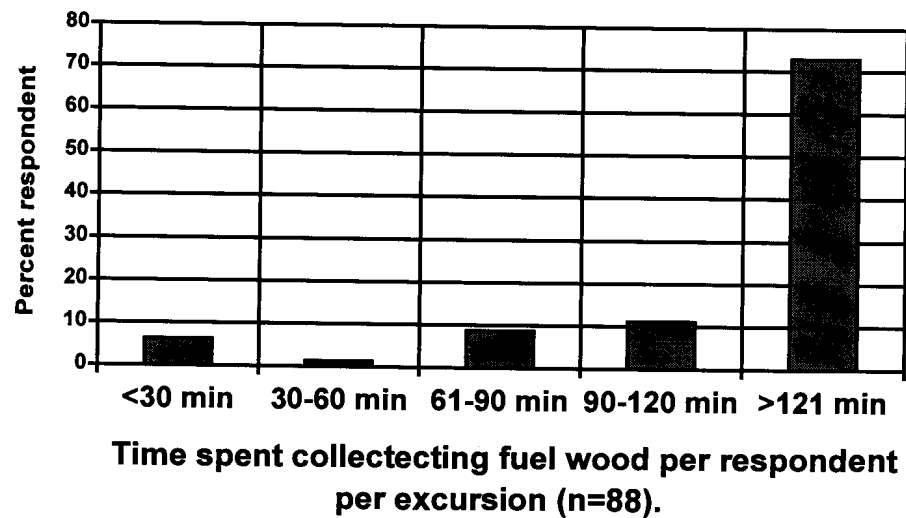


Fig. 4.14: Time spent collecting fuel wood.

There are traditional beliefs and opinions surrounding the way in which wood should be collected. Only dry or dead wood (these could be shrubs or trees) and shrubs are collected (fig. 4.15). This is, however, only applicable when dry wood is available, and this principle is always stressed by the older generation who are no longer actively involved in the collection of fuel wood.

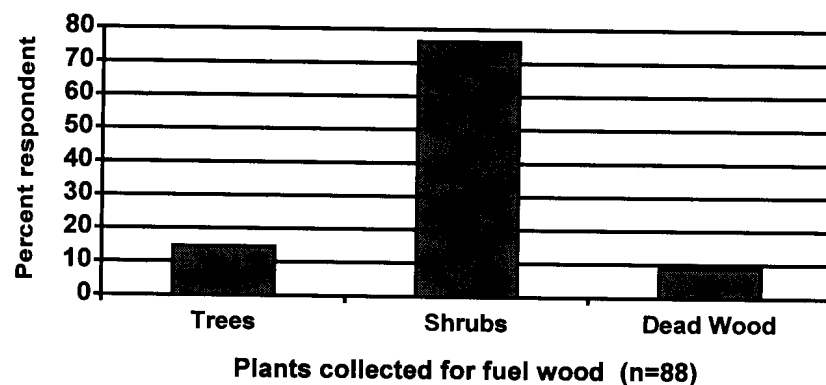


Fig. 4.15: Portion of plants collected for fuel wood.

There are plants which will normally not be collected for making fires in houses due to the beliefs or taboos associated with them. The general principle is that plants used for a certain function or which have medicinal value will not be used for fuel. Fruit trees will not be used for wood except when they are dead. Trees on burial site are not to be used for wood. There are certain types of trees that are not collected because it is believed that they either lead to bad luck or will cause family troubles. Homesteads are also protected using certain rituals that involve plants. Plants that are used for the protection of homesteads can not be used as firewood by the same homestead. Families with surnames that are derived from certain trees are also not keen to use those trees. For detailed descriptions of these practices see “The Ethnobotany of the Vhavenda People” (Mabogo 1990).

4.7. AGRICULTURAL ACTIVITIES

Communities use communal land tenure system that depends on summer rainfall to plant one crop of maize per annum. There is an increasing demand for orchards. Some people have started to plant vegetables at their homes during winter. Twenty-five percent of the community interviewed did not have access to extra plots of land for cultivation. These people are using their extended residential stands for cultivating maize. Forty-three percent of the people interviewed had access to plots less than one ha in size. (fig.4.16).

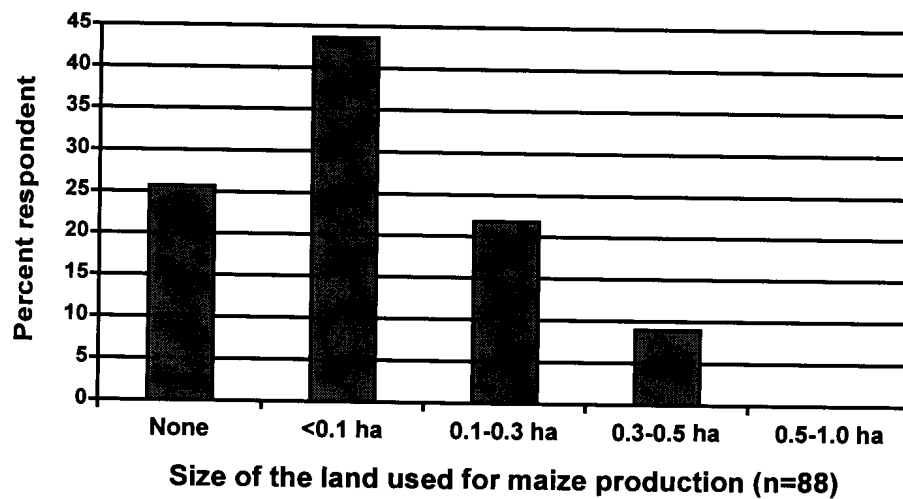


Fig. 4.16: Size of the land used for maize production.

Due to the steepness of the terrain animal traction is used for cultivation. There is also an increase in the number of gardens along the rivers where vegetables are being produced. These gardens are used for winter vegetable production, and are either not cultivated in summer, or are flooded or fallowed. More than sixty-six percent of the community interviewed uses intercrop agriculture, composed of mainly maize, pumpkins, and beans (fig. 4.17).

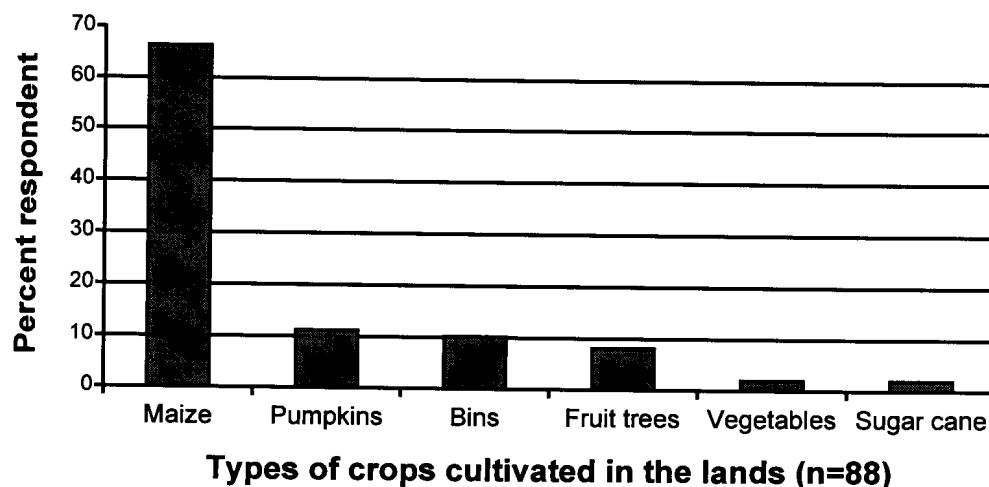


Fig 4.17: Types of crops cultivated in the area.

More than 47 percent of the community interviewed produce less than five unmilled eighty kilograms bags of maize meal. Forty-one percent harvest between 6-10 bags (fig. 4.18). This is under dry land conditions with no active application of fertilizers (inorganic or organic) or pesticides and herbicides on the maize. Vegetable producers and people with orchards apply livestock manure. Compost from the organic pits used as waste bins are spread across the homestead usually as renewal mechanism of the old pit not as fertilizers.

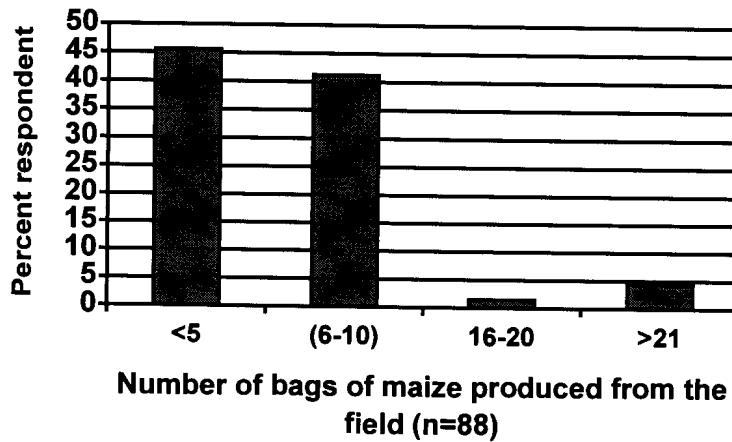


Fig. 4.18: Number of bags of maize produced from the field.

Sixty percent of the people interviewed do not own cattle while 29 percent own less than 10 cattle (fig. 4.19). Figure 4.20 indicates uses of the cattle in the households. Cattle are kept for assistance in the field and for sale to supplement household income. Some of them are also kept for sacrificing. Up to 85 percent of the livestock are kept as a source of wealth for the family. The same applies to the goats (fig. 4.21 and fig. 4.22). Fourteen percent of the goats are used for sacrifice purposes, which is higher than the number of cattle kept for sacrifice purposes (fig. 4.20).

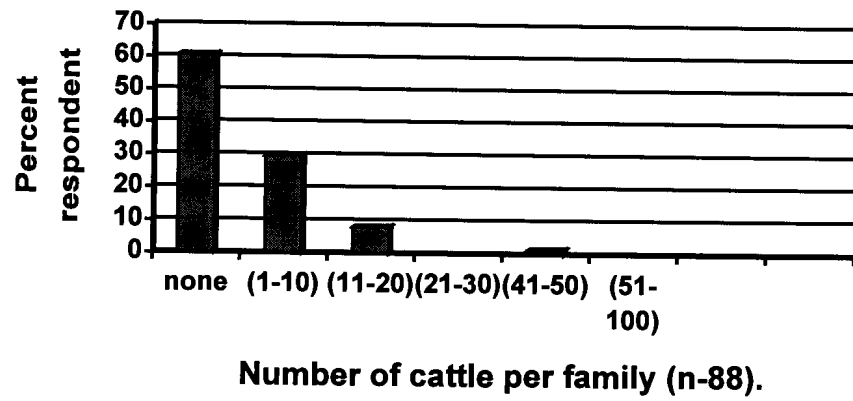


Fig. 4.19: Number of cattle per family.

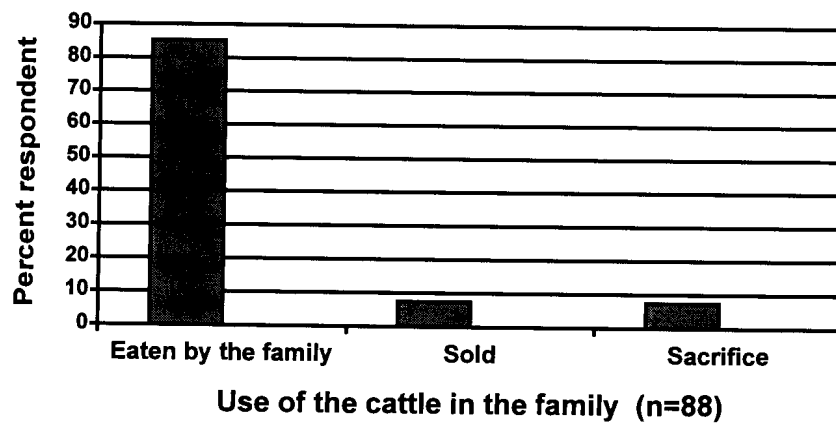


Fig 4.20: Uses of cattle in the family.

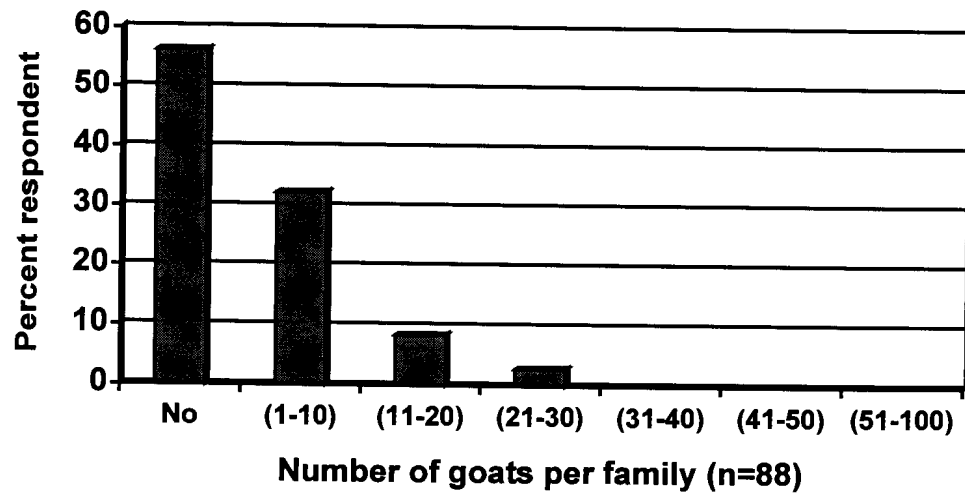


Fig. 4.21: Number of goats per family.

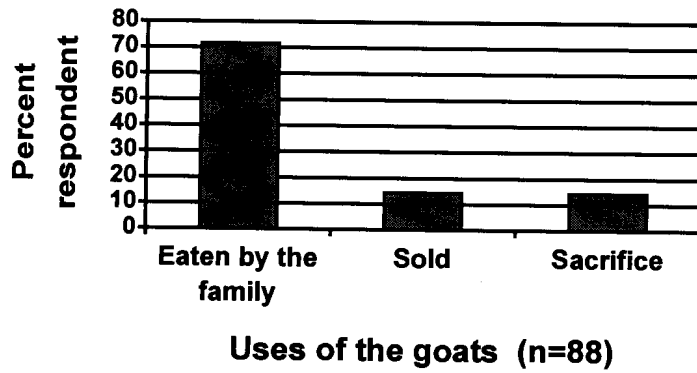


Fig. 4.22: Use of goats in the family.

The most important aspect about livestock keeping is whether they are kept for sacrifice or for supplementing income. When livestock is kept for scarifices, families keep them at any cost. When livestock are kept for income generation purposes, families are willing to accept compensation for the loss of their potential income generation sources.

Livestock grazes in the areas where people stay and on their communal lands during winter (fig. 4.23). They also feed on the mountains and on the silted areas of lake Fundudzi during winter when fodder material is scares on the mountains and communal lands. This means that if the number of livestock increases unchecked, they can impact negatively on the environment by reducing ground cover. This will lead to increase soil erosion in the vicinity of the lake.

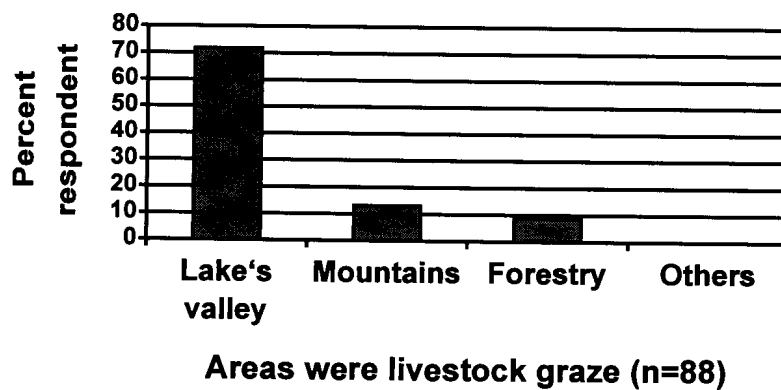


Fig. 4.23: Areas were livestock graze.

4.8. USES OF THE LAKE AND ITS SURROUNDINGS BY THE COMMUNITY

More than fifty percent of the local people interviewed use fish from the lake at some stage during the year (fig. 4.24). People who do not use fish from the lake are mostly from the older generation who do not eat fish at all. Fish from the lake are mostly harvested during the summer. The harvest during winter is smaller resulting in smaller numbers of anglers. There are some people that fish during July at the lower portion of the lake. Fishing during this period involves casting of short lines between the rocks.

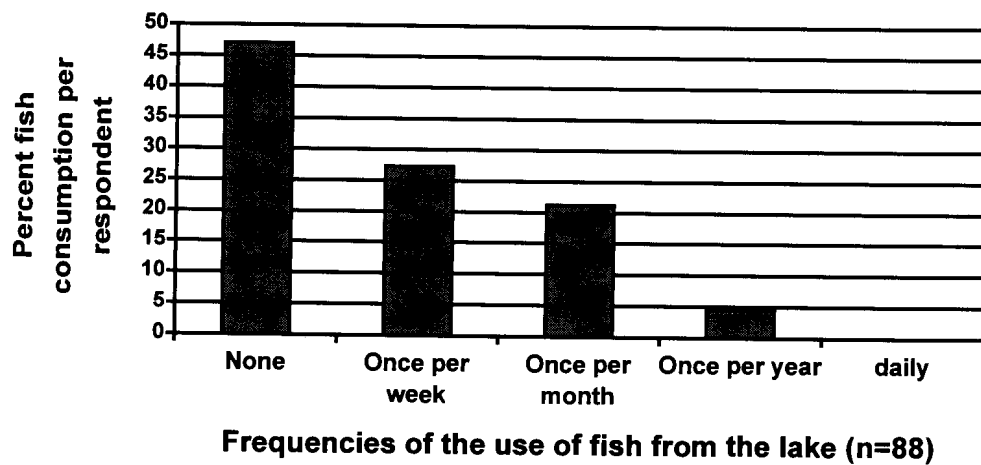


Fig. 4.24: Frequencies of fish consumption from the lake.

Fifty-one percent of the people who use fish from the lake believe that both the quantity and sizes of the fish caught are decreasing. The reasons provided by the anglers for the apparent diminishing fish stock are well thought out and in line with scientific reasoning (Table 4.1). All the respondents were fishing for home consumption only.

Table 4.1. Reasons provided in support/ in opposition to the apparent diminishing fish stock issue. (The Yes responses are for those who said the fishing success rate is decreasing and the No responses are for those who said the fishing success was not decreasing).

Yes (fishing success decreasing)	No (fishing success the same)
Shortage of rainfall drought. When the lake is full there is more fish.	It depends on the depth at which you fish.
There are too many people fishing. They are also using termites, which attract many fish including the small ones.	Whites come and put in fish in 1947. Local fish ate them all. In 1950 they come back with a different type, which looks like the local fish, and survived.
Use of nets affects the breeding population.	
People are fishing for sale. The fish will go away.	
White people brought in fish but have not repeated.	

Table 4.2. Plants list that people are presently using from the mountain catchment area for various reasons (excluding firewood).

Common name (Venda)	Scientific name	Uses	Place of collection
Sando, Tshipandwa, Mufhata, Muelela, Murathamapfene Muvundabando, Mutonddo. Mufhata , Muluwa,	<i>Bersama tysoniana</i> <i>Maytenus senegalensis</i> <i>Brachylaena uniflora</i> <i>Albizia gummifera</i> <i>Rothmannia mananjae</i> <i>Acacia caffra</i> <i>Pterocarpus angolensis</i> <i>Brachylaena uniflora</i> <i>Acacia ataxacantha</i>	Crafts such as: Wooden spoons, Wooden plates.	Along the mountains
Mutondo, Muluwa,	<i>Pterocarpus angolensis</i> <i>Acacia ataxacantha</i>	Arch for the traditional houses, hand- hoe handles, Wooden trays,	Along the lake.
Mulalamaanga	<i>Prunus africana</i>	Wooden drum	Dance forest.
Mupfure ndonga, Mulalamaanga, Muswoswo	<i>Jatropha curcas</i> <i>Prunus africana</i> <i>Synadenium cupulare</i>	Medicines for broken limbs, running stomach.	All over the area.
Mupesu, Mututulwa , Mushulwa, Mukwatikwati	<i>Securidaca congipedunculata</i> <i>Solanum pandauraeform</i> <i>Solanum aculeastrum</i> <i>Euclea natalensis</i>	Medicine for different things such as wounds.	Mountains
Musungudzwane	<i>Lippia javanica</i>	Nose bleeding.	All over the area.

Tshiumbeumbe	<i>Clematis brachiata</i>	Medicine for colds.	Mountains.
Muunguri	<i>Maesa lanceolata</i>	Medicine for broken or swollen area	Mountains.

4.9. USES OF PLANTS FOR MEDICINE

Medicinal healing or the spiritual beliefs of the people are taboo to speak about. The local community refused to talk about the medicinal trees that are used for healing since they viewed it as a secret component of their way of life. They believe that they will lose the medicinal powers from their forefathers to the strangers. The above information table 4.2 was thus considered common knowledge to all people. Many of the people, although they do not openly accept the use traditional healers, visit them after other medication. There are diseases know to be cured more effectively by traditional healers than professional doctors. In that case the concerned parties will first consult medical doctors and when they are recovering, will then visit the traditional healers for cleansing and future protection. Some villages are so isolated and lack access to public transport to such an extent that people will not visit clinics or hospitals if the local remedies are thought capable of curing the illness.

4.10 CULTURAL IMPORTANCE OF LAKE FUNDUDZI

More than seventy-three percent of the people interviewed believed that the lake is of cultural important to them (fig. 4.25). The relatives of the Tshiavha Royal family and the Tshiavha Royal family believe that the lake is directly associated with their culture. Of the other community members who believed that the lake is of cultural importance to them, none could specify a single cultural activity that they performed at the lake or that relate to the lake (Table 4.3). The reasoning behind the question was that if more people believed the lake is of cultural importance to them, it will be

more justifiable for them to protect it and to sacrifice some of the benefits they derive to ensure the long-term conservation of the lake.

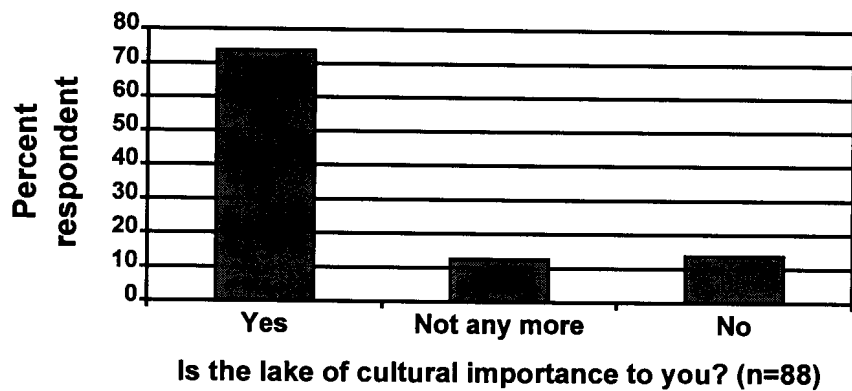


Fig. 4.25: Is the lake of cultural importance to you?

Table 4.3. Community responses to the cultural importance of the lake question.

The lake is culturally important	Not culturally important.
It is the sacred place for the Tshiavha family, and their sacrifice place.	Only the Tshiavha people will protect it.
People can play the Tshikona dance at the lake	Nobody is allowed to touch any thing from the Lake.
The lake influences rainfall patterns, when there are no rains the Royal Family sacrifices at the lake calling for rains.	The family does not always go for sacrifice as they used to do in the olden days.
Visitors from foreign countries come to see our culture.	It is only water.
It gives pride to the local community as a inland water body.	It does not help us with anything today.

Its formation is of historic importance to the people of Tshiavha.	It is just another place we get fish.
It is like our culture, we are attached to it, and we can not discuss our history without mentioning the lake.	
The lake is a special natural feature that is found nowhere else. People from all over the world come to see it or study it.	

4.11 MYTH AND STORIES ABOUT LAKE FUNDUDZI

Myths associated with Lake Fundudzi are central to its preservation and to the lake being sacred (Table 4.4). Certain myths are prevalent to specific villages while others are common to all villages.

Table 4.4. Indicates the myths and stories about the lake.

If you take the water from the lake it will evaporate before you reach your destination.
The lake does not accept foreign objects like fences and tins. The lake pushes them or removes them. The lake is also alive. You see this by the waves. Any protection intended should not include fencing of the Lake.
When you come close (at any place you can see the lake) to the lake for the first time you must turn your back and look through you knees (kodola). If you fail to do so your eyes will see darkness and you will not be able to see the lake.
You can hear the tshikona dance performed by the "zwidudwane" (half bodied person) during the middle of the night.
When the lake is full, the Royal Family must sacrifice the cattle for the lake to recede. The lake does not get filled by water from the rivers but by wind blowing and rain water that fall directly to the lake.

Fences are not allowed. At one stage, they placed poles in order to erect fence and the following day all the poles were removed.
There is a valley where you can not pass any excrement. Even if you do not know the valley you will receive a warning which could either be voices or a stone thrown to you by invisible beings.
People are not allowed to collect any items from the burial site and the surrounding areas such as, wood. If you collect any items, you will be attached to the place or get lost in the mountains or bushes until a ritual ceremony is performed by the Netshiavha Royal family.
Tshakhwedzi. This is a mountain that becomes an island when the lake is full. It is said that two sheep were once lost on the mountains just before it filled. They were surrounded by water for many years and reproduced in the area. When the water finally receded they were so used to the mountain and considered it their home to such a degree that they would go out for grazing and return in the afternoon. They were finally taken by the Netshiavha chief.
Netshiavha Royal family members are not allowed to be circumcised or if they do, they must never go close to the lake as they will fall into the lake and die.
If you have a wound and swim or wash in the lake's water, you will be healed.
Crocodiles found in the lake do not eat people. Even if you are drawn and stay for many days they will not eat you.
Whites once came to the sacred place and took photographs. They all died along the way when they were going home.
Water from the Mutale River does not mix with the lake water. Fundudzi has water that does not flow. It passes through without mixing. You can only see it when you are further away.
At the lake there are drum like stones that are used by the Zwidudwane during their rituals.
You cannot look at it for a long time. If you do your eyes will see darkness.
At the bottom of the lake there are rocks constructed to block, the lake waters while the Mutale water passes through. People are not allowed to reach the rocks at the outflow of the lake.

There is also beliefs that at the bottom of the lake there is a village and people.
If you are at the lake during the night you will see fire running up and down.
You can tell the weather by looking at the lake in the afternoon during a clear day. The patterns that you see reflected indicate the following day's weather. If the lake indicates clear signs of water on the side and centre it means that it will be a rainy season.
The lake had many bananas around the Mutale entrance and at the outflow below the lake. They could be eaten by wild animals and people, as they liked as long as they did not carry them home or sell them. They all disappeared because of a certain man who cut them to sell. No items from the lake are supposed to be sold.
White people came and constructed some tent during the 1970's. They made a fence around the tent and one day when they woke up the fence was removed by the water. People who insisted on going through to the sacred place all died as they went home.
Wild animal collectors came and collected snakes from the sacred forest. They put them inside the bags. When they woke up the following day all the snakes were gone while the bag was still tired.
Water from the lake is used to call rain.

Local communities have shared these stories orally for many generations. They differ from one village to another although there are common themes that are told in all villages. They were used to restrain certain actions that were considered negative or irritating to their gods.

4.12. LAKE'S IMPORTANCE TO THE COMMUNITY

The local community believes that the lake is of importance to them even though they do not benefit directly from it. People who do not directly link their history to the lake or have any memory association through their family and forefathers still believed that the lake is of importance to them and their children. The combined impact of those who do not know and those who said it does not need protection is

however more than that of those who believed that it does need protection. These two ideas will need to be reconciled before any successful conservation campaign can be effective.

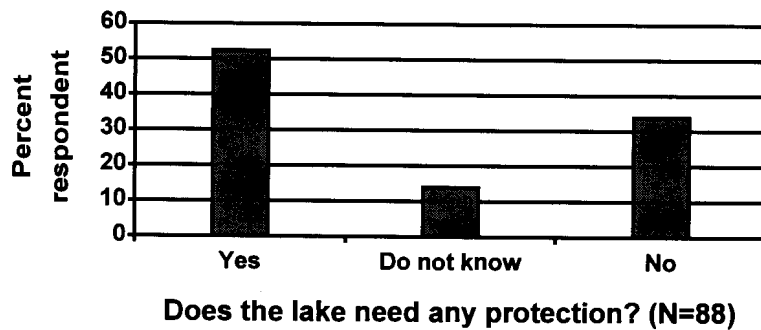


Figure 4.26. Respondent who gave reasons in support of the conservation or the protection of the lake or negated it.

Fifty-two percent of the people interviewed felt that the lake needed protection from over fishing and other exploitations as indicated in table 4.5. They were willing to stop over-exploitation of the fish or to be engaged in actions considered beneficial to the lake. Ironically those who felt that the lake needed protection were still engaged in actions they understood to be degrading to the area and affected the lake. They felt that their individual action will not make any difference. Those who do not believe that the lake needs protection were basing their argument on the fact that the lake was there before they were born and nobody was physically protecting it.

Table 4.5. The strategies offered to reduce negative impacts on the lake. Those who thought the lake needed protection and those who felt the lake does not requires any form of human protection.

Protection of the lake required	Protection not required.
Over-fishing or fishing by nets. Anglers should be allowed to fish by line only.	It will be protected by the ancestors as a resting-place and sacrifice.
Animals and people from drowning in the mud.	It is already protected by "Zwidudwane". Its gods do not want any extra protection.
Burning and cutting vegetation along the lake and rivers.	It does not want to be protected as it can protect itself.
Prevent pollution by garbage.	It is a natural thing, done by the gods and will protect it.
Controlling soil erosion.	
People are dying in the lake.	
Tree felling along the lake.	
Animal access should be controlled.	

This is an indication of how some of the local community members felt about the lake and the catchment area conservation (Table 4.6). It is therefore in the conscious mind that the area is suitable for conservation and should be managed as such. It is therefore important to harness this positive approach of the community when and developing a strategy that will incorporate their ideas.

Table 4.6. Strategies suggested by the communities as suitable uses for the catchment area and lake.

It should be conserved for the people to see it.
Limited accesses to the lake either by use of lake permits.
It is the place where God made a miracle.

When the communities were asked what type of development they would like in their area, the responses varied as indicated on Table 4.7. The work creation opportunities were not clearly indicated to imply only sustainable opportunities. Common themes in the responses were the creation of work and the improvement of the infrastructure.

Table 4.7. Types of development that the local community would like to see and the frequency of those responses.

Type	Reason	Percent
Resort with accommodation facilities like hotel and casino.	Create employment for local people.	29.72
Agricultural development in the form of orchards, Supply of irrigation water (Irrigation schemes along the rivers) Settlement projects for the communities.	Cultivate our own crops. Most people without work would be employed.	12.16
Clinics and crèche.	Create job for the nurses and teachers.	12.16
Tarred road.	Easy flow of traffic including taxi.	10.81

Brick making.	Create job opportunity.	8.11
Recreation centres, Cinemas,	Create job opportunity.	6.75
Industries, firms.	Create job opportunity.	4.05
Broiler production.	Create job opportunity.	2.70
Dress making.	Create job opportunity.	1.35
Shopping centres, recreation facilities.	Create job opportunity.	2.70
Resting places for visitors.	Create job opportunity.	2.70
Bakery.	Create job opportunity.	2.70
More residential stands should be allocated to the people.	For local people.	2.70
Tourist attraction place.	Create job opportunity.	1.35

In general, people want anything that will create job opportunities for them and their children, so that they do not need to go to urban areas when they completed schooling in need of employment. There is also a realisation that if the infrastructure of the area is not improved it will be difficult for any development to take place in the area.

It is surprising to find that people who complain about the lack of facilities and infrastructure are willing to stay in the same place (table 4.8). More than fifty-nine percent of the residents interviewed preferred to stay in the same area because they can still plough their lands and harvest something that decreases their expenditure. They accept that life in urban areas is expensive.

Table 4.8. Indication of the places and percentage distribution of the places the local community would like to stay and their reasons.

Place.	Reason	Percent
Urban areas	There are facilities good roads and electricity and shops, Closer to work place.	28.07
Same place (Rural area).	It is the praying place where we sacrifice, because they have livestock. For cultivation of our lands, Just used to the area, Your place of birth is your place of death. Food is not always bought you can produce your own, The place is beautiful.	59.64
Tshitandani, Mademeni.	New areas close to the main road and the shops.	12.28

In areas where there is no supply of water and electricity or villages are not close to the main roads, residents felt that they needed to move to the newly settled areas called Mademeni and Tshitandani because they are close to the main road and electricity supply. They are not willing to move completely away from a rural setting. Most of the young generation people feel that they will be better off if they stay in urban areas.

Even people who were negative about the availability of facilities wanted to stay in the same place and push for the facilities to be developed instead of moving to areas where facilities exist.

The communities in the catchment area are aware of the environmental issues and causes of soil degradation. They all have basic knowledge about the conservation of soil and the protection of wildlife (Table 4.9).

Table 4.9. What (if any) do you consider the biggest environmental problem in your area?

Environmental problem	Percent
Cutting green plants for wood.	44.61
Cultivation too close to the rivers and on top of the mountains.	12.31
Killing of wild animals by snares.	12.31
Shortage of toilets.	1.53
Fire.	16.92
Cultivation of steep slopes.	4.61
Over-fishing.	1.53
Increased land and air pollution that ends up in the river and lake.	1.53
Nothing.	1.53
Pollution to the lake by household waste.	1.53
People washing in the rivers that end up in the lake.	1.53

The community is largely aware of activities that will negatively impact their environment, although they continue to exploit the environment. They are forced by their circumstances and the lack of prosecution of offenders. The local chiefs were not supported in their effort to prosecute the offenders using their traditional prosecution style by the environmental law enforcement agency, forcing them to abandon the initiative.

There are no signs that the area is burnt frequently. The vegetation cover is seriously degraded with areas becoming bare during the winter. This would increase soil erosion during the first summer rains before vegetation germination. There were signs of gully formation, mostly starting either in the field along the road or in old fields that were no longer cultivated (fig. 4.27).



Figure 4.27. Indicates gully formation at the edge of a field.

4.13. DEVELOPMENT OPTIONS FOR THE AREA

Any development in the area should incorporate the concerns of the local residents (table 4.10). The need for electricity is being addressed as construction is underway. The need for roads have increased as the gravel roads are eroded. In some areas, such as Tshitangani and Tsharotha, the roads are very poor and are not maintained. Tsharotha is not accessible by road at all. Tshitangani has no shop or café and people travel for more than two hours to buy bread.

Table 4.10. What would you consider as the biggest shortcoming of your area (village)?

Development short coming of the area	Percent respondent
Roads.	34.86
Water supply.	24.34
Electricity.	20.39
Shortage of employment (jobs).	4.60
Lack of communication systems (telephones).	3.94
Shortage of clinic.	3.94
Water supply in the house.	2.63
Shortage of transport facilities.	2.63
Shortage of shops.	1.31
No post office.	0.66

As a conclusion to the questionnaire respondents were asked to give any additional information that they consider important and that was not reflected in the questionnaire (table 4.11). The concerns needed to be addressed as developers interacted with the local community.

Table 4.10. Additional comments not covered by the questionnaire.

Fundudzi should not lose its status as a praying and burial place for the Netshiavha clan or family.
It should be known to the world.
There are lots of people without work.
Old people are no longer receiving their pensions.
People must be taught how to protect the environment.

Researchers, politicians and government employees are fooling around with us as they ask from us problems we are experiencing and never give us feedback or improve the situation.

The lake has potential for development and yet it is not developed.

Old age pay was not paid for more than 4 month and old people were very resistant to any person coming from the outside.

People have no work and would appreciate any thing that will create job opportunities for them.

So many people come and ask lot of questions but we do not see the results or the changes.

Lack of work for all people in this area.

CHAPTER FIVE: CHANGES IN LAND USE PATTERNS OVER THE PAST 60 YEARS AS REFLECTED BY AERIAL PHOTOGRAPHS

5.1. Introduction

The following section was a compendium of the study area using aerial photographs of the catchment area from 1937 until 1987. The aerial photographs were used to draw the changing vegetation maps. The historical background as narrated by the local elders and chiefs about the construction of terraces is included. The physical examination of the terraces and demonstration of their construction was done by the chief of Thononda while an account of the traditional terraces was narrated by Mr. Nemaungani (1998) to the researcher during the interview period.

5.2. Method used

Aerial photographs of the catchment area starting as early as 1937 were used for drawing the land patterns maps. Aerial photographs indicate land use patterns at different stages when they were taken. There is a ten years interval between the aerial photographs which makes the periods in-between unaccounted for. The information from the aerial photographs was compared with the information collected during the interviews with the local communities.

5.3. Terraces

Vendas are known for their artwork in their homesteads using stone as a medium. Evidence of this art can be drawn from the Dzata ruins and the Tshivhase Royal Palace stone walls that are still intact. The stone walls were, however, not constructed for the same purpose as the terraces but rather as protection of people and livestock against enemies.

Terraces are defined as horizontal places created by stones or other material for the purposes of utilising the area. Terraces in the catchment area were created for agricultural purposes. Most terraces in the area are made of stone.

Terraces (phidza) in the Gondoni, Govha and Muladi valleys were initially made of bushes (fig. 5.1). They were changed into stone terraces as a result of advice from government extension officers in the 1960s. They are prominent landscape features that are easily recognised from aerial photographs of the 1960s. Terraces made of stones are common in areas where stones are easily available whereas areas that are clear of stone, bush or grass (mostly thatch grass, *Themeda triandra*) have been left to act as terraces.



Figure 5.1. Terraces along the Govha, Gondoni valleys. These terraces were initially made of bushes and later changed into stone terraces.

5.4. History of the terraces

Terraces have been an aspect of Venda farming in the catchment area since farming started. According to Mr. Nemaungani an old man born between 1901-1907, terraces were present when he grew up. The land he inherited from his parents had terraces. These terraces were made of vegetation. He did however concede that they had changed in the 1960s when rocks were used. The main objective of these terraces was to protect their maize against strong winds and livestock when they fed on the maize remnants in the winter (Nemaungani, 1998).

5.5. Aerial photographs of 1937

The earliest aerial photographs of the area which were taken in 1937 (map 3) clearly shows that the agricultural fields had been divided by lines of trees (terraces). It seems as if the trees were intentionally left either to act as fences or terraces, especially in the Tshiavha area (fig. 5.2). During this period farming was practised only in fairly flat areas with limited amounts of rock due to low population densities. The type of terraces made of trees are locally known as phidza. At this stage the influence of the agricultural extension officers were not yet present in the area as they only came into effect between 1947 and 1950. The bushes accumulate organic matter from the farm crop and soil on the top part of the terraces.

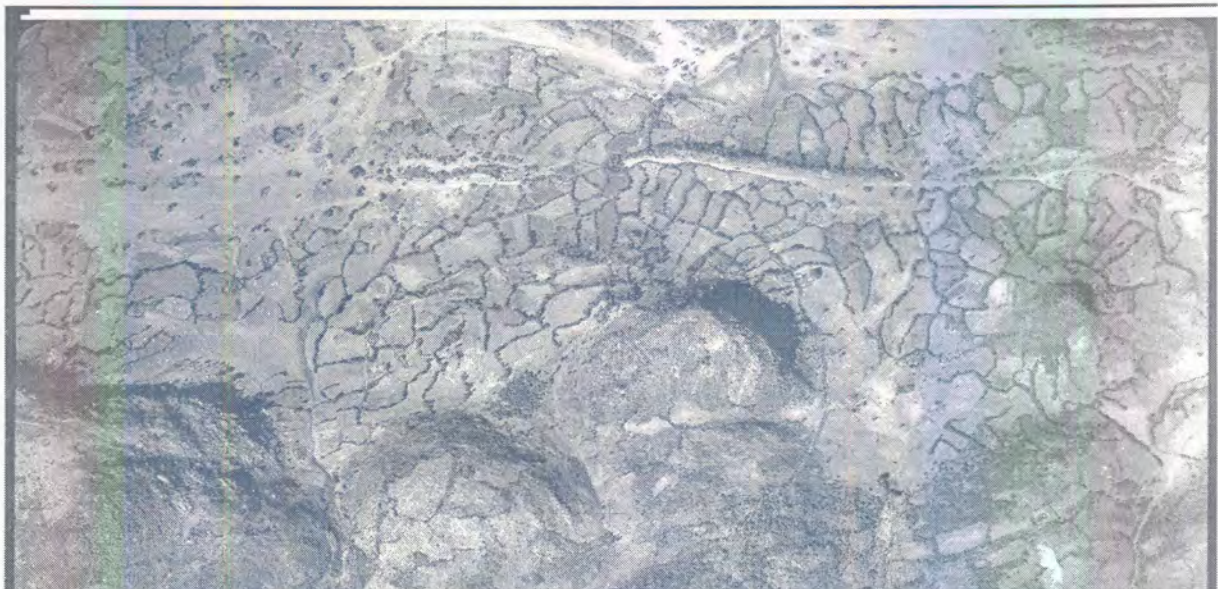


Figure 5.2. An enlarged portion of the land from an aerial photograph of 1937 indicating bushes left in between the fields.

A comparison of the aerial photographs of 1937 to those of 1987 indicate that there is no significant difference in the size of the silted area of the lake. During the period 1937 there was more land covered by trees over the whole catchment area. The

Mutale River catchment area was not yet afforested. Most of the areas were covered by mountain grassland with only the sacred forest and with steep slopes being covered by montane forest.

The process of terrace formation using bushes involved no physical work from the owner of the land. An area where a terrace should be developed is targeted and left uncultivated. The area left is mostly wider than 60 cm. All bushes will be allowed to grow undisturbed. The growth slows down the speed of water, resulting in the deposition of soil. After this practice had continued over many years, it results in the accumulation of soil and crop remnants on the upper side of the terrace. There is a sharp decline in the slope that is formed in the vegetated area. The distance between terraces (area under cultivation) varied from 6 meters to 12 meters. Most of the terraces are made of thatched grass. The grass is not planted but encouraged to grow as the area is left uncultivated. The grass is harvested during the winter for the construction of house roofs.

Terraces constructed from rocks involve the removal of rocks found in the field to the demarcated line (fig. 5.3). Two parallel rows of stones are made using big rocks. Small stones are thrown between the two rows to support them. There is no physical removal of soil from the top portion of the terrace in order to level the area. Over the years, soil will move to the bottom accumulating above the terrace. If there is a need to increase the size of the terrace, the height of the wall can be increased by adding stone. Terraces are not at right angles to the slope but lean over slightly to the upper area.

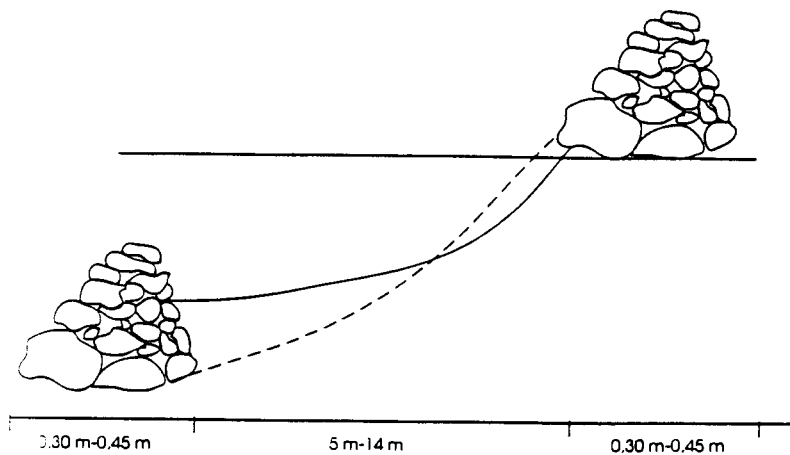


Figure 5.3. Terrace construction as demonstrated by the Chief of Thononda. The line along which terraces were to be constructed was initially pegged by government agricultural officers.

5.4.1. Between 1946-1950

One year after Mr. Nemaungani had returned from World War II (± 1945) the government embarked on a campaign to stabilise the river and gullies against erosion. They started constructing stone walls along the gullies and rivers. Fountains were fenced off and an order was given to chiefs not to allow livestock to feed close to them. It is difficult to find remaining evidence for the stone walls constructed along the rivers. The aerial photographs for the period 1937 do not show any terraces or structures along the river systems.

5.5. Aerial photograph of 1951

Map 4 indicates an increase in population density, mostly along the Govha River. This area was cultivated without leaving trees (hedges or phidza) in-between fields. There is an increase in areas with little ground cover on the northeastern side of the lake. There are patches of bush encroachment on the grassland along the rivers. The process of resting lands for few a years (fallow systems) could have caused such an encroachment.

5.6. Aerial photograph of 1963

Cultivation along the Govha River (map 4). Field cultivation adopted the hedging method and left bushes in-between lands. The number of homesteads had decreased compared to 1951.

Between 1950 and 1956 negotiations with Chief Tshivhase for the allocation of land to be used for the establishment of forestry heated up. Chief Tshivhase continued to refuse permission for the establishment of forestry in his land. The first plantation started in 1957 after the death of Chief Tshivhase.

By 1963 forestry was established in all areas that were covered by mountain grassland. The only areas left were these along the rivers, steep areas and linkages to the sacred forest.

Areas along the Gondoni rivers were intensively cultivated. They looked like bare areas with no vegetation. The areas along the Mutale River remained covered by bushes and trees due to the mountains, steepness and rocks.

During 1964-1970 a campaign was launched to build terraces on all maize fields. This was done with the assistance of the then Department of Agriculture personnel. Government agricultural extension officers were responsible for laying down markers (points along the fields) where the owners of the land would construct terraces stones (Thononda Chief, personal communication).

Terrace construction using rocks involved many labour days in order to reach a standard height of between 0.3 meters to 1.5 meters. This process may be gradual. Rock terraces need constant renovation and addition of stones as more soil collects on the upper side (fig. 5.4) (Critchley and Tshikovhela 1998).

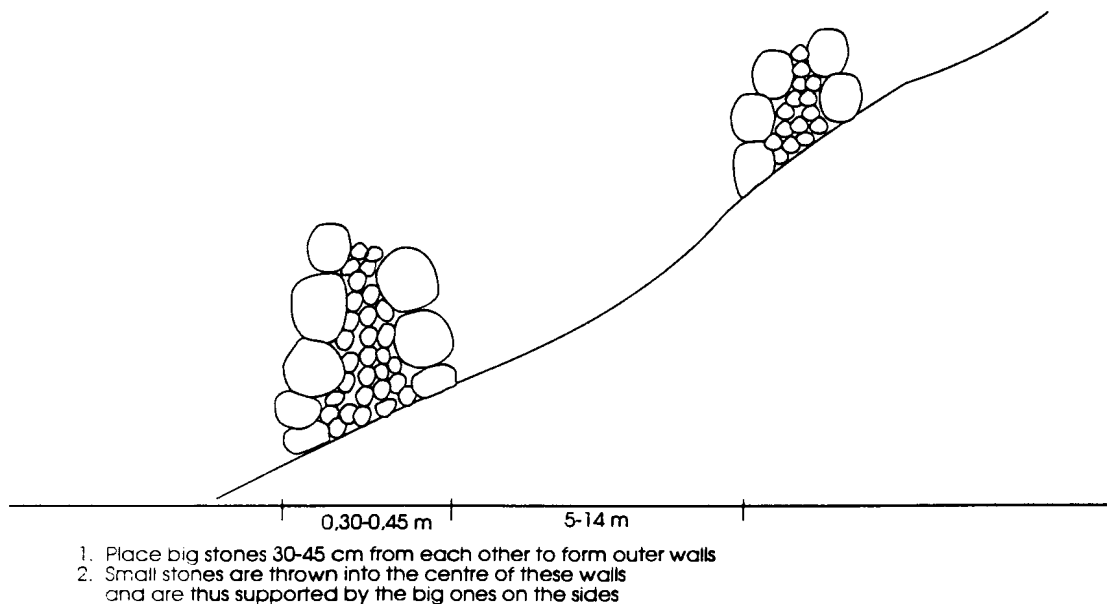


Figure 5.4. Terraces made of rocks adapted from Crickley and Tshikovhela 1998.

5.7. Aerial photography of 1970

Settlement patterns changed as formal stands were demarcated at Hakhakhu an area above the Muladi River (map 5). An indication of rock terraces starts to emerge along the Govha River. The new trend did not destroy the earlier demarcation of bush terraces along the fields.

5.8. Aerial photography of 1977

A new formal settlement with demarcated stands is seen along the Govha River valley at Tshiheni (map 6). Areas that were cultivated and which retained some trees as terraces were being cleared. This took place along the Govha and Gondoni rivers. There is also an expansion of the villages in the Tshitangani area along the Mutale River. Tsharota villages also shows an increase in size with more land under cultivation with bushes in-between the lands.

5.9. Aerial photography of 1987

The formal settlements at Tshiheni are easily noticeable from the aerial photographs. Two new formal settlements at Thononda and Phungoni are now clearly visible (map 7). Cultivation of the land has decreased with more lands being laid off and appearing as bushes on the aerial photographs. Orchards have also been established along the fountains of the Govha and the areas between the Gondoni and Muiladi rivers.

The area has been under many forms of development and expansion since 1987. For the final planning of the area a recent aerial photograph will be necessary.

5.10. Conclusion

The aerial photographs shows the following two important aspect in the catchment area. Number one is the prominent distribution of the locally made terraces on the first aerial photograph taken in 1937. This was before the influence of the agricultural extension officers. They were made from bushes and act as separations and protection against wind.

The second feature is the appearance of the rock terraces between 1967 to 1970. During this period a clear indication of the terraces as they appear in the land today took form. The information is confirmed by the local elders like Nemaungani and Chief Nethononda.

CHAPTER SIX: TOWARDS AN INTEGRATED LAND-USE PLAN FOR LAKE FUNDUDZI

6.1. Integrated management of existing practices

The catchment area and the lake should be managed as a unit with clear indications from the authorities about their management objectives. This will reduce conflict situations that may arise from different communities as resources become scarce and the development of the area takes place. At the present moment there are different chiefs in the area who may have different approach to living in the catchment area. The traditional authorities should be recognised as having played a significant role in the conservation of these areas. Traditional customs that are advantageous to the area should be included in the policy framework. The conservation department should embark on an assessment to find out the lifestyle of the traditional leaders, local communities and chiefs that contributed to the conservation of the catchment area with the objective of incorporating relevant aspects and environmentally sound practices into the new management policy. A corporate integrated catchment management system that will also focus on the development of the area in all aspects of its potential, should be developed with emphasis on local human development.

A holistic impact assessment for the whole catchment should be conducted and made public. This will eliminate the cumulative effect of small but many negative impacts that seem insignificant if viewed individually.

The process of land allocation should be reviewed with the objective of reducing negative impacts on the soil and natural forests. This will only be achieved if the catchment areas state of environmental sensitivity is known. With this in mind, the allocation of land will no longer be done locally by the chief, but by either the Department of Agriculture and Land Affairs or Department of Environment, Land

and Agriculture or even by informed institutions that focus specifically on the catchment area.

Communities along the forestry plantations should be allowed to cut invasive plant and species that grow outside the plantation. Such action will limit invasive plants, may create job opportunity (i.e. working for water programme).

Peat along the river act as sponges that absorbs water during the rainy season and releases it slowly during the dry period. By so doing they stabilise the flow off the river and assure the continuous supply of water to lower areas throughout the year. With all the information available on the ecological benefits that peat bogs can provide, the peat bog should be conserved for its environmental functions rather than being excavated and sold. The well intended policy of removing the blue gum trees (*Eucalyptus*) and other exorbitant water utilising plants would be counteracted by the removal of the peat.

The Department Agriculture, Land and Environment should have its policy communicated to all staff members so that they do not contradict themselves. Planting of blue gum trees in the catchment area whether for ornamental purposes or for wood, will result in the same effect as being planted for forestry purposes. If the policy of the department is to remove blue gum trees in the catchment area, they should not distribute the same trees to the community in the catchment area for ornamental planting.

A co-ordinated effort should be made by all departments when they work with the communities. Priority lists should be developed that extension workers can consult on a regular seasonal or annual basis. Soil erosion and the clearing of bushes would be an important aspect demanding attention. The training of extension officers must be holistic as the rural communities' approaches to life are diverse.

A partnership approach will promote the search for common objectives, and defined the roles, responsibilities and accountabilities of each individual who participated in the process of decision making. The principle of stewardship at levels of strategic and operational management should be applied (WRC 1996).

6.2. Proposals for the restoration of the area

Lake Fundudzi has the potential to be conserved as a natural feature of historic importance to the Venda people in general and the Vhatavhatsindi in particular. The conservation of the area can also lead to the unearthing of valuable information when technological and human resources of the area are developed. The critical challenge that faces the community and the government is to ensure that land use provides the greatest sustainable benefit. If the best sustainable option is not yet available, the area should nevertheless be conserved with this objective in mind. The effects of present dry land maize production and other forms of utilisation are not the most environmentally friendly options. If these practices continue the environmental degradation of the area may be irreversible. The proper conservation of the area will in the long run benefit the local community although it may be seen as disfranchising them in the short term. Negative impacts in the area include the loss of pristine forest for orchard development, loss of production by dry land cultivation with no input, overgrazing, and soil erosion. The areas should be declared a conservation area with limited use. This means that areas close to the settlement will be allowed to be used for certain activities that are compatible with the conservation of the area, while isolated and sensitive areas will be declared core conservation areas with no human activities. In line with the above remedial measures, measures are needed to rehabilitate and restore the area.

The following are some suggested restoration measures that will increase the resilience of the ecosystem:

- A moratorium should be placed on the clearing and use of lands along the rivers. A strategy to revegetate the area should be adopted and implemented with immediate effect. This will increase the availability of clean water to the residents

that are still dependent on the fountains for the supply of drinking water. A healthy river system will be able to handle limited amounts of pollution that will be deposited through seepage by the activities of the local community.

- Any development likely to have a negative impact on the environment should not receive assistance from the government in the form of funding. This should also apply to a farmer who has an orchard that stretches to the river bank or farmers farming without contours along steep slopes. People already in categories that will be classified as unwanted should be given an option to change their activities over a period of time. Farmers should be educated on the different forms of farming with strong emphasis on conserving their soil and be given a period of grace to apply their knowledge. Those who fail should then not be assisted by the government while structures should be made to apply pressure on them to comply. Traditional avenues may be more affective.
- Government through the department of conservation should be prepared to buy back land that was sold to people and is situated in sensitive areas. This will only apply to people with permission to occupy specifically established orchards along the Mutale River in the Tshitangani and Govha and Gondoni valleys in the Tshiheni areas. The owners can also be given an option to change activities as such that they will not have a negative effect on water resources and the environment. Land that is purchased by the state should be allowed to regenerate into forest and local communities should have controlled access to such forests for purposes that will not negatively impact on the environment.
- The chiefs who are the custodians of the “Zwitaka” (traditional burial site) should form voluntary groups to revegetate these areas. The Department of Environment, Land and Agriculture must assist them in reclaiming their custodianship of the Zwitaka, which will act as a core to regenerate the areas around them. With proper traditional environmental education the “zwitaka areas” will be respected by local communities and will not be easily destroyed.
- Rural communities should be encouraged to be actively involved in any activities that can generate income for them. They would for example start vegetable gardens at their homes, beekeeping, free-range chicken rearing and diversify

their agricultural production base to include products that can be sold for income. This will reduce their dependence on natural resources.

- The chiefs and the community should adopt a livestock policy for their respective areas. Livestock left to move around freely have increased the poverty levels of those without livestock. Community members interested in growing orchards or vegetables at their yards could not do so because their plants would be destroyed by livestock before they mature. If all livestock are looked after by their owners throughout the year, local communities will be free to plant their own vegetables without having to fence in their yards. This would help decrease the level of food shortage. At present only those who can afford to have fences around their yards can plant vegetables and harvest their crops successfully during the winter months irrespective of the availability of water. With the increased number of areas receiving tapped water along the road, the first activity is to grow vegetables all year round on their stands.
- The local community should be actively encouraged to plant indigenous plants that are either used as medicine, for wood, fruit trees and others in area close to their homestead.
- The lake should be considered a heritage site that needs protection from exploitation. A formal recognised protection status must be given to the lake so that it can be protected and managed in a way that will prolong its survival. The Lake and the surrounding areas can either be demarcated as a heritage site, protected areas or protected area with limited use. The above can be done following proposals made by Larkhan (1995) and Caldecott (1996):
 - The conservation of the lake starts with the conservation of the catchment area and proper planning of any development and land-usage in the catchment area. Any effort that is taken to reduce the environmental negative impact on the catchment areas will improve the lifespan of the lake. It is therefore important that certain areas along the catchment areas are viewed as sensitive and should be rehabilitated to their natural state and preserved.
 - Such efforts will directly contribute to the conservation of the core area

(the lake). All development activities should be limited to places where they will not change the scenic or heritage status of the lake.

- At present there are areas along the mountains which are still covered by shrubs and trees which are still in a natural state. Some of these areas are not easily accessible for people and livestock. These sites should be considered for conservation.
- Most of the areas already in use by the local community will continue to be used except if such utilisation is in direct violation of the protection of the lake. Other methods of using the land that may not be in conflict with the conservation of the area must be developed. Traditional use zones, which will include harvesting and the collection of resources considered useful by the community in the area and the mountains must be created. Local people should be allowed to collect such resources even if it means a seasonal allowance whereby harvesting is limited after assessing the levels of abundance of resources. These resources will include craft wood, fish, medicine, fruit, thatch grass and the like. Core areas of protection may be exempted from harvesting of certain types of resources.
- Infrastructure must include an administration office site and road constructions. Access roads to the Lake will have to be constructed. All this should be planned in a way that reduces soil erosion and pollution to the lake.

Finally, for sustainable management of the catchment the area should not be fragmented by organisational, administrative and political boundaries, but rather the catchment area should be managed as a single unit.

6.3. Options on conservation models for the area

The catchment area and the areas on the eastern side of the lake should be declared a protected area, conservation area or heritage site. This will act as a buffer zone next to the lake, and forms the core area of protection. The portion of the Mutale River from where it flows out of the lake to where it reaches the populated areas at the irrigation plots should be considered as being part of the

protected area. The whole forestry area and its pockets of natural forest should also be protected along with the catchment area (map 9).

It seems as if it will be difficult to exclude the communities from the catchment area as they have been in the area for many generations and they are dependent on the catchment area. Certain limitations must be set to restrict the exploitation of natural resources that may increase the siltation of the lake and the general pollution. Agricultural activities must be investigated with the objective of reduction of soil erosion. Methods that promote soil conservation in agricultural lands such as terraces and contour planting will have to be enforced. Any other agricultural production method that is acceptable to the communities and produces the required agricultural product to the local communities should be included in the plan. The methods will have to be tested in small scale and evaluated in the area. Waste management policies with incentives, not punishment, must be developed.

People who depend on the harvesting of natural resources like trees for craft and hunting should be targeted for training and job opportunities so that the suggested development does not reduce their life quality. The assumption is that if they can generate income from doing other work, there will be no more incentive for them to return to existing practices.

Any activities that support the community and beliefs that need to be discontinued will have to be phased out over a period of time. During this process a proper educational campaign will have to be conducted to inform the community of the underlying reasons why these activities can no longer be allowed.

Population explosion in the catchment area is as crucial as anywhere in the country. It put tremendous pressures on all the resources that are available and can not be addressed by the catchment area in isolation from the central government policy. It is however important to mention that during the interview there were strong indication mostly from the younger generation to move to

area were the are provision of services. In order to attract people out of the catchment are, the development of the surrounding area will need to be increased.

6.4. CONCLUSION

The conservation of the catchment area will not be directly aimed at the conservation of specific endemic species as this have not yet been established in the catchment area or biodiversity. However rational development and conservation in these areas will increase survival potential of the localised biodiversity. The catchment area has listed red data fauna and flora. All listed red data fauna and flora that occur in the catchment area which are supposed to be found will be conserved (see Jacobsen, (1998)). The initial conservation objective will be aimed at conserving the scenic landscape, the lake, the watershed for the provision of environmental services and at improvement of the water quality and quantity of the river systems. In the long-term, such a conservation project will result in an increase in plants and animals that are indigenous to the area. This will also increase alternative opportunities for the local community to improve their livelihood indirectly from these resources. If these are managed in a sustainable manner it could increase the food supply, security, and wealth of the local community and decrease their dependency on natural resources.

Dry-land agricultural activities as being practised at the present moment in the catchment area are prone to increase soil erosion. This practise must be re-organised to include strong emphasis to soil erosion prevention methods. The new practice might mean a short-term loss of income or change on the preferred crops. The long-term benefit will be improved yield resulting in more income.

In line with the request from the Netshiavha Royal family, areas such as the burial site and the sacred praying place should be reserved and not be open to the public.

Any such request from the other chiefs should be treated the same.

The rapid development residential sites in the catchment area means that more people are looking for residential sites and are being forced to settle in any available areas without proper planning. This could be avoided if the chiefs and the government can plan new settlement areas and provide them with services that will attract people away from settling in sensitive sites. The Mademeni area, for example, is a newly created residential zone where many people from the lower area of Tshiheni would prefer to settle. This area is considered to be closer to the main road and electricity supply.

The involvement of the local chiefs is paramount to any successful development of the catchment area. This involvement of the local chief and the community at large will include the management style that will be adopted for the running of the area. All involved people including the chiefs' should bind themselves to abide by the principles that are agreed during the negotiation. If and when the feasibility studies and the strategic environmental assessment are done on the whole area it is indicated that certain activities are most suitable done in a specified area, that decision must be binding to all the chiefs and the local community. No one should unilaterally decide to hold the process of development in the area at ransom because the development is not taking place at his land or in areas that he preferred. The influence of the local taboos and beliefs will need to be incorporated into the day to day management of the catchment and the visit to the Lake and can be a strong selling point to tourist and local communities.

A strong environmental education campaign must be initiated for the school going age group. This will sustain the initiatives in the later years.

One of the major problems the catchment area is facing, and indeed the whole of South Africa, is population expansion. This could be the underlying cause of all problems experienced at the lake and the catchment area. It is however difficult to

come out with a policy and statement that can address the problem in a small area like the Lake Fundudzi catchment area. This point is therefore omitted as it will be influenced by the South African national policy on population growth.

6.5. RECOMMENDATIONS

- This is a first attempt to develop a sustainable and holistic land-use plan of the catchment area of Lake Fundudzi area. The plan is therefore not going to come up with solutions for all problems that the area is facing at present. It will however try to indicate potential and possible solutions that can be adopted to address some of the problems. These recommendations may also change, as more information becomes available to the people who will continue to study the area.
- Further studies will be required on the mapping of the area with an intention of the formalisation of the boundaries of the conservation area. The present maps have been drawn from the aerial photograph of 1987. A recent aerial photograph will be required in order to be able to draw a final map that can be used for the possible demarcation of the area for conservation.
- The strategic environmental assessment for the whole catchment area must be done with immediate effect possible by DALE. This will be able to inform the decision making people on the activities that are suitable to the area and those that can not be condoned. Without such an assessment all development in the area will be based on partial information that are not reliable when you look at the whole area's scenario.
- Information on the age of the terraces, which can be obtained by means of carbon dating of soil profiles, can also be collected. Carbon dating can be used in association with the aerial photographs in determining the period where erosion was accelerated. A combination of the two could also be used to project the future lifespan of the lake should land-use continue unchanged.
- Evaluation of the carrying capacity of the catchment area is necessary in order to advise the community correctly on appropriate production and stocking rates.

- Long term studies on the sedimentation of the lake using carbon dating and sediment catching will also be required. Monitoring or assessing of pollution levels and pollutants of the water to the lake can also help in determining the status of the aquatic life in the lake.
- The local chiefs are in support of development in the area as long as it does not disfranchise them of their soil and will benefit the local community.
- All development should be co-ordinated from a central office with knowledge of the environment. Any changes in the catchment area's landforms should be halted until a proper feasibility and sensitivity study of the area has been done. The present arrangement whereby any person could clear the land in the catchment area of the lake should be prohibited. The extraction of any natural resources should be halted until an entry of the natural resources is completed. For example a data base that indicate the available fish stock in the lake and determine the amount that can be harvested without depleting the breeding stock. The same principle will apply on the available land, plants, and animal.
- An assessment on the acceptability of bottling the water either from Mutale River or Lake Fundudzi may be required to add value to the natural resources from the area. There has been an interest from people to use the water from the lake for ritual purposes.

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Annexure A. Historical narration by chief Nethononda and Mr Ramakhumisa

Movement of people in the study areas as explained by Chief of Thononda. (this information was included in the study by Willie Crichley, Escort Netshikovhela and the extension officer at the site Mr. Ramakhumisa during the research on the terraces in the Thononda area. Although their study did not account to the period at which the activities took place.

The history of the movement of people in the area is important as it will further establish the period at which certain activities were done.

< 1933	The first time that recorded history of the areas was kept. By this date all the contour constructions were already established. This are the old phidza type of terraces.
1947-1950	Strong presence of the government agricultural officers. They were encouraging people not to cultivate along the rivers and on top of the mountains or steep areas.
1951	An agreement was reached with the chiefs that they prohibit cultivation along the river backs.
1964-1967	The area was affected by drought. People did not have enough to eat as their crop failed. They started to harvest trees to sell as wood in order to raise money.
1963-1966	With the lack of rain, the vegetation cover was badly affected. When the rain came during the summer months, the lake water's become turbid due to erosion from the open area.
1967	This triggered discussions between the chiefs and the government agricultural officer whereby and agreement was reached to create terraces on all agricultural fields.

1974-1975	The first structured settlement were agricultural fields were separated from the housing area. The first road to the area was constructed.
1978-1979	Venda prepares and become independent. This resulted in the increased effort on the reintroduction of the contour. The government employed people to refurbish the contours using drought relief funds. Machinery was used for the first time in the construction of the terraces.
1989-1993	The government drought relief fund assisted in the maintenance of the contours.

General perception of ordinary people in relation to soil erosion in the study area.

It was clear that most people believed that cutting down of trees and ploughing along the slope is the major cause of soil erosion. The only solution people believe would solve the problem was a strong punishment of all people who do not implement control measures against soil erosion. At the present moment people are enriching themselves by ploughing areas that are not suitable with no sanctioning from the authority of the traditional leaders.

In conclusion the records were kept from 1933 by the chief. There is no mention of the construction of the terraces in the area until 1967. The first aerial photographs to indicate the presence of the present terraces are for the 1970.

Annexure B1. Indicates plants found in the catchment area

The list was drawn with the help of Mr Mudau of the Thohoyandou herbarium.

Scientific name	Venda name
<i>Acacia karroo</i>	<i>Muunga</i>
<i>Aeschynomene nodulosa</i>	<i>Muvumbaredzi</i>
<i>Albizia adianthifolia</i>	<i>Muelela</i>
<i>Albizia versicolor</i>	<i>Mutamba-pfunda</i>
<i>Allophylus africanus</i>	<i>Muvhadelaphanga</i>
<i>Annona senegalensis</i>	<i>Muembe</i>
<i>Anthocleista grandiflora</i>	<i>Mueneene</i>
<i>Antidesma venosum</i>	<i>Mukwal-kwali</i>
<i>Aphloia theiformis</i>	<i>Mufhefhera</i>
<i>Apodytes dimidiata</i>	<i>Tshiphophamadi</i>
<i>Bauhinia galpinii</i>	<i>Mutswiriri</i>
<i>Bridelia micrantha</i>	<i>Munzere</i>
<i>Canthium mundianum</i>	<i>Mutondo</i>
<i>Carissa edulis</i>	<i>Murungulu</i>
<i>Cassia petersiana</i>	<i>Munembenembe</i>
<i>Cassipourea congoensis</i>	<i>Tshamulevhu</i>
<i>Catha edulis</i>	<i>Luthadzi</i>
<i>Celtis africana</i>	<i>Mubvubvu</i>
<i>Clerodendrum glabrum</i>	<i>Munukha-tshilongwe</i>
<i>Combretum molle</i>	<i>Mugwiti</i>
<i>Croton sylvaticus</i>	<i>Mulathoho</i>
<i>Cryptocarya liebertiana</i>	<i>Munenzhe</i>
<i>Dichrostachys cinerea</i>	<i>Murenzhe</i>
<i>Diospyros mespiliformis</i>	<i>Musama</i>
<i>Diospyros whyteana</i>	<i>Munyavhili</i>
<i>Diplorhynchus condylocarpon</i>	<i>Muthowa</i>



<i>Djeudolachnostylis maprouneifolia</i>	<i>Mutondowa</i>
<i>Dombeya burgessiae</i>	<i>Mufulwi</i>
<i>Enterospermum rhodesiacum</i>	<i>Muhashambande</i>
<i>Erythrocosa menyharthii</i>	<i>Tshinzie</i>
<i>Faurea galpinii</i>	<i>Mutango</i>
<i>Grewia occidentalis</i>	<i>Mulembu</i>
<i>Helichrysum kraussii</i>	<i>Tshifulathulo</i>
<i>Heteropyxis natalensis</i>	<i>Mudedede</i>
<i>Hexalobus monopetalus</i>	<i>Muhuhuma</i>
<i>Hibiscus masterianus</i>	<i>Muhwidzhi</i>
<i>Leonotis mollis</i>	<i>Mununzvu</i>
<i>Maytenus peduncularis</i>	<i>Mukwatule</i>
<i>Muluna coriacea</i>	<i>Vhulanda</i>
<i>Nuxia floribunda</i>	<i>Mulanotshi</i>
<i>Ocotea kenyensis</i>	<i>Muangata</i>
<i>Olea capensis</i>	<i>Musiri</i>
<i>Peltophorum africanum</i>	<i>Musese</i>
<i>Pouzolzia hypoleuca</i>	<i>Mudola</i>
<i>Pteleopsis myrtifolia</i>	<i>Nwanda</i>
<i>Pterocarpus rotundifolius</i>	<i>Muhataha</i>
<i>Rapanea melanophloeos</i>	<i>Tshikhonwa</i>
<i>Rhoicissus tridentata</i>	<i>Murumbula-mbudzana</i>
<i>Rhus rehmanniana</i>	<i>Tshitasiri</i>
<i>Schefflera umbellifera</i>	<i>Mukho</i>
<i>Senecio barbetonicus</i>	<i>Tshitadzisa</i>
<i>Smilax kaussiana</i>	<i>Mukokole</i>
<i>Solanum panduraeforme</i>	<i>Mututulwa</i>
<i>Syzygium legatii</i>	<i>Mutawi</i>
<i>Tabernaemontana elegans</i>	<i>Muhatu</i>
<i>Tarchonathus trilobus</i>	<i>Mutwari</i>
<i>Tecomaria capensis</i>	<i>Mupashile</i>



<i>Trichilia dregeana</i>	<i>Mutuhu</i>
<i>Verninia stipulacea</i>	<i>Mululudza</i>
<i>Vernonia colorata</i>	<i>Phathane</i>
<i>Widdringtonia nodiflora</i>	<i>Thahululo</i>
<i>Xylopia parviflora</i>	<i>Muvhula vhusiku</i>
<i>Ziziphus mucronata</i>	<i>Mukhalu</i>
<i>Zoutpansbergia caersulea</i>	<i>Nyatsi</i>

Annexure B2. Plants believed to have specific medicinal value to the Venda's or used in their wood works or other.

Scientific name	Venda name
<i>Acacia ataxacantha</i>	<i>Muluwa</i>
<i>Adenia gummifera</i>	<i>Bopa</i>
<i>Bequaertiodendron magalismontanum</i>	<i>Munombelo</i>
<i>Bersama tysonia</i>	<i>Sando</i>
<i>Cephalanthos natalensis</i>	<i>Murondo</i>
<i>Clematis brachiata</i>	<i>Tshiumbe-umbe</i>
<i>Ekebergia capensis</i>	<i>Mutomvuma</i>
<i>Euclea divinorum</i>	<i>Mutangule</i>
<i>Euclea natalensis</i>	<i>Mukwati-kwati</i>
<i>Ficus capensis</i>	<i>Muhuyu</i>
<i>Ficus natalensis</i>	<i>Muumo</i>
<i>Halleria lucida</i>	<i>Murevhe</i>
<i>Himania caffra</i>	<i>Mutanzwa</i>
<i>Iboza ripari</i>	<i>Tshiolo-olo</i>
<i>Landolphia kirkii</i>	<i>Muvhungo</i>
<i>Lippia javanica</i>	<i>Musudzungwane</i>
<i>Maesa lanceolata</i>	<i>Muunguri</i>
<i>Mimusops zeyheri</i>	<i>Mubumbulu</i>
<i>Painani curatellifolia</i>	<i>Muvhula</i>

<i>Prunus africana</i>	<i>Mulalamaanga</i>
<i>Rauvolfia caffra</i>	<i>Munadzi</i>
<i>Sclerocaya caffra</i>	<i>Mufula</i>
<i>Securidaca longepedunculata</i>	<i>Mupesu</i>
<i>Suda rhombifolio</i>	<i>Mutundo</i>
<i>Syzygium cordatum</i>	<i>Mutu</i>
<i>Trema orientalis</i>	<i>Mukurukuru</i>
<i>Urera tenax</i>	<i>Muvhazwi</i>
<i>Vangueria infausta</i>	<i>Muzwilu</i>
<i>Xymalos monospora</i>	<i>Tshipengo</i>

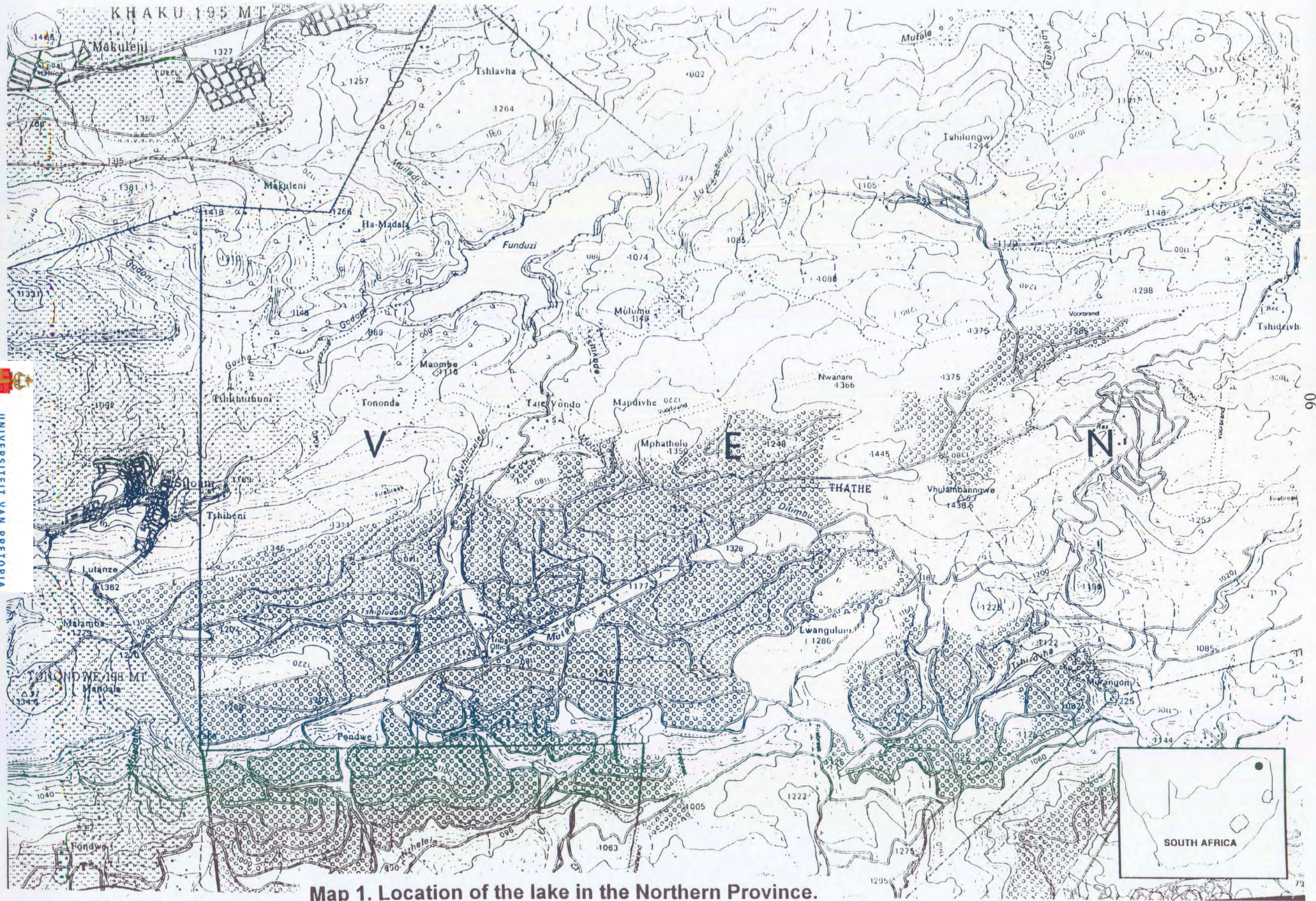
Annexure B3. Exotic plants found in the catchment area

Scientific name	Venda name
<i>Caesalpinia decapetala</i>	<i>Luanakha</i>
<i>Dodonaea viscosa</i>	<i>Mudedeniasi(mufentsi)</i>
<i>Lantana camara</i>	<i>Tshidzimbambule</i>
<i>Melia azedarach</i>	<i>Muserenga</i>

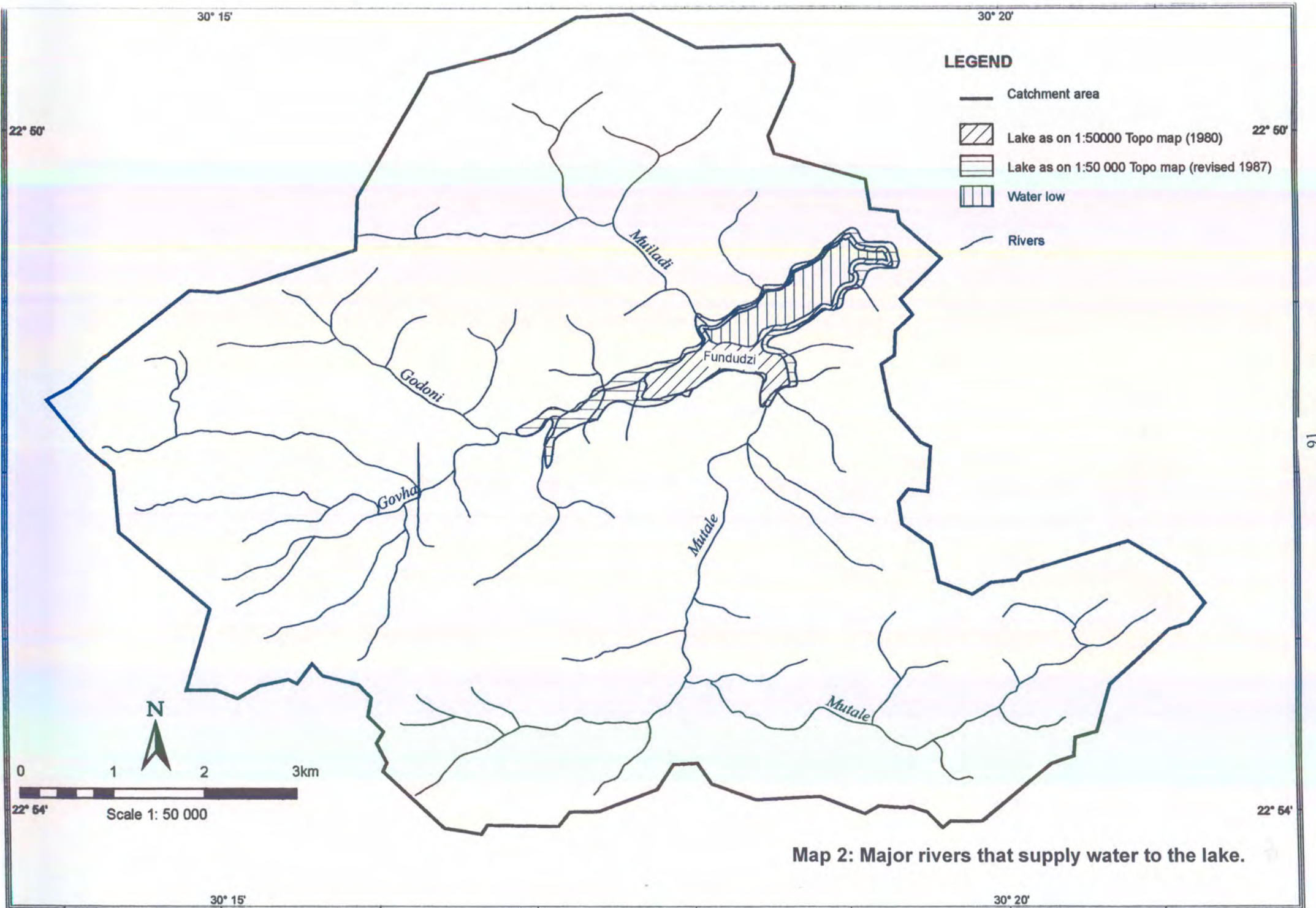
Annexure C. List of red data listed plants likely to occur in the catchment area according to Jacobsen 1998.

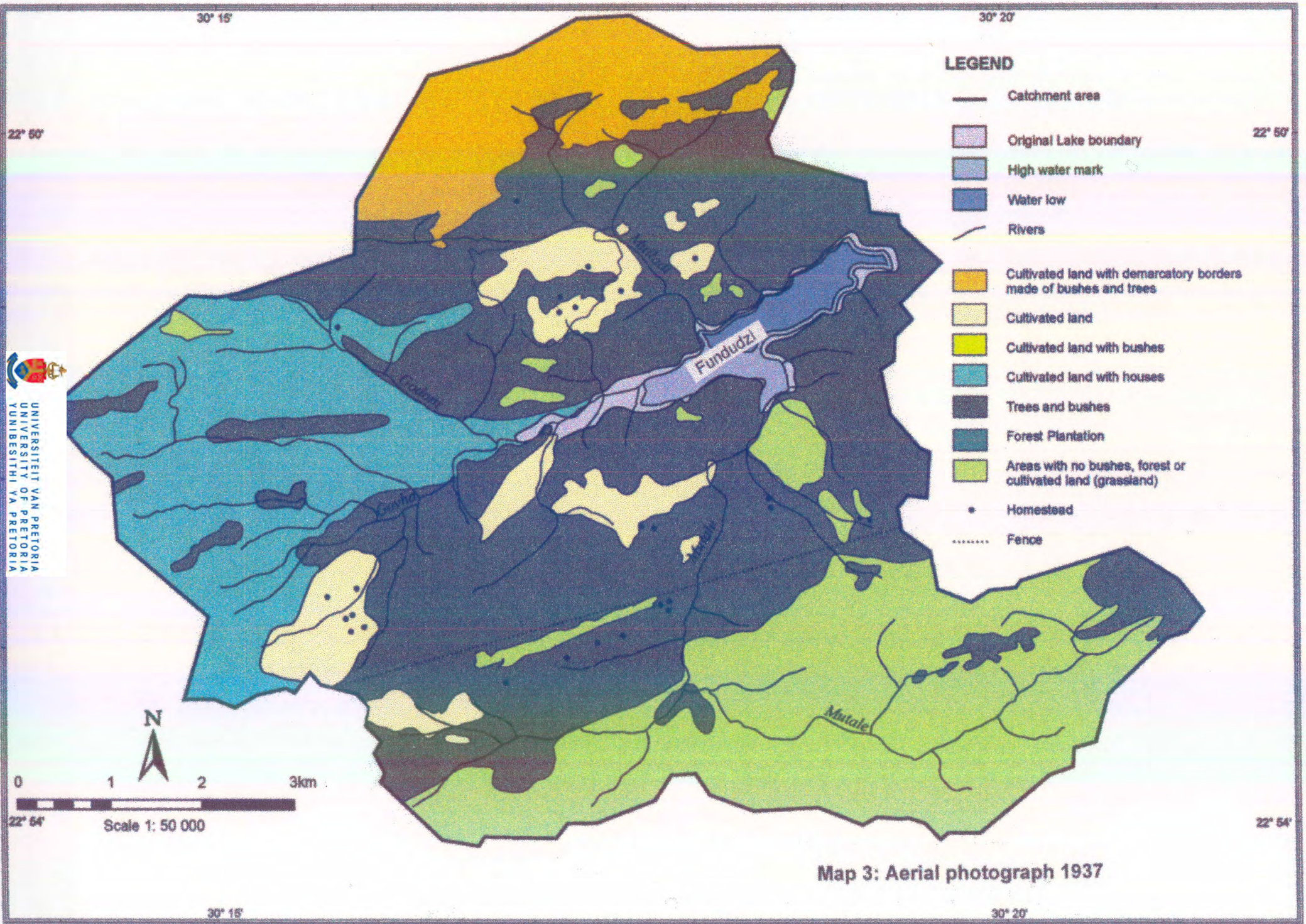
<i>Taxon</i>	<i>Status</i>
<i>Aloe vogtsii</i>	R
<i>A. Petropila</i>	R
<i>Ansellia africana</i>	V
<i>Euphobia rolandii</i>	R
<i>Loudeta filifolia</i>	K
<i>Maytenus Pubescens</i>	K
<i>Orbea maculata</i>	R
<i>Ozoroa albicans</i>	K
<i>Rhynchosia vedae</i>	K
<i>Strophanthus luteolus</i>	R

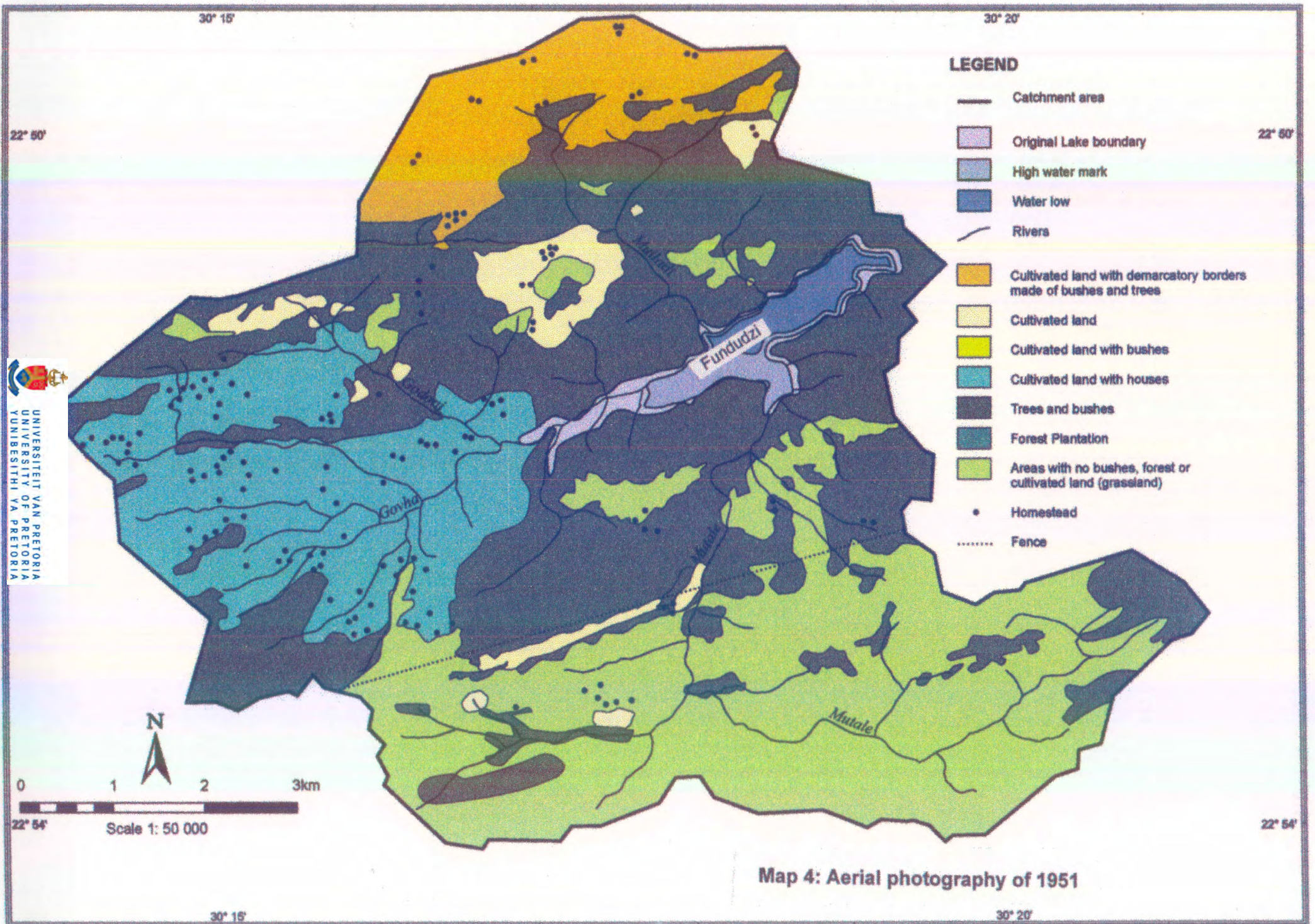
V = vulnerable, R = rare, K = insufficiently known, I = indeterminate,



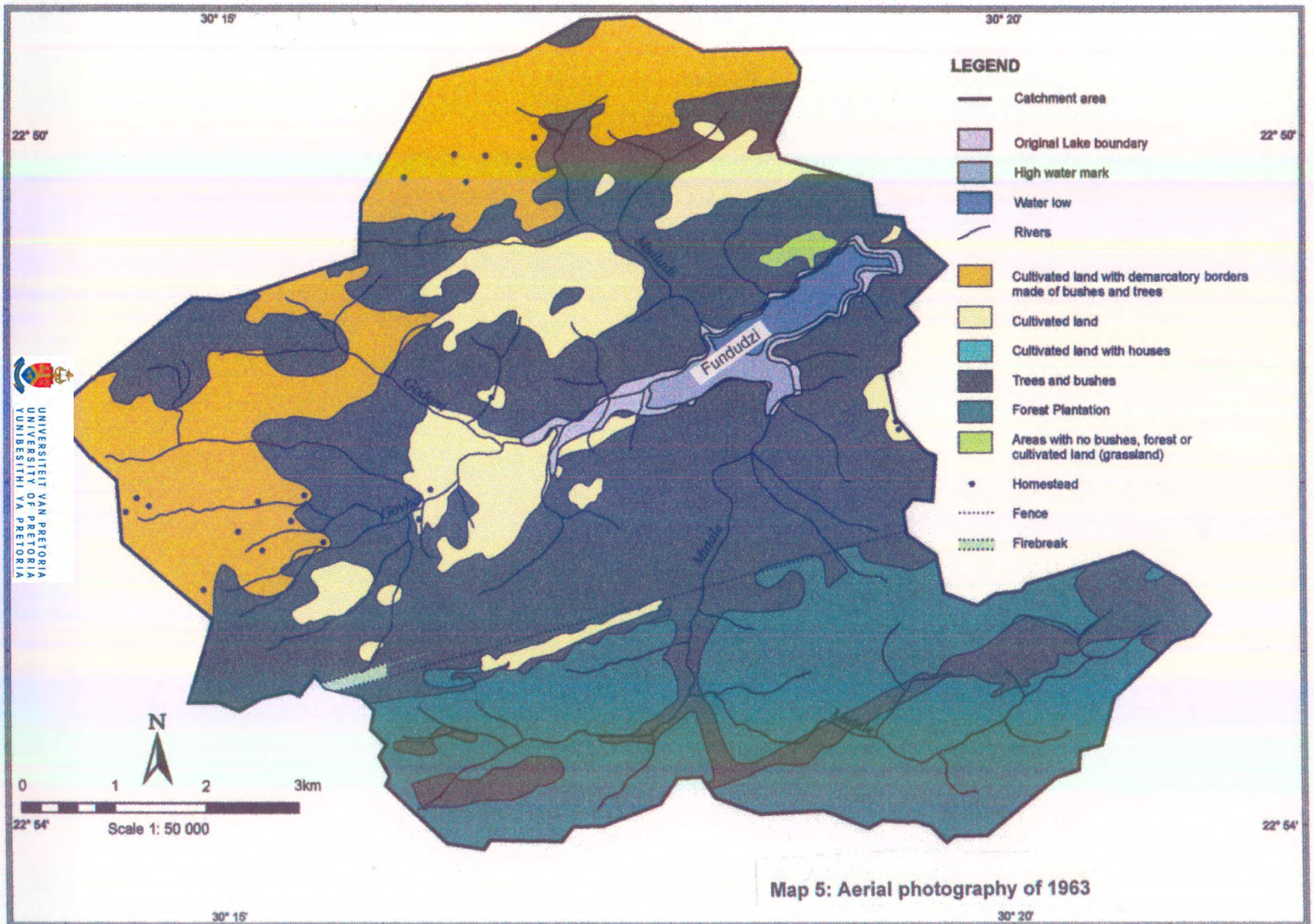
Map 1. Location of the lake in the Northern Province.



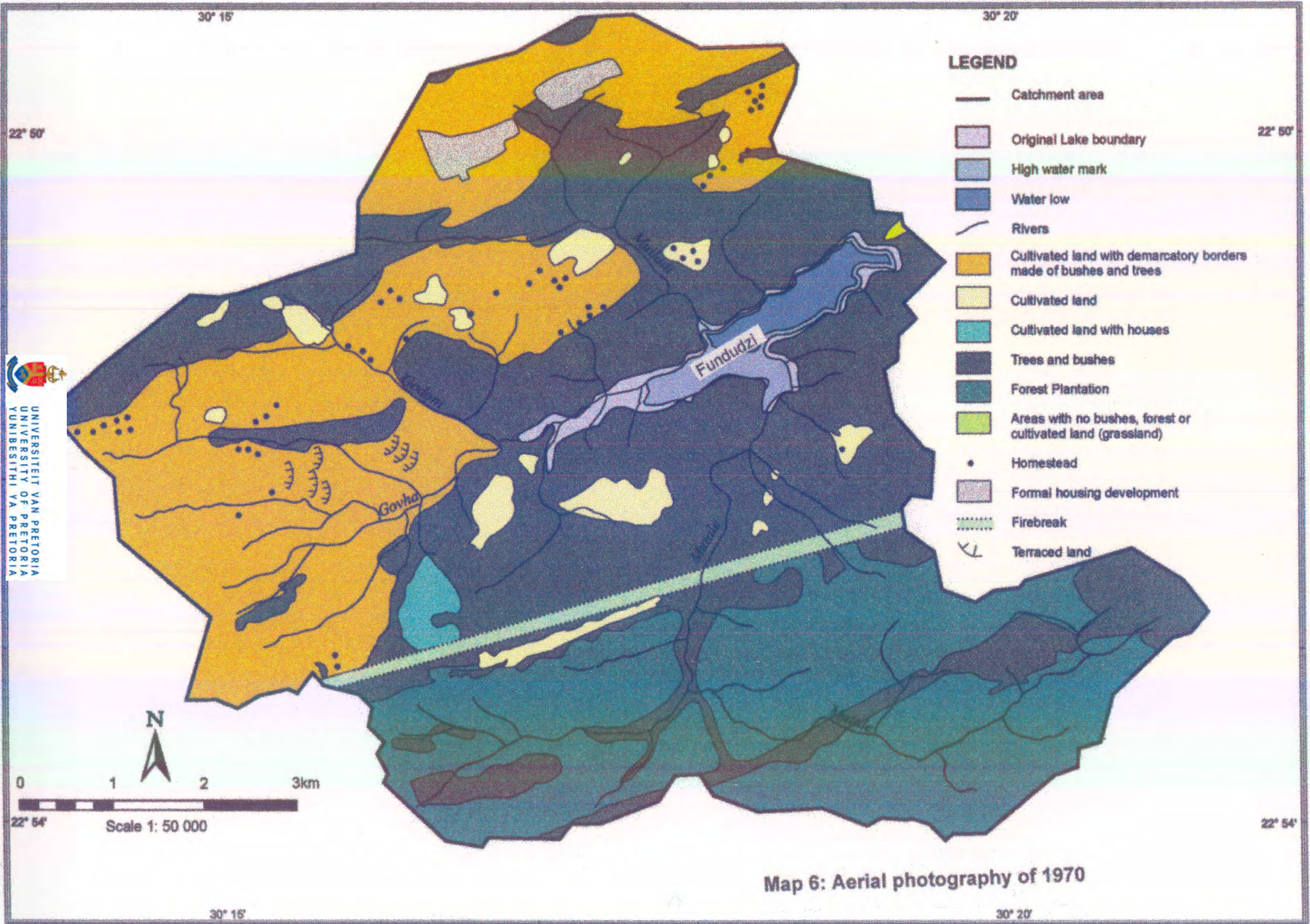




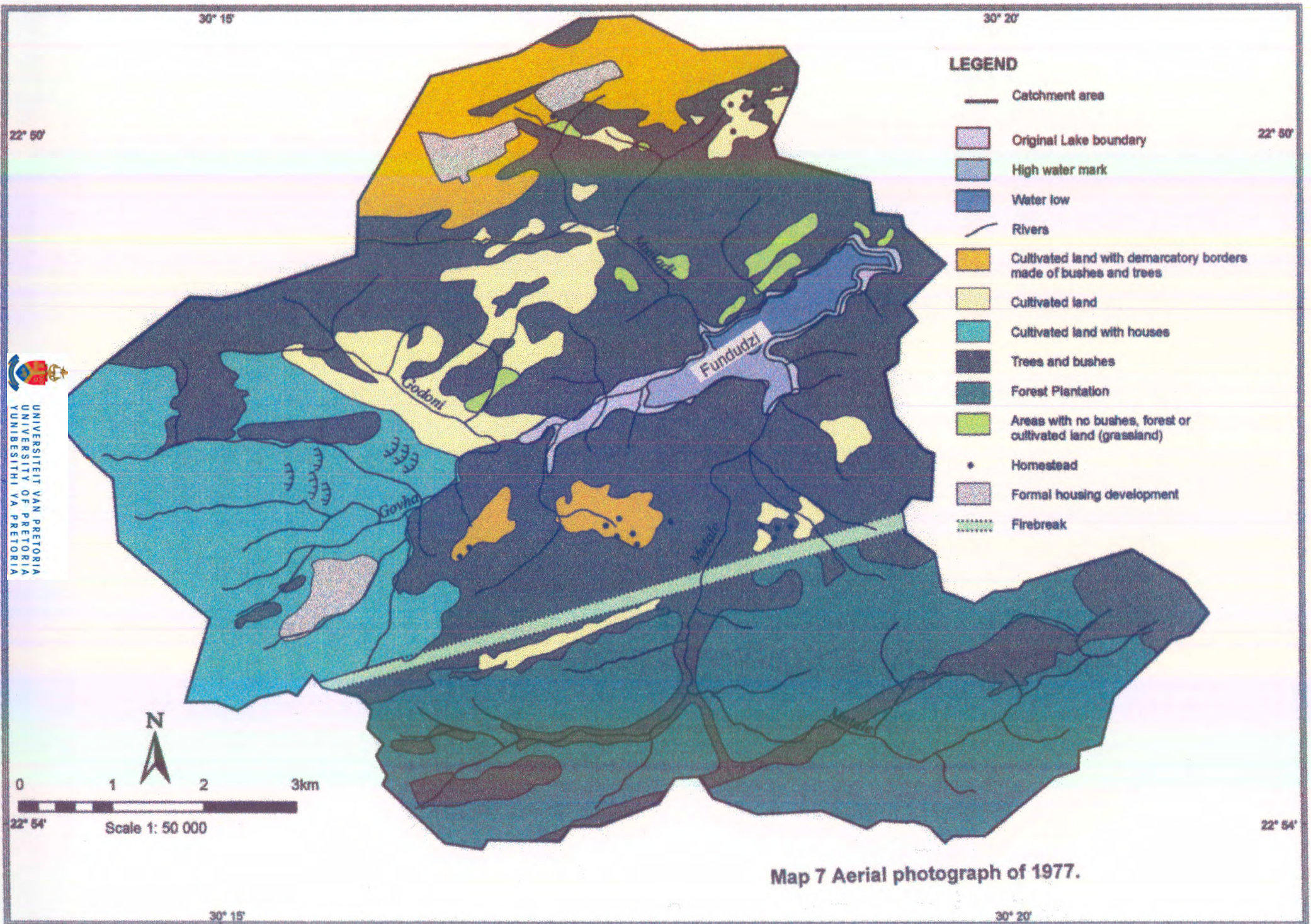
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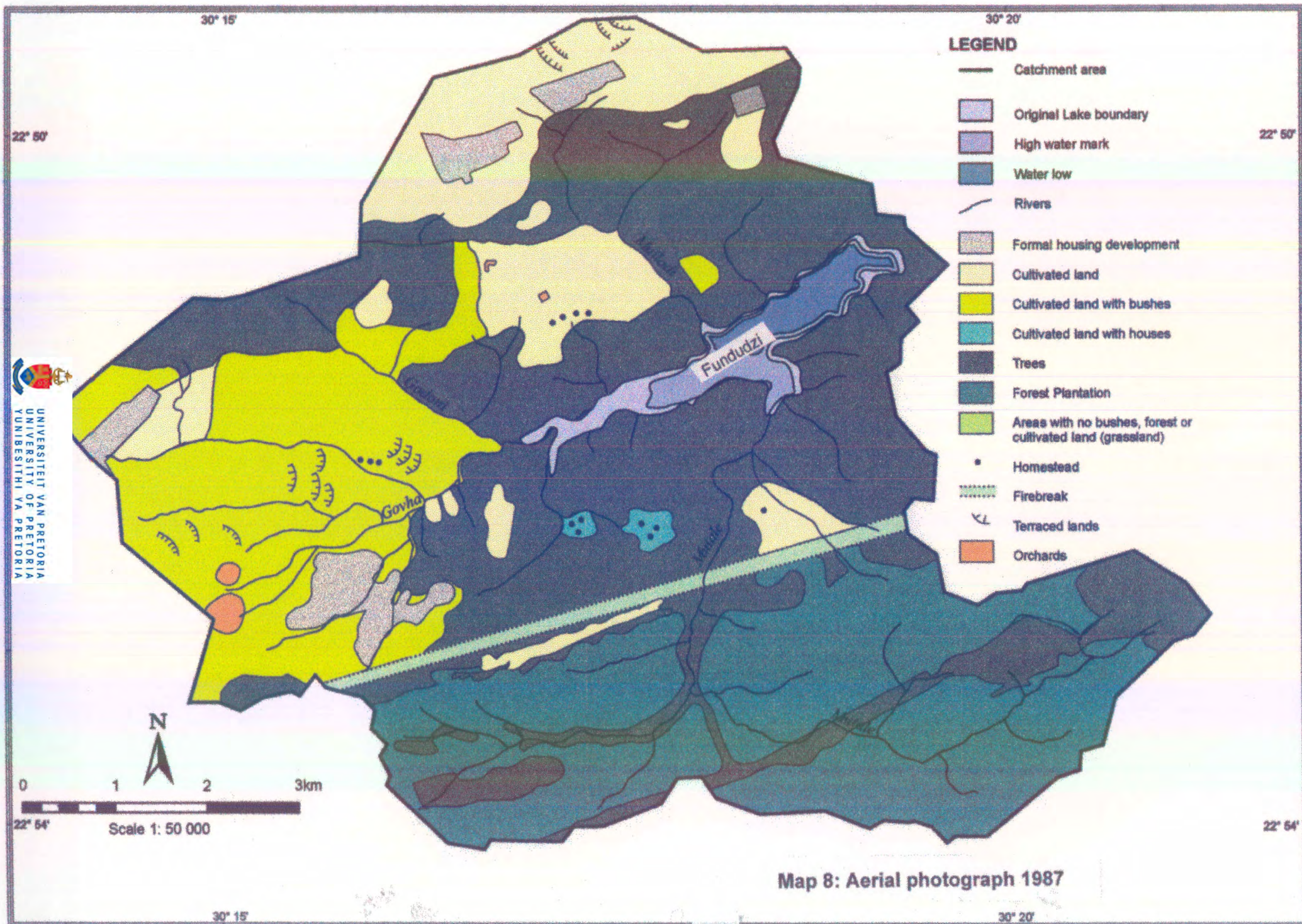
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YUNIBESITHI YA PRETORIA



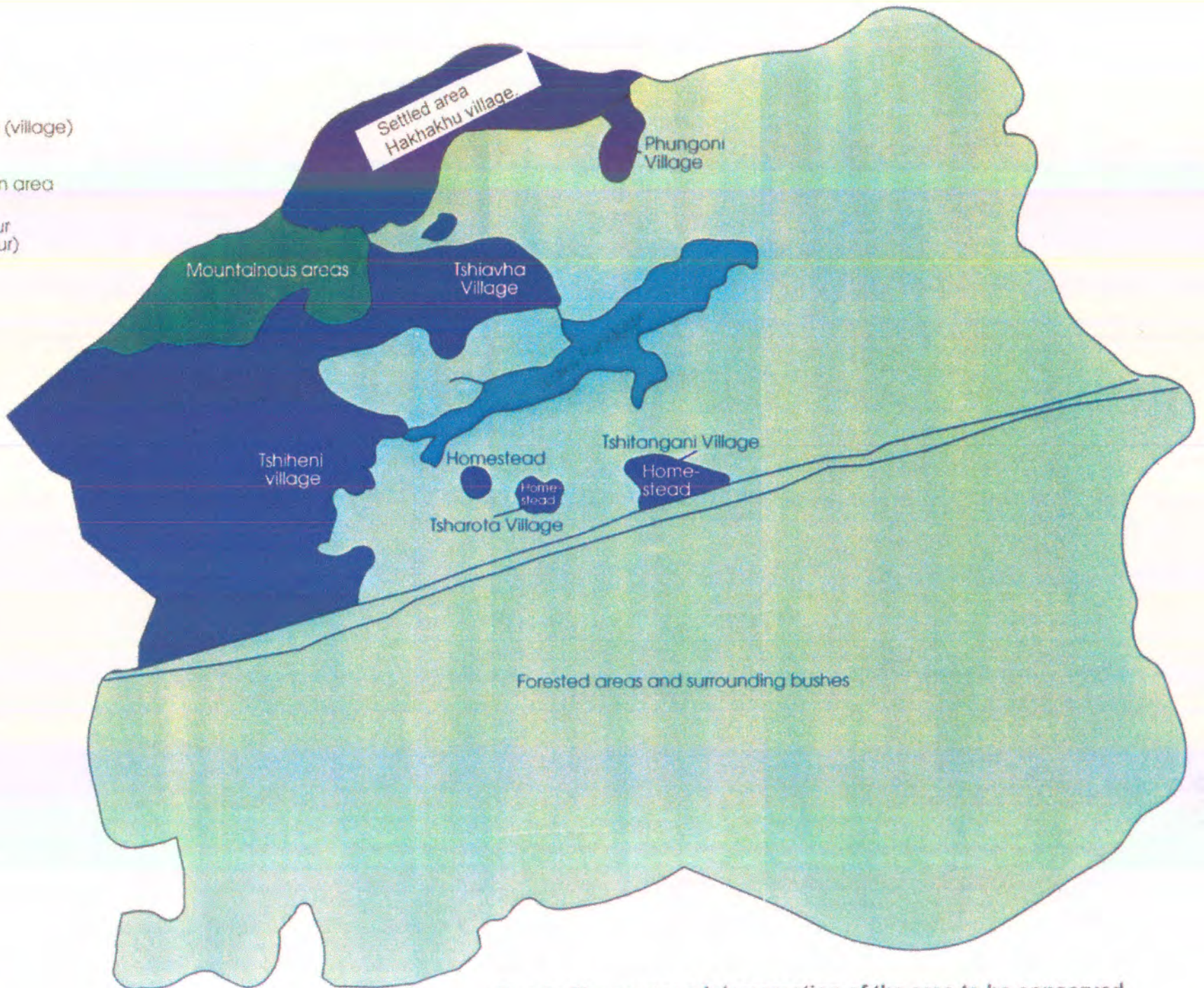
Map 6: Aerial photography of 1970



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- Mountains
- Settled area (village)
- Conservation area
- Green colour (Water colour)



Map 9: The proposed demarcation of the area to be conserved.

Acknowledgement

I would like to thank all the people who have helped and supported me during the study and their co-operation during the interview. Special thanks go to the following individuals and company:

- Chief of Thononda and Tshiavha,
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- My wife Edith Mudanalwo who afforded me an opportunity to go away from home for more than two months0 doing research.
- Mr Ramakumisa S. Thononda agricultural extension office.
- Prof. B.C.W. van der Waal and the University of Venda for the support and data.
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- Thohoyandou herbarium for the identification of plants.
- Tourism official from the Thohoyandou offices.

APPENDAGE A. QUESTIONNAIRE

QUESTIONNAIRE USE TO COLLECT LAND USE AND CULTURAL INFORMATION. THE INFORMATION IS PRESENTED IN CHAPTER FOUR.

Name of researcher _____ Date _____

Village _____ Household size _____

Respondent _____ Sex _____ Age _____

Occupation _____ Highest standard passed _____

Position _____

1. Where do you obtain water?

1.	2.	3.	4.	5.	6.	7.	8.
lake	stream	well	borehole	tap in-house	Communal tap	fountain	others

2. How far do you travel to carry water?

1.	2.	3.	4.	5.	6.
<30 minutes	30-60 min	61-90 min	90-120 min	>121 min	others

3. (A) Do you wash cloths in:

1.	2.	3.	4.	5.
Lake Fundudzi	River	Communal tap	Home tap	others

(B) What soap is used for washing clothes? _____

4. (A) What type of waste does you family generate?

1.	2.	3.	4.	5.
Plastic	tin (can)	organic	fabric	others

(B) How do you dispose it (get rid of it)?

1	2	3	4
Pit bin	Open bin in the yard	Open bin in open space	Just throw away

5. What kind of toilet facilities do you use?

1	2	3	4
Pit	Flush	Open area	Others

6. (A) What do you use mostly for fuel

1.	2.	3.	4.
Wood	Electricity	Gas	Paraffin
Collect	Buy		

(B) Where do you collect wood?

1.	2.	3.	4.
Sacred forest	Plantation	Natural forest.	others

(C) How long, (in time) do you it take to collect wood?

1.	2.	3.	4.	5.
<30 minutes	30-60 min	61-90 min	90-120 min	>121 min

7. Do you normally collect _____ for firewood?

1.	2.
trees	shrubs

8. Which types of trees and shrubs will you not collect (damage) for firewood and why?

Name	Reason	
		1.
		2.
		3.
		4.
		5.
		6.

9. (A) Does your family have any other portion of land (orchard) and how big is it? (size)

1.	2.	3.	4.	5.	6.	7.
no	<0-0.1 ha	0.1-0.3 ha	0.3-0.5 ha	0.5-1.0 ha	1.2-2 ha	others

(B) What do you plant or is planted in the orchard?

1.	2.	3.	4.	5.

10. How much money do you get from harvest? _____

11. (A) Does your family keep cattle here?

1.	2.	3.	4.	5.	6.	7.
no	1-10	11-20	21-30	31-40	41-50	50-100 more

(B) Are they mainly

1.	2.	3.
Eaten by the family	Sold	Sacrifices

12. (A) Does your family keep goat here?

1.	2.	3.	4.	5.	6.	7.
no	1-10	11-20	21-30	31-40	41-50	50-100 more

(B) Are they mainly for

1.	2.	3.
Eaten by the family	Sale	Sacrifice

13. Where do you graze you livestock.

1.	2.	3.	4.
Lake's valley	Mountains	Forestry	Others

14. (A) Does your family use fish from the lake?

1.	2.	3.	4.	5.
no	once a week	once a month	once a year	Daily

(B) Are fish getting scarcer these days?

1.	2.
no	yes

(C) What do you think is the cause? _____
0 _____

15. Which indigenous animal (found in these area) are of special importance to you.- please give reason.

name	reason	
		1.
		2.
		3.
		4.
		5.
		6.

16. List animals that were present in the valley that have disappeared in your lifetime. (include all mammals, birds, reptiles and fish)

1.	2.	3.	4.	5.	6.	7.

17. List plants species that have become extinct (no longer available) in your area during your lifetime

1.	2.	3.	4.	5.	6.	7.

18. (A) List plants that people are still using from the bush /mountains or along the lake and what they use it for (excluding firewood)

name	uses	place of collection	
			1.
			2.
			3.
			4.
			5.
			6.
			7.
			8.
			9.
			10.

- (B). Which part of the plant do they use?

1		2		3		4		5		6		7		8	
Roots	1.	Roots	1.	Roots	1.	Roots	1.	Roots	1.	Roots	1.	Roots	1.	Roots	1.
Flower	2.	Flower	2.	Flower	2.	Flower	2.	Flower	2.	Flower	2.	Flower	2.	Flower	2.
Buck	3.	Buck	3.	Buck	3.	Buck	3.	Buck	3.	Buck	3.	Buck	3.	Buck	3.
leaves	4.	leaves	4.	leaves	4.	leaves	4.	leaves	4.	leaves	4.	leaves	4.	leaves	4.
Fruits	5.	Fruits	5.	Fruits	5.	Fruits	5.	Fruits	5.	Fruits	5.	Fruits	5.	Fruits	5.
Others	6.	Others	6.	Others	6.	Others	6.	Others	6.	Others	6.	Others	6.	Others	6.

19. Is the lake of cultural importance to you?

1.	2.	3.
yes	not any more	no

Why? _____

20. What kind of religion do you practice? _____

21. What stories and myth are told about this lake?

22. Where do you go first when you are sick?

1.	2.	3.	4.	5.
Clinic	Hospital	Traditional healers	Church Minister	others

23. Do you think the lake and the valley need protection?

1.	2.	3.
yes	do not know	no

How ? _____

24. Which type of development would you like to see in these area and why?

Type	reason	
		1.
		2.
		3.
		4.
		5.
		6.

25. If you have a choice where would you like to live and why?

26. What (if any) do you consider the biggest environmental problem in you area?

27. What would you consider as the biggest problem of your area (village)? _____

28. Any other comments not covered in the questionnaire? _____

APPENDAGE A: QUESTIONNAIRE CODING

Number of respondent

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88		

Village

Tshiavha	5	Phungoni	1	Thononda (Govha)	10	Tshiheni (Manieni)	1
Thononda (Tshiavha)	1	Hakhakhu (Makuleni)	1	Lutomboni Lwa ntha	1	Mademeni	11
Tshinungu (Tshiavha)	1	Tshiavha (Kharadza)	1	Thononda (Thamba)	5	Tshiheni (Mavhulani)	15
Lupame (Tshiavha)	1	Thononda	6	Thononda (Thondoni)	11	Malili	1
Tshifume	5	Thononda (Lutomboni)	4	Thononda (Thulwane)	1	Tshitangani	5
Tshiungani (Tshiheni)	1						

Household size

Not willing to disclose	3
<3	7
4-6-	36
7-9	21
10-13	12
>14	9

Sex

Male	Female
37	51

Age

<20	9
21-30-	21
31-40	20
41-50	5
51-60	7
61-70	15
71-80	6
>81	5

Occupation

Teacher	12
Pensioner	19
Unemployed	20
Builder	3
Gota	2
Heading his cattle	3
Student	21
Sells fruit along the road, close to school (self employed)	5
Employed (Driver, Priest)	2

Highest standard passed

None	25
< Std 6	17
Std 7-10	30
M+1	
M+2	6
M+3	7
M+4	3

Position

Head	25
Wife	18
Family elder (Grandparents)	15
Child	29

1. Where do you obtain water?

9.	10.	2	11.	12.	5	13.	14.	50	15.	23	16.	4
----	-----	---	-----	-----	---	-----	-----	----	-----	----	-----	---

2. How far do you travel to carry water?

7.	58	8.	17	9.	5	10.	3	11.	12.
----	----	----	----	----	---	-----	---	-----	-----

3. (A) Do you wash cloths in?

6.	7.	52	8.	33	9.	10.
----	----	----	----	----	----	-----

(When the answer of the question is 3, is 3 and 4, the type of soap used will not be relevant)

(B) What soap do you use for washing clothes?

Powder	Bar
56	17

4. (A) What type of waste does you family generate?

6.	13	7.	16	8.	67	9.	3	10.
----	----	----	----	----	----	----	---	-----

(C) How do you dispose it (get rid of it)?

10	5	20	46	30	22	40	6
----	---	----	----	----	----	----	---

5. What kind of toilet facilities do you use?

10	63	20	2	30	17	40	1 (Neighbour's toilets)
----	----	----	---	----	----	----	-------------------------

6. (A) What do you use mostly for fuel?

5.	77	6.	7.	2	8.	1
10	63	20	7			

(B) Where do you collect wood?

5.	6.	28	7.	48	8.
----	----	----	----	----	----

(C) How long, (in time) do you it take to collect wood?

6.	5	7.	1	8.	7	9.	9	10.	59
----	---	----	---	----	---	----	---	-----	----

7. Do you normally collect _____ for firewood?

3.	8	4.	42	5.	5\
----	---	----	----	----	----

13. Which types of trees and shrubs will you not collect (damage) for firewood and why?

Name	Reason		
Musvoswo, Tshioloolo	Lack fire	1.	6
Mupeta, Murevhe	Used for the dead people, to suppress violet actions to silence	2.	16
Mutanzwa	Used for sticks during rituals at the lake, For bones of the traditional healers.	3.	4
Mukundandou	They are from the elephant clan	4.	2
Mulondwane	Hatred	5.	2
Gokolodza, Mulalandilale, Mutafula	Lot of smoke, Fire cracks	6.	3
Muzwilo	If you have cattle they bear males only	7.	3
Mumvumvu, Mukhulu, Musenzhe, Muthathavhanna	Holding the yard	8.	5
Sando, Mutungu	Will be hated	9.	16
All fruit trees	They provide fruit for the people	10.	4
Bopa	Dead man's tree	11.	4
Mutungu	The smoke causes headache	12.	1

9. (A) Does your family have any other portion of land (orchard) and how big is it? (size)

8.	20	9.	34	10.	17	11.	7	12.		13.		14.	
----	----	----	----	-----	----	-----	---	-----	--	-----	--	-----	--

(B) What do you plant or is planted in the orchard?

6.	65	7.	11	8.	10	9.	8	10.	2	11.	2
Maize		Pumpkins		Bins		Fruit trees		Vegetables		Sugar cane	

10 How much money or bags of maize do you get from harvest

No. Bags	
<5	31
6-10	28
11-15	5
16-20	1
>21	3

11. (A) Does your family keep cattle here?

8.	45	9.	22	10.	6	11.		12.	1	13.		14.	
----	----	----	----	-----	---	-----	--	-----	---	-----	--	-----	--

(B) Are they mainly?

4.	23	5.	2	6.	2
----	----	----	---	----	---

12. (A) Does your family keep goat here?

8.	40	9.	23	10.	6	11.	2	12.		13.		14.	
----	----	----	----	-----	---	-----	---	-----	--	-----	--	-----	--

(B) Are they mainly for?

4.	20	5.	4	6.	4
----	----	----	---	----	---

13. Where do you graze you livestock?

5.	33	6.	6	7.	4	8.	
----	----	----	---	----	---	----	--

14. (A) Does your family use fish from the lake?

6.	31	7.	18	8.	14	9.	3	10.	
----	----	----	----	----	----	----	---	-----	--

(B) Are fish getting scarcer these days?

3.	21	4.	22
----	----	----	----

(C) What do you think is the cause?

Shortage of rainfall (Drought)	14
Too many people fishing. They are also using termite, which attract many fish including the small ones.	5
Use of net affect the breeding population	2
People are fishing for sale. The fish will go away	1
Fish were brought in by white and they are no longer bringing in stock.	1
Use of nets	1
No: It depend on the depth you fish	2
White come and put in fish in 1947. Local fish ate them all. In 1950 they come back with a different type which looks like the local fish and survive.	1
Muvenda ha li khovhe	1

15. Which indigenous animals (found in this area) are of special importance to you? - Please give reason.

name	Reason	
		7.
		8.

16. List animals that were present in the valley that have disappeared in your lifetime. (Include all mammals, birds, reptiles and fish)

8.	9.	10.	11.	12.	13.	14.

17. List plants species that have become extinct (no longer available) in your area during your lifetime

8.	9.	10.	11.	12.	13.	14.

18. (A) List plants that people are still using from the bush /mountains or along the lake and what they use it for (excluding firewood)

name	Uses	place of collection		
Sando, Mubvuhelo, Tshipandwa, Mufhata, Muelela, Murathamafene Muvundabando, Mutonddo. Mulakholomo, Mufhata, Muluwa,	Wooden spoon, Wooden plates	Along the mountains	11.	10
Mutondo, Muluwa,	Arch for the traditional house, hand-hoe handle, Wooden tray,	Along the lake	12.	1
Mulalamaanga	Wooden drum	Dance forest	13.	
Mupfure ndonga, Sindabudzi Mulalamaanga, Muswoswo	(Medicines)Broken limbs, Running stomach	All over the area	14.	5
Mupesu, Marumbini, Mututulwa, Mushulwa, Mukwatikwati	Medicine	Mountains	15.	5
Musungudzwane	Noise bleeding	All over	16.	3
Tshiumbeumbe	Colds	Mountains	17.	6
Munguri	Medicine	Mountains	18.	1

(B). Which part of the plant do they use?

19. Is the lake of cultural importance to you?

4.	59	5.	10	6.	11
----	----	----	----	----	----

Why?

Yes

It is the sacred place for the family, sacrifice place for other family,	19
People can play the Tshikona dance at the Lake	1
The lake influence the rainfall patterns, When there are no rains the family sacrifice at the lake calling for rains	2
Visitors from foreign countries come to see it	2
Threatens us a big water body inland	1
The formation is a history to the people of Tshiavha.	1
Sacrifices calls rail for the nation	1
It is like our culture to relax and swim at the lake, The history of the lake is Attached to us.	8
Special natural features that is found nowhere else. People from all over the world come to see it and study	4

NO.

Only the Tshiavha people will protect it	1
Nobody is aloud to touch any thing from the Lake	1
The family does not always go for sacrifice as they used to do in the olden days.	1
It is only water	1
It does not help us with anything today	2
It is just another place we get fish	2

20. What kind of religion do you practice?

None	2
Christianity	60
Traditional sacrifices	18
Both Traditional and Christianity	3

21. What stories and myth are told about this lake?

If you take the water from the lake it will evaporate before you reach your destination	1
The lake does not accept foreign objects like fences and tins; Any protection should not include fencing of the Lake. The lake is also alive. You see this by the waves.	3
When you come close (at any place you can see the lake) to the lake for the first time you must turn back and look through you knees (kodola) If you fail to do that your eyes will become duck and you will not be able to see the lake.	4
Tshikona dance are still being performed during the reburial of the royal family	1
When the lake is full, the royal family must slaughter cattle for the lake to recede. The lake does not get filled by rain water but by wind blowing	2
There is a valley were you could not pass water or excrete. Even if you do not stay in the place you will hear voices or and if you insist stones from nowhere will fall close to you. Fence I not allowed. At one stage, they placed stand in order to erect fence and the following day they were gone.	2
People are not aloud to collect any items from the burial site and it bushes. E.g., wood. If you collect it, you will be attached to the place until they rituals are performed.	1
Zwidudwane brings to the sorghum to the chief's kraal telling him to prepare the brew for praying (phasa)	1
Tshakhwedzi. Two sheep were lost on the island just before it fills. They were surrounded by water for may years and reproduced in the area. When the water finally receded they could go and graze on the other side of the lake but later went back to the island for overnight. They were later taken by the Netshiavha chief.	2
Family members are not aloud to be circumcised or if they do, they must never go close to the lake as they will fall into the lake and die.	2
If you have a wound and swim or wash in the water, you are healed.	1
Crocodiles found in the lake do not eat people. Even is you drawn and stay for many days they will not eat you. Even if you move through the forest and meet tigers, they will not do you any harm.	5
The lake is the resting-place for the Vhatavhatsindi clan as they throw their borne into it.	1
Rocks look like drums and are used by the Vhatavhatsindi during their rituals.	2
Whites come to the sacred place and took photos. They all dies along the way when they were going home.	2
Water from Mutale river does not mix with the lake water. Fundudzi has water that does not flow. It pass through without mixing. You can only see it when you are further away.	3

At the lake there are drum like stone that are used by Zwidudwane during their rituals	6
You can not look at it for a long time. If you do your eyes will see darkness	1
At the bottom of the lake there are rocks constructed to block, the lake water while Mutale water pass through. People are not aloud to reach the rock at the outflow of the lake. These people are believed to sign Tshikona dance at some time during the scarifying period.	3
There is also a believe that at the bottom of the lake there is a village and people.	1
People who are circumcised are not allowed during the sacrificing period.	1
If you at the lake during the night you will see fire running up and down	1
You can tell the weather by looking at the lake in the afternoon if it is a clear day. The patterns that you see reflected indicate the following days weather. If the lake indicate clear signs of while water on the side and center it means that it will be a rainy season.	1
The lake had many of bananas around the Mutale entrance and at the outflow below the lake. They were eaten by wild animals and people, as they like as long as they do not carry them home or sell. They all disappeared because of a certain man who cut them for sale. No items from the lake is supposed to be sold.	3
White people come and construct some tent during 1970. They made a fence around the tent and one day when they woke up the fence was removed by water. People who insist on going through to the sacred places all die as they go home	3
Wild animal collectors come and collected snakes from the sacred forest. They put them inside the bags. When they woke the following day snakes were gone while the bag was still tired.	1
Water from the lake is used to call rain.	1
Fundudzi la ha nya kondolela, kodolela u nyele phakoni mutshimba vuhvi thi vhonwi	1
Tshigugumela kholomo ya tshiaavha. They prayed cattle called Tshigugumela. They can not harvest any crop before giving sacrifice to the cattle. (U suma)	

22. Where do you go first when you are sick?

6.	36	7.	17	8.	8	9.	18	10.	1 (to sacrifice)
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23. Do you think the lake and the valley need protection?

4.	34	5.	9	6.	22
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How?

(Yes)

Over-fishing or fishing by nets. Fishing only by line not by net.	10
Animals and people from drowning in the mud	2
Burning and cutting vegetation along the lake and rivers.	3
Only the royal family can protect it	1
Pollution by garbage	3
Controlling soil erosion	1
People are dying in the lake	1
It should be conserved for the people to see it.	1
Use off trees in catching the fish. I.e. Floating plant to reach deeper water.	1
Limited access to the lake either by use of lake.	3
It is the place were god make a miracle	1
Trees felling along the lake	1
Animal access should be controlled	1

(No)

It will be protected by the ancestors as a resting-place and sacrifice.	4
It is already protected by Zwidudwane (Half bodied person) Its gods does not want any extra protection and its dogs	3
It does not want to be protected as it can protect itself.	2
It is a natural thing, done by the gods and will protect it	2

24. Which type of development would you like to see in these area and why?

Type	Reason		
Resort with accommodation facilities like hotel and casino.	Create employment for local people	7.	22
Agricultural development in the form of orchards, Supply of irrigation water (Irrigation schemes along the rivers) Settlement projects for the communities.	Cultivate our own crops Most people without work would be employed.	8.	9
Dress making		9.	1
Brick making		10.	6
Resting places for visitors		11.	2
Tourist attraction place		12.	1
Broiler production		13.	2
Shopping centres, recreation facilities,		14.	2
Bakery		15.	2
Industries, firms		16.	3
Recreation centres, Cinemas,		17.	5
Clinics and crèche	Create job for the nurses and teachers	18.	9
Tarred road	Easy flow of traffic including taxi	19.	8
More residential stands should be allocated to the people.	For local people	20.	2

25. If you have a choice where would you like to live and why?

Place	Reason	
Urban areas	There are facilities good roads and electricity and shops, Closer to work place	16
Same place (Rural area)	It is the praying place where we sacrifice, because they have livestock. For cultivation of our lands, Just used to the area, Your place of birth is your place of death. Food is not always bought you can produce your own, The place is beautiful	34
Tshitandani, Mademeni	A new area close to the main road and the shops that is being settled.	7

26. What (if any) do you consider the biggest environmental problem in you area?

Cutting green plants for wood	29
Cultivation of steep slopes.	3
Cultivation to close to the rivers and on top of the mountains	8
Killing of wild animals, by snares	8
Shortage of toilets	1
Fire	11
Over-fishing	1
Increased land and air pollution that end in the river and lake.	1
Nothing	1
Pollution to the lake of household waste	1
People are washing at the rivers that end up at the lake.	1

27. What would you consider as the biggest problem of your area (village)?

Roads	53
Electricity	31
Water supply	37
Water supply in the house	4
Lack of communication systems	6
Shortage of employment.(job)	7
Shortage of transport facilities.	4
Shortage of clinic	6
No post office	1
Shortage of shops (Tshitangani people takes up to 4hours to the shop)	2
Shop	1

28. Any other comments

Fundudzi should not loose its status as a praying and burial place for the Netshiavha clan.	1
It should be known to the world	1
There are lot of people without work,	1
Old people are no longer receiving their pensions	1
People must be taught how to protect the environment.	1
Researchers, politicians and government employees are fooling around with us as they ask from us problems we are experiencing and never give us feedback or improve the situation.	1
The lake should be having potential for development and yet it is not developed.	1
Old age pay was not paid for more than 4 month and old people were very resistant to any person considered being from outside.	1
People have no work and would appreciate any thing that will create job opportunity for them.	3
So many people come and ask lot of question but we do not see the result or the changes.	1
Lack of work for all people in this area.	2

