

1.0 EXECUTIVE SUMMARY

Mozambique has suffered over thirty years of almost continuous warfare. Consequently, changes in the abundance and demography of forestry and wildlife resources have occurred. For example, regeneration of forest has taken place in some areas due to population absence, while deforestation through unsustainable use has occurred in others.

Most development and rehabilitation organisations in Mozambique, and especially in Sofala Province, have been concerned with food security and agriculture with little attention being given to forestry and wildlife management. However, local communities rely on the existence of, and their entitlement to access, these resources in order to fulfil basic needs. Meeting basic needs through exploitation of natural resources is complicated further in specially designated areas such as national parks. Here, conflicts may exist between the need to preserve the natural environment and habitat and the needs of local people to exploit resources.

In March 1997 the African Development Bank provided funding to the Natural Resource department of the Mozambican Ministry of Agriculture and Fisheries (GERFFA) for a two year project in which resource use and management was to be examined. The main objective of the project is the formulation of a sustainable forestry and wildlife resources management plan which will ensure that resources continue to be available both at present and in the future. This management plan will form a model that can be adapted and used for resource management throughout Mozambique.

The socio-economic section of the GERFFA project was devised to work alongside each project component and provide information in terms of the interactions between local communities and their use and management of resources. This information will be incorporated into the management plans proposed by each component. In this respect the final forest and wildlife management plan will recognise conflicts existing in terms of natural resource use and attempt to address the needs and problems of local communities in order that resources are available for use by local communities both at present and also for future generations.

2.0 INTRODUCTION

The recent history of Mozambique is one fraught with warfare and destruction. The Independence war of 1964-74 was followed swiftly by the FRELIMO/RENAMO civil war that began in 1976, intensified in the early 1980s and eventually ended in 1992 (Finnegan 1992). Over thirty years of warfare, associated with recurrent drought, has led to the classification of Mozambique as one of the poorest countries in the world. Average per capita income in 1991 was estimated at around US\$80. It is estimated that nearly half of all urban and rural households cannot meet minimum daily calorie requirements from their own resources and two-thirds of the population live in absolute poverty (GERFFA, 1996). In addition, many parts of the country have little infrastructure including transport networks, health systems or schools as a result of the conflict period and lack of material resources.

In terms of natural resources, the conflict period has had variable effects. Prior to 1980 it is estimated that three quarters of the population of Mozambique lived in rural areas. However, the widespread destruction caused by the civil war and drought have resulted in the out-migration of some 1.5 million people from rural areas to settle in peri-urban and urban areas and over 1 million displaced people living in neighbouring countries (GERFFA, 1996). This had two implications on forestry resources: firstly, expanding populations in urban and peri-urban areas has led to increased use of forestry resources. Secondly, out-migration of populations has led to the regeneration of forestry resources in rural areas. This scenario is again changing however as displaced people move back to their original areas.

In terms of wildlife resources, Gorongosa National Park, one of four National Parks within Mozambique, was closed by FRELIMO in 1973. Prior to this, Finnegan (1992) describes the park as “a world famous big-game hunting ground that attracted 20,000 tourists a year”. Following its closure the park was no longer protected, conservation activities ceased and unsustainable hunting activities proliferated, mainly by military personnel and professional hunters. This has led to a serious decline in the number of animals. Military activity has also destroyed much of the infrastructure in the area. This affects not only opportunities for tourism and economic activities within local communities, but also the ability of local communities to participate in sustainable hunting practices.

The World Bank, World Food Program, UNDP/FAO and other international organisations have lent assistance to the management of natural resources within Mozambique. Locally, Sofala Province has received assistance from relief and development organisations such as, Food for the Hungry International, GTZ and World Vision. However, these local efforts have concentrated mainly on issues of food security and agricultural activities. Little development, rehabilitation or management has been attempted or achieved in terms of forest and wildlife resources.

There is, however, an obvious need for such activities for several reasons: firstly in order that the National Park can be restored to something similar to its former status. Secondly, so that the regenerated natural resources in rural areas, that are subject to increasing pressure from returnees, can will be used sustainably, and thirdly so that depleted resources in urban and peri-urban areas can be regenerated and used sustainably in the future.

In March 1997 the African Development Bank, in an attempt to address this problem, provided funding to the Natural Resource department of the Mozambican Ministry of Agriculture and Fisheries (GERFFA) for a two year project in which resource use and management was to be examined. Though there are various components associated with the project the main focus is on wildlife and forestry resources. The overall output from the project will be a formulated model-plan that will form the basis of future wildlife and forestry management throughout Mozambique.

The socio-economic section of the project is concerned with the broad interactions of local communities with their natural and non-natural environment. Understanding of these interactions will facilitate the production of a management plan that will take into consideration the actions and needs of local communities and lead to the sustainable use of resources. The socio-economic study will eventually take place on a large scale during 1998 in different areas of Sofala Province. However, prior to undertaking a large study, a pilot exercise was carried out in order that methodologies could be selected that would provide information that was of relevance to specific components within the project. Workshops were also carried out in order to familiarise component members with various methodologies and devise aims and objectives for the socio-economic study in order that the study met the needs of all involved.

The pilot study therefore has several main outputs: the first describes the learning process that took place as the team began to work in an integrated manner, share information and strive to achieve common goals. The second is the actual fieldwork project that took place in Nhambita, a rural community within the Buffer Zone of Gorongosa National Park in which methodologies were tested and an initial level of data was collected. Critical examination of the results of this work provides a platform from which to take decisions regarding the final proposal for the large-scale socio-economic study that is to take place in 1998.

3.0 BACKGROUND TO THE FORESTRY AND WILDLIFE RESOURCES MANAGEMENT PROJECT (GESTAO DOS RECURSOS FLORESTAIS E FAUNISTICOS – GERFFA)

The GERFFA project was identified in March 1992 by an FAO/IC mission at the request of the African Development Bank (ADB), who are responsible for the financing of the project, and the Government of Mozambique. At the request of the ADB the FAO conducted a preparation mission in February 1993, which was followed by an ADB appraisal mission in June/July 1993 (GERFFA, 1996).

The GERFFA project is centred around three provincial sites: Sofala, which includes Gorongosa National Park, Marromeu Game Reserve Complex, the Beira Corridor extending to the Zambezi river and also areas of mangroves; Manica, including the Beira Corridor and a large area of natural vegetation; Cabo Delgado, including a large area of natural forest between Pemba and the border with Tanzania.

The main objectives of the project are split into four with a specific component within the project to address each objective:

1) Managed Forestry Component

Objective: To manage forest resources in the project area through:

- development of a forest concession system
- field testing of forest inventory
- sustainable harvesting techniques
- development of management systems
- training of staff and institutional building
- sustainability in products supplied to forest industries
- provision of a model for sustainable management throughout the country

2) Wildlife Management

Objective: To manage wildlife resources in the project area through:

- enhancement of Government capacity for wildlife management

- protection of biodiversity
- development of the economic potential of wildlife resources through provision of opportunities for eco-tourism and opportunities for future donor support in community-based natural resource utilisation and wildlife-related activities

3) Social Forestry

Objective: To enhance community participation in afforestation and natural forest management through:

- social agro-forestry programmes to increase wood, non-wood products and food production
- reduction in environmental degradation
- improvement in technical capacity of the provincial forestry service involved in social forestry activities

4) Institutional Strengthening

Objective: To strengthen the institutional capacity of the DNFFB and SPFFBs, particularly in the central and northern part of the country through:

- supplying equipment to SPFFBs to improve functioning
- upgrading staff capability through in-service training
- supporting the Central Services through strengthening of applied research, particularly in addressing forest management and social forestry related problems

3.1 Socio-Economic Study

The socio-economic study is not contained in any individual component, but in fact overlaps with each component. Objectives of the main socio-economic study that is to take place in 1998 are as follows:

- to providing components with information from various communities in terms of :
 - a) use of and attitudes to natural resources within the local environment, including forestry, wildlife, water and farming systems information
 - b) use of non-natural resources, infrastructure and services, including transport

systems, employment opportunities, markets, access to health facilities, school facilities and mills

- c) systems of control and access to natural and non-natural resources
- d) existing livelihood systems
- e) economic activities at micro and macro scale
- f) broad problems and needs identified by communities
- g) specific cultural practices and beliefs in terms of resources

This information will then facilitate the formulation of both management plans and development activities.

3.2 Importance Of The Socio-Economic Study

In any development or rehabilitation project, or when formulating management plans there is a need to understand and involve the cultural, social and economic activities of local communities. It is often difficult, when engaged in scientific, quantifiable studies, to see the link between people and resources. Yet the socio-cultural traditions associated with resource use may be a source of future conflict if the local community is not consulted in terms of resource management planning.

The success of any kind of development project is, arguably, ultimately dependent on the involvement of local communities. Omitting the link between people and resources has serious implications for the success of any management plan. For example, forest inventory may operate as a purely scientific, numerical exercise, with little or no direct community involvement. It may not include any understanding as to how the local communities utilise the resources within the local forest in their area. This could, for example, result in concessions being granted to individuals without full knowledge of how the local community is dependent for its survival on the forestry resources. Conflict may occur if the concession holder does not recognise the value of subsistence gathering within the forest to the local community and restricts access for local people.

A similar level of problem is possible within the Wildlife Component. For example, one of the activities within the Wildlife Component involves aerial surveying of animal population densities. However, this work bears little relation to how people within the local community

utilise wildlife resources for subsistence purposes, and unless this is understood, then the survey work merely provides one piece of the jigsaw.

Projects or management plans that do not involve the local community can be described as ‘top-down’. In other words a project is implemented without any consultation with the local community. The local community does not take any part in the decision making process and the project does not take into consideration the needs and problems of the local community. Therefore, there is no partnership between the implementing organisation and the local community.

In terms of natural resources there is a complex relationship between people, forest and wildlife resources. The following table conceptualises a simplified version of the benefits and drawbacks to each group in this relationship.

Table 3.1 The Relationship Between People, Forest and Wildlife

	PEOPLE	FORESTRY	WILDLIFE/FISH
PEOPLE	*	+ (fuel, food, construction material)	+ (food)
FORESTRY	- (possible decline)	*	+/-
WILDLIFE	- (possible decline)	+ (habitat)	*

The results can be summarised as follows:

- 1) People benefit from the existence of forest and wildlife resources (in terms of, for example, food, building resources, medication, fuel etc.).
- 2) Forestry ‘can’ suffer from utilisation by people and declines if used unsustainably.
- 3) Wildlife ‘can’ suffer from utilisation by people and declines if hunting occurs unsustainably.
- 4) Wildlife benefits from the existence of forest as habitat and would decline if forest degenerated through unsustainable use.

Though this is an oversimplification, for example, it does not consider the effect of wildlife as pests to the farmers, nor does it consider the fact that large numbers of animals may

damage forest resources, it still indicates that people emerge as the overall beneficiaries in this relationship. It is clear, therefore, that formulating natural resource management plans without considering the continuing needs of the local population may lead to resentment. This is especially so if local people consider that they will suffer in terms of access to resources in the immediate future due to the plan. For example, denying people access to resources may lead to growing resentment as hunting, fishing and exploitation of other natural resources would no longer be permitted in an area was once freely accessible. This type of action tends to form barriers between local people and managers and ultimately management plans that are ignored or disregarded by the local community.

Working ‘with’ the community rather than implementing plans ‘for’ the community can be described as the opposite of the ‘top-down’ approach. This represents the ‘grassroots’ approach in which managers work with and learn to understand local communities. In this way co-operation with local communities is sought and objectives are realised through mutually beneficial, joint initiatives. Co-operation is especially important in the case of Gorongosa National Park where there is no fence surrounding or protecting the park. Not that this is necessarily a negative factor. Fences can form barriers that exclude and alienate people and lead, again, to feelings of resentment. If, however, the co-operation of local people is not sought and the invisible boundary of the park is ignored the continued existence of wildlife and forestry resources and therefore the park itself is threatened.

It is therefore imperative that in attempting to rehabilitate the National Park (or indeed any natural resource area) one of the main priorities should be to work in partnership with the local community in order to gain their co-operation and promote the sustainable use of natural resources.

The socio-economic study can help to address some of these problems by focusing on and creating an understanding of the relationship between natural resources and the local community, including the social, cultural and economic traditions of natural resource use. This may include the types of trees people use, how people survive in times of drought or famine, the food they eat and their access to medical care (which may come either from a health centre or from traditional medicines). Understanding the behaviour of local communities creates a platform from which a partnership with the local community can be

developed in order that co-operation in terms of natural resource use can be established.

Such knowledge of the community is useful to the different components within the GERFFA project. For example, if the social forestry component were to introduce village nurseries it is useful to know what type of tree species are preferred by the local community for fuelwood and construction. However, in looking at the interaction of the local community with natural resources in isolation, important aspects of community life and existing problems and needs may be missed. For example, lack of employment opportunities or economic activity may affect the level of exploitation of natural resources. This, however, would not be identified if natural resources were examined in isolation. It is therefore necessary to take a broader view of community life, including problems involving non-natural resources, in order that a holistic and dynamic picture of the workings and interactions of a community can be gained.

4.0 PRESENT GERFFA OPERATION

In planning the initial pilot socio-economic study it became apparent that two fundamental problems existed. These were as follows:

- 1) lack of integration both between components and between components and the socio-economic section of the project
- 2) lack of coherent concept of the use and value of the socio-economic study

In relation to the first problem, it is of some significance that the different components within the project all became operational at different times. For example, the project was initially concerned only with social forestry; other components and specifically the wildlife component did not become operational within the original project until a much later date. Consequently, each component developed independently of the others and worked in isolation in individual areas with little integration between components. If this continued, the possible outcome of the project would be that information regarding forest inventory would be available in one area, wildlife counts using aerial photography in another and village nurseries established in yet another area. The result of such activities would be a series of separate reports from individual areas, which were in no way related or integrated. Clearly, a cohesive national resource management plan would not be forthcoming from such an agenda.

The second problem is related to that fact that the socio-economic section of the project did not become operational until July 1997 and had no definite guidelines as to how it would become integrated with other working components that were at the time pursuing activities in different areas. There was also a distinct lack of a coherent plan for the socio-economic study. Individual components were unsure as to what the study entailed. For example, what methodologies would be used, how the study would benefit their areas of expertise and precisely what types of information would be forthcoming.

The initial remit of the pilot socio-economic study was therefore extended in an attempt to address and resolve these problems before fieldwork commenced.

4.1 Pilot Socio-Economic Study

Discussions and workshops involving the various components led to the decision that the pilot socio-economic study should encompass more than one piece of fieldwork in which to test methodologies and techniques of data collection. The broader aims were developed to include the following:

1. Facilitation of an ongoing integrated, multi-disciplinary focus to the project in general and the socio-economic study specifically. This was to be achieved through the production of an interactive environment in which members of individual components could discuss the following:
 - a) Future activities and methods for integration between individual components and individual components and the socio-economic section of the project. For example, decisions regarding joint working areas and the possibility of establishing a 'study team' for fieldwork activities.
 - b) Types of information that the socio-economic study could produce which would be of use and value to individual components.
 - c) Type of data that would be available for specific purposes (such as quantitative data needed for policy formulation).
 - d) Acceptable methodologies in the collection of such data.
 - e) Types of community data already produced at present by each component which may be formalised and incorporated into the socio-economic data collection.
 - f) Identification of additional areas in which detailed research is required, possibly through incorporation of extra external research assistants.

2. To incorporate the above information and suggested methodologies into a trial socio-economic study which would be carried out within a local community in Sofala Province. Main areas in which the study focuses are the same as those which are planned to be used in the 1998 large-scale study and are as follows:

- a) use of and attitudes to natural resources within the local environment, including forestry, wildlife, water and farming systems information
- b) use of non-natural resources, infrastructure and services, including transport systems, employment opportunities, markets, access to health facilities, school facilities and mills
- c) systems of control and access to natural and non-natural resources
- d) existing livelihood systems
- e) economic activities at micro and macro scale
- f) broad problems and needs identified by communities
- g) specific cultural practices and beliefs in terms of resources

The overall objectives of these two main aims are as follows:

- The production of a holistic report that benefits from inputs of each component and provides an integrated picture of natural and non-natural resource availability, use and present management within one local community. This will also lead to the identification of additional research areas.
- That the information produced and experiences gained from the trial fieldwork is discussed in relation to the experiences and needs of other components and used as a platform from which to develop the proposal for the second large-scale socio-economic study of 1998. This should result in a new proposal that is mutually beneficial and acceptable to all components.

5.0 METHODOLOGIES

Three methodologies were used during the pilot phase of the project as follows:

- A literature review was undertaken in order to establish both the types of investigation that had previously taken place and the level existing knowledge in terms of resource use and management and socio-economic aspects of community life within the project areas. This included the examination of projects which members of the GERFFA team had been involved.
- A series of ongoing workshops and discussion meetings in order to collectively establish an acceptable framework for the socio-economic pilot study and an integrated approach between components. These activities led to the identification of the aims of the pilot socio-economic field study and methodologies that would be utilised in the field. Future workshops will lead to the formulation of the 1998 large-scale socio-economic study.
- A combination of Participant Rural Appraisal (PRA), Rapid Rural Appraisal (RRA), questionnaires and anthropological techniques used in the field, decided upon as a result of workshops.

5.1 Literature Review

A number of methodological studies have already taken place within Sofala Province, some of which have involved present GERFFA staff. Examples of recent work originating from organisations practising in Sofala Province can be seen in Appendix 1.

Projects can be generally divided into two categories: research projects and practitioner investigations. Research projects tend to be academic and involve the use of surveys and questionnaires, the output being papers that do not necessarily lead to any direct and immediate action within the community. Practitioner investigations tend to use more informal techniques such as RRA and PRA and result in direct action within communities.

In examining data already collected from organisations working within Sofala Province, it is apparent that all are practitioner investigations as the information was produced with the intention of identifying projects, areas and to influence the type of community projects that

will be implemented. It is evident however, that the methodology used in each of the above investigations was mainly large-scale questionnaire surveys completed in over a short time-frame. There are however, many disadvantages associated with such large-scale questionnaire surveys that are discussed in the following section. In addition, (and according to the remit of each individual organisation) it can be seen that all but two of the completed reports pertain to agriculture and food security rather than the management of natural resources. The remaining two socio-economic studies include an historical overview of the Zambesi Delta and a socio-economic survey of Gorongosa and Marromeu. The latter does focus on natural resources including forestry and to some extent wildlife. However, this was again formulated using questionnaire techniques. Though useful, this did not provide either an adequate level of detail or the level of community contact that was envisioned for the pilot socio-economic study.

Existing reports and the advantages and disadvantages of various methodologies available for use was discussed with the GERFFA team in order that an overall objective and methodology could be developed that would fill the gap left by the reports produced by other organisations. In this way natural resource use and management within a socio-economic framework could be studied at depth and with accuracy.

In addition it was envisaged that the methodology selected should lead to the accumulation of useful information for both researchers and practitioners. Researchers should therefore be able to utilise information to further academic studies and identify additional topics of investigation, while practitioners should find the information useful in decision making, management plan formulation and project identification.

5.2 Workshops And Discussion Sessions

Workshops and discussion sessions are ongoing processes that were held with three purposes. The first purpose was that the socio-economic section could identify the information needs of each component and activities already carried out in working with and monitoring socio-economic activity of local communities. The second was that individual components could assist in formulating the exact aims and objectives of the socio-economic study. Thirdly, that the pilot and future socio-economic study could be planned taking both the above purposes

into consideration. Broad aims of workshops are consequently as follows:

- 1) To achieve an integrated, interdisciplinary approach to the project.
- 2) To identify information that will lead to the better understanding of communities for each component.
- 3) To identify uses of findings.
- 4) To provide information regarding social science and socio-economic methodologies available for use that would be appropriate for the information needs of each component.
- 5) To identify lessons which may be gained from the study and changes to be applied in future.

5.2.1 Sectoral Experiences

In discussing the human dimension of the GERFFA project it was apparent that each component was concerned to a large extent with the behaviour of local communities. The main human dimension and socio-economic factors of the project for each component related to achieving the sustainable use of resources by local communities and attaining sustainable livelihoods. This was in terms of agricultural, forestry and wildlife practices.

The main socio-economic and political-economic factors affecting local and official management of natural resources was related to traditional land-use and management practices and methods of regulating or changing these practices in order that they become and remain sustainable. This would involve the formulation of policy at a macro level and implementation within local power structures at a micro level.

In terms of gaining information and knowledge regarding socio-economic activities within the project area it was apparent that information was already being collected by individual components from areas in which they were working. These included, for example, formal checklists on community activities and qualitative remarks by the Managed Forestry Component and a logbook of community activities collected by the Wildlife Component. It also became apparent that information collected by one component was also of value to other components in addition to the socio-economic section. For example, the Managed Forest Component generally performed wildlife inventories in areas that they were working. This information would, no doubt, be of value to the Wildlife Component.

6.0 FIELD METHODOLOGY

During the workshop sessions component members requested additional information in terms of methodologies that are available for use in socio-economic studies. This was of value when deciding which methodologies would provide data that was most useful to individual components.

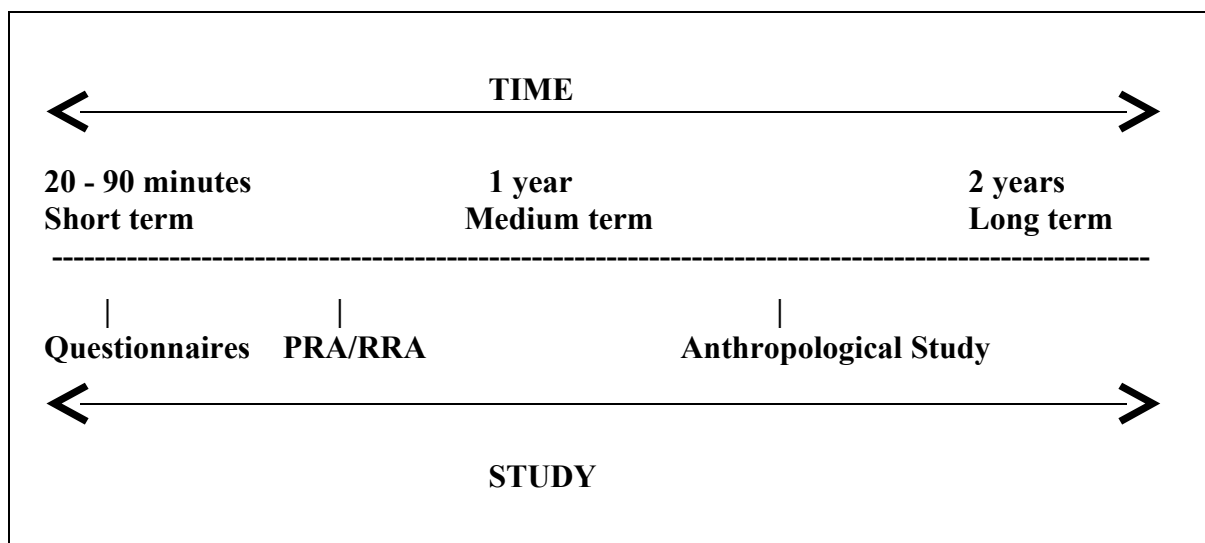
6.1 Differing Field-Methodologies Possible to Use

There are three distinctive divisions to the type of study that can be performed prior to commencing any particular project. Studies include the following:

- Baseline questionnaires
- PRA / RRA
- Anthropological techniques

Each type of study varies considerably from the other and each has distinct advantages and disadvantages. One of the main distinguishing features of each is the length of time taken in each study. This can be seen in Table 6.1 below:

Table 6.1 Different Time Scales Associated with Individual Studies



It can be seen from the table above that questionnaires are relatively quick to complete, PRA and RRA takes between two and four weeks and anthropological studies can be much more time consuming. There are many other advantages and disadvantages associated with each technique that will be explored in greater detail below.

6.1.1 Questionnaires

Questionnaires involve a short interview with a family or individual. Questions asked in questionnaires are prepared in advance by the research team and asked to a random number of families or members of the population within a community. This is known as the 'sample population'. Specific closed question are asked which are aimed at generating 'yes' or 'no' answers. Information generated produces quantitative data, in other words data can be quantified so that a specific figure can be given, for example, of the number of children within a sample who attend school. The information gained is extrapolated and taken to be representative of the average for the entire community.

The practical advantages and disadvantages of questionnaires as a methodology are as follows:

Table 6.2 Practical Advantages and Disadvantages of Questionnaires

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Short time scale 	<ul style="list-style-type: none"> • Viewed as development tourism – brief visit by urban professional. • Minimal contact with community. Lack of cultural understanding. No time to develop insight into ‘etic’ and ‘emic’. • Feared by local community (may appear to be checking up (suspicious), leads to altered behaviour or community and unreliable information). • Lack of time to build up trust and confidence from community. • Little time for cross-checking of data or observation of the community within a ‘normal’ setting.
<ul style="list-style-type: none"> • Low cost 	<ul style="list-style-type: none"> • Poor quality of some data (lack of cross-checking, trust and observation).
<ul style="list-style-type: none"> • Easy to use techniques 	<ul style="list-style-type: none"> • Inflexible, rigid approach which has a specific agenda so no opportunity to explore related or other important issues. • Preparing questions for questionnaires make it necessary to anticipate problems within the local community prior to even meeting the community. The agenda is then set by the researcher according to the researcher’s interpretation of reality.
<ul style="list-style-type: none"> • Minimal training needed 	<ul style="list-style-type: none"> • Low level of skill share to researchers.
<ul style="list-style-type: none"> • Easier to cover large areas 	<ul style="list-style-type: none"> • Vulnerable groups may be omitted. • Different areas may vary greatly and have differing problems. Questionnaires may not be area specific.
<ul style="list-style-type: none"> • Quantifiable data • Acceptable scientific methodology 	<ul style="list-style-type: none"> • Unreliable data (lack of cross-checking, observation and trust). • Lack of depth to data, ‘yes’ or ‘no’ answers are not always applicable and may miss the most important problem as perceived by the local community.

6.1.2 PRA/RRA

RRA was developed largely due to the inadequacies of extractive questionnaire techniques of

data collection and in response to the demand for an increasingly cost-effective method of data collection. PRA originally appeared as a component of RRA though quickly evolved into a separate, individual technique with unique methodologies.

RRA and PRA have been distinguished as approaches rather than methods. RRA is concerned with gaining insight and information from rural people about rural conditions in an effective and timely manner. Many practitioners consider the term RRA should thus be used for data-collecting activities, topic investigation and research. The researcher in this case continues to be an urban professional and data is removed from the area and analysed externally. The objective is to generate lively discussion within the community. Meetings may be held with members of the community in general or specific groups such as women, men or elders. As questions are open-ended rather than closed, discussion is generated and a greater depth of information is gained which may not be forthcoming from activities such as questionnaires where the objective is a simple 'yes' or 'no' answer. In addition, the topic of discussion is not rigidly fixed and so can change in order that other issues that are important to the local people can also be discussed.

PRA, for many, involves the empowerment of vulnerable groups with an ultimate goal of power reversal. In this case the professional acts as facilitator and in effect 'passes the stick' to members of the local community in order that the local community become the analysts. The role of the professional is pupil with local people being the experts and teachers. It is thus argued that the term PRA should be reserved for on-going empowerment process involving appraisal, analysis, planning, action, monitoring and evaluating (Chambers, 1997). The following table indicates some of the differing approaches and methodologies of PRA and RRA.

Table 6.3 Approaches and Methodologies of PRA and RRA

RRA	PRA
<ul style="list-style-type: none"> • Observation • Verbal interaction • Semi-structured interviews • Focus groups • Secondary data collection: <ul style="list-style-type: none"> Reports, articles, books Maps Aerial photography Satellite imagery Photographs • Asking experts • Case studies • Transect drawing, soil analysis, tree identification 	<ul style="list-style-type: none"> • Shared visual representation and analysis by locals: Mapping: <ul style="list-style-type: none"> Modelling Listing Sequencing Comparing Scoring Ranking • Time-line, trend and change analysis • Seasonal calendars • Daily time-use analysis • Shared presentation and analysis • Participatory planning

Source: Adapted from Chambers (1997)

Using RRA and PRA techniques have practical advantages and disadvantages in comparison to questionnaires as indicated in the table below:

Table 6.4 Advantages and Disadvantages of RRA and PRA

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Increased time scale. (Therefore, increased community contact in 	<ul style="list-style-type: none"> • Still relatively short time frame, may be insufficient for detailed observation and

which mutual trust and co-operation can be developed).	<p>understanding of culture and area.</p> <ul style="list-style-type: none"> • Time scale may inadequate to generate trust and confidence. • Cannot cover as many areas if short project time scale.
<ul style="list-style-type: none"> • Increasingly representative. (Vulnerable groups can be identified and approached separately). 	<ul style="list-style-type: none"> • Group meetings can be dominated by wealthy/powerful.
<ul style="list-style-type: none"> • Varied, appropriate, non-intimidating techniques using few, if any, resources. 	<ul style="list-style-type: none"> • Some techniques may be considered condescending. • Techniques may not be understood by local community.
<ul style="list-style-type: none"> • Increased skill share between researchers. 	<ul style="list-style-type: none"> • More training required.
<ul style="list-style-type: none"> • Increasing quality and reliability of data. 	<ul style="list-style-type: none"> • Data analysis problematic as difficult to quantify, may be unacceptable as scientific method.
<ul style="list-style-type: none"> • Flexible techniques. 	<ul style="list-style-type: none"> • Not subtle (as with indirect observation). • Agenda still set by researcher therefore problems still anticipated to some extent to controller's interest and interpretation of reality.

6.1.3 Social Anthropology

Anthropology is concerned with understanding rather than directly changing the behaviour of others. The traditional methodology used in social anthropology is known as 'participant observation' and involves living within a community for a substantial period of time (1-2 years), becoming immersed in the local culture, work, food and language, whilst remaining as unobtrusive as possible. Other techniques that are used during the fieldwork period include: semi-structured and unstructured interviews, direct and indirect observation and the use of case study material. The aim of such research is to allow the researcher to develop an 'actor-oriented' perspective that provides a valuable entry point and a 'way of seeing' that is appropriate to specific development projects. This involves distinguishing the 'etic', or outsider's mental framework, from the 'emic' or local, insiders understanding. The overall

aim is for the researcher to become an ordinary member of the local community and therefore experience the same problems and needs as the local community.

Table 6.5 Practical Advantages and Disadvantages of Anthropological Techniques

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Long time duration. (Gives depth, quality and reliability to information. Allows trust and mutual respect to develop between researcher and community. Also permits an holistic study of the community.) 	<ul style="list-style-type: none"> • Long time duration unfeasible prior to need for urgent development initiatives. • Generates information that may be unnecessary.
<ul style="list-style-type: none"> • Training of one person only (though intensive). 	<ul style="list-style-type: none"> • Low skill share.
<ul style="list-style-type: none"> • High quality information and adequate opportunity to cross check through observation. 	<ul style="list-style-type: none"> • High cost for long fieldwork duration.
<ul style="list-style-type: none"> • Qualitative reliable and detailed information. 	<ul style="list-style-type: none"> • Information difficult to quantify. • Information may be analysed in a subjective manner as objectivity is lost due to the length of field experience. • Difficult to extrapolate information to other communities so result is a very detailed account of one area only.

It can be seen that the techniques available for use are very varied each one facilitating the collection of a different type of data and having varied associated practical advantages and disadvantages.

6.2 Methodologies Used in the Pilot Socio-Economic Field Study

When deciding on a methodology for the pilot socio-economic study, it was concluded that in isolation none of the techniques discussed above was adequate for the type of data that needed to be collected. For example, it was thought the questionnaires alone would not give

the level of depth to information that was needed, nor would it be flexible enough to explore other issues which were important to the local community in a holistic manner. PRA alone would not provide any quantitative data and would not allow for cross-checking of information through observation and measuring. Anthropology and participant observation alone was impossible as the time scale in which the data could be collected could not be extended over such a long period and the data could not be extrapolated to other areas.

In order to address this problem a methodology was devised which involved a combination of each of the above techniques, with some slight alterations, for example to the way a questionnaire is traditionally used. This was an attempt to maximise the advantages of each technique and minimise the disadvantages.

A more detailed description of the methodologies that were used in the study is as follows:

- **Participant Observation** – This involved the research team living within the community for a period of three weeks. During this time in-depth structured and semi-structured interviews took place, for example, with the Regulo, Chiefs, Traditional Healer and individual women. Direct and indirect observation was carried out at all times. Interviews and observations were recorded in full detail.
- **Participant Rural Appraisal (PRA)** – This involved meetings with different members of the community including women, men and elders, both as separate groups and communally. Activities which were used include: resource mapping; seasonal calendar; timetable of daily activities; timeline; gender division of labour; farming systems analysis; scoring; ranking and shared presentation and analysis.
- **Rapid Rural Appraisal (RRA)** – This activity included general independent activities and observation and focus groups involving locals in activities such as spidergrams showing general resources, forest resources and problems faced by community; Other activities included transect drawing, soil analysis and tree identification. Also studies of existing reports, maps and aerial and terrestrial photography were carried out.
- **Questionnaires** – Questionnaires were performed in each zone of the *Regulado*. A total

of 43 questionnaires were filled in. This accounted for approximately 42% of the population. The questionnaires used differed however, from the traditional technique in that they were open-ended and exploratory rather than closed and rigid. They were in fact similar to an extended interview with guideline questions. This reduced the inflexibility normally associated with questionnaires and allowed for the exploration of other issues that were considered important by the local community.

- **Quantitative Data** – This additional methodology included anthropometric measurements of children and adults, daily fuelwood weights in order that the amount of wood used per person per day could be calculated, distances walked to resource collection sites and distances walked to get to amenities such as the health centre and mill. This was measured using Global Positioning System. This data was useful as it gave an immediate impression of certain aspects of the community. Also the data could be used at a later date for compare against new information for example, to identify whether the distance to collect fuelwood has increased or whether child nutritional status has deteriorated. This data can also be used to test the effectiveness of any resource programme that is implemented in the area.

Using a combination of techniques in this way had several advantages as follows:

- A large amount of reliable, high quality data could be collected within the time available.
- The data that was collected could be cross-checked with greater ease.
- The data produced was both qualitative and quantitative so that results were not based only on opinions of the researcher that may be subjective, but also reliable figures. In turn, observations and opinions verified the figures that were produced.
- A variety of methodologies provided a level of flexibility so that issues could be explored in greater depth and in a holistic manner.
- A high level of skill share existed with research assistants.
- The fieldwork was of low cost in relation to the quality of information collected.

It was envisaged that information gained from these methodologies would lead to the identification of both the needs and problems of the local community as they are actually perceived by the local community (rather than the researcher). Throughout the fieldwork an

effort was continually made to ensure that the views of minority and weaker groups were heard.

Utilisation of this information by various components within the project will ensure that management proposals and plans will stem from a 'grassroots' rather than 'top-down' orientation. Initiatives will then meet the needs of local people in the most appropriate, effective and efficient manner. In this way, resource use and management will become and remain sustainable.

6.3 Site Selection

The site to be selected for the pilot socio-economic study was discussed with various components. Though all areas within the buffer zone vary to certain extents depending, for example, on factors such as distance to the nearest accessible transport systems, the site selected was taken to be representative, to a certain extent, of other communities within the buffer zone of Gorongosa National Park. For example, it was a subsistence farming area dependent to a large extent on the ability to use natural resources in the area, factors that are shared with many other communities in the buffer zone. After discussions with the park administration it was anticipated that this community did not have severe problems in terms of resource availability. This was, however, considered acceptable as the main aim was to test methodologies and examine the data produced with other components in order that changes could be made prior to the main study of 1998. Information gathered from a community without severe problems is also useful in terms of contrasts and comparisons that can be made with other communities examined in the main study.

7.0 FIELDWORK REPORT

7.1 Nhambita Regulado: Historical Overview and General Information

Gorongosa National Park is situated within Sofala Province and was established by the Portuguese colonial government in 1948. Many communities living within the park area were given one years tax exemption in order to assist with relocation to external areas. At this time human settlements were not considered acceptable within specially designated wildlife zones. Nhambita *Regulado* was one of the relocation areas.

Nhambita *Regulado* is situated within the southern ‘buffer zone’ of Gorongosa National Park. The buffer zone is a designated area that surrounds the entire park, extending between 10 and 20Km in diameter (see Map 7.1). There are approximately 6000 people living in the buffer zone. Communities occupying this area are subject to certain rules and regulations in terms of resource exploitation. For example, hunting and gathering is only allowed for subsistence purposes and certain trees are protected, by law, from exploitation.

Nhambita *Regulado* is situated within Gorongosa Administrative District and covers an area of approximately 20,000 hectares. The natural vegetation within this area is typically miombo woodland, comprising *Brachystegia* and *Acacia* forest types including *Pterocarpus angolensis* (Umbela) and *Millettia stuhlmannii* (Panga-Panga).

Within the *Regulado* there are three administrative zones: Nhambita, Mussinhawa and Nhanganha. The Nhambita zone includes a small region known as Boa Maria which was previously a cotton production and export area. Access to the *Regulado* and the main administrative zone of Nhambita is via a minor road leading from the main Inchope to Villa de Gorongosa road. Map 7.2 shows an approximate representation of Nhambita *Regulado* as was drawn by locals during an RRA session. It can be seen that the boundaries of the *Regulado* are formed by the Pungue River, Gorongosa National Park (situated beyond the Boa Maria road), the road branching from the main Villa de Gorongosa/Inchope road leading to Chitengo and the neighbouring *Regulado* situated to the west of Nhambita. The rivers Rapise and Nhambita run through the *Regulado*. The area is relatively densely forested around the homesteads, though the homesteads and *machamba* (or farming) areas have been cleared for housing and agricultural purposes.

Prior to the civil war inhabitants of Nhambita *Regulado* benefited from the existence of Gorongosa National Park due to transport systems that were in operation to and from the park and nearby towns. The park also offered employment and opportunities for economic activity such as the marketing of local products. However, during the civil war Gorongosa area became a centre of military activities. Tourism, transport networks and employment opportunities all ceased to exist. At the same time mining of fields and roads prevented people from tending their *machambas* and consequently led to a food shortage. This forced a

large proportion of the population to leave the area, becoming internally displaced and known as '*deslocados*' (Finnegan 1992). The *deslocados* of Nhambita tended to move from the rural area towards the larger towns, with Nhamatanda being most common area followed by Jasse, Metochira and Beira. The average length of time spent away from the area was 8.8 years. Most of the people returned between 1994 and 1996, though the highest number of people returned in 1995. During this period of absence *deslocados* survived through securing employment on other *machambas*, in domestic labour or by living from handouts and food parcels.

In the most recent population survey dated 23/6/97, the population of Nhambita *Regulado* was reported at 612 people. This represents approximately 102 families with an average of six people per family. There are still families returning to the area, though the majority have now returned. New people that did not live in the area prior to the war were also found to be moving into the *Regulado*, for example from Beira. The reason for this was reported to be the increased opportunity for agriculture and therefore better food provision than in urban areas.

7.1.1 Homestead and Machamba Layout

There is no village type layout with a centralised housing area within Nhambita *Regulado*. Families are instead spread out on widely scattered homesteads. This is to some extent a result of the traditional fallow-farming practices that require larger areas of land. In addition, Finnegan (1992) reports that this type of settlement originated during colonial times as it helped locals escape the taxes and forced labour which were imposed by the Portuguese.

Each homestead is typically occupied by the family unit consisting of the husband, his wife or wives and their children. However, this scenario was found to vary greatly. Family units within Nhambita *Regualdo* also comprised: single men living alone; older siblings living with and taking care of younger children with no parents; divorced women living with their children. For the purpose of the questionnaire a family unit was taken to be the homestead and all the individuals living within it at the time of questioning.

The homestead consists of a series of buildings made of bamboo walls, sometimes covered with mud, with grass thatched roofs. There is one central area, sometimes only a thatched

roof without solid walls where the family congregate and where food is cooked on an open fire. Besides this central area there are also additional sleeping rooms. Other buildings/structures may include duck/chicken coops, grain stores and the latrine.

Trees that could be found on the homestead area were usually functional trees in that they were either large trees that provided shade or they were fruit trees, usually mango, papaya and banana. Vegetables, such as tomatoes and sweet potatoes would often be grown directly beside or on the homestead and were harvested as required for cooking.

Grain was either stored in a purpose built structure surrounded by bamboo and grass to keep birds away or, in the case of sorghum, in a heaped pile on a wooden frame approximately 50cm above the ground. Grain was also found to be stored on high structures within the main living area or outside but usually above the main open fire. This is for two reasons: initially this facilitates the drying of maize; secondly the smoke from the fire protects the maize from insect damage.

During the research period families were seen sleeping on the floor outside their houses by an open fire. This was because the house was infested with ants which disturbed sleep.

7.1.2 Work Performed by NGOs in Nhambita

Several Non-Governmental Organisations (NGOs) have worked within Nhambita *Regulado* over the last few years as shown in Table 7.1 below:

Table 7.1 NGO Activities

Organisation	Activities
Gorongosa National	<ul style="list-style-type: none"> • Ongoing conservation and community programmes.

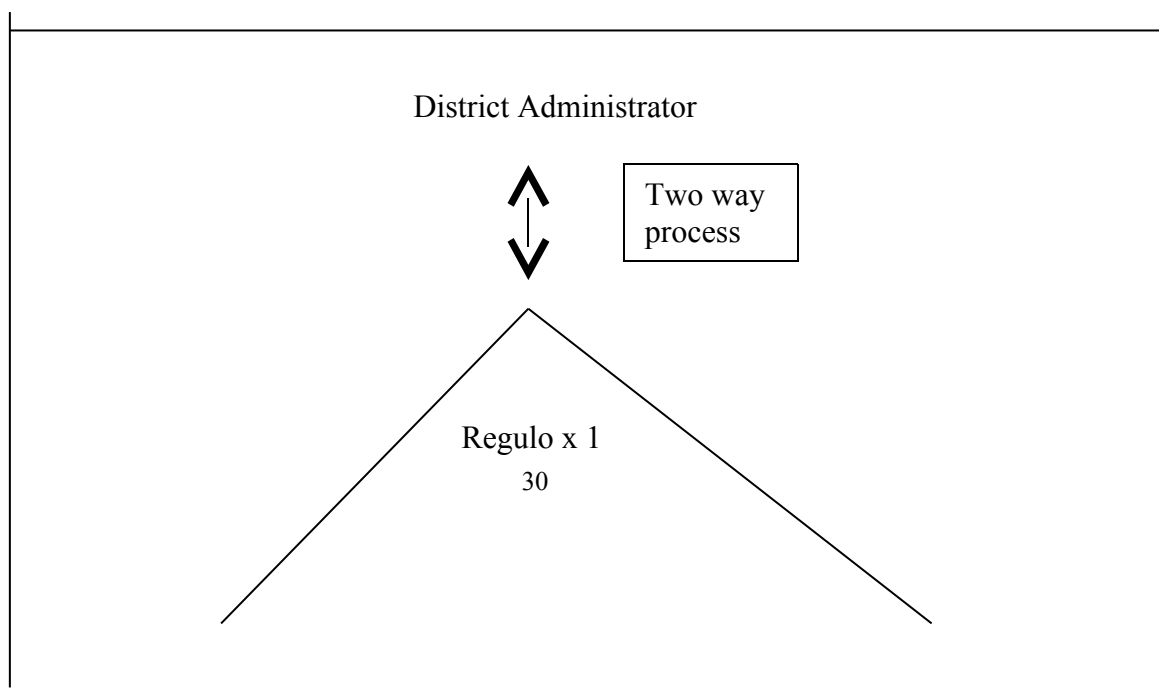
Park	
AAA	<ul style="list-style-type: none"> • Unfinished work on borehole. • 1994-5 - Provided some food and seeds (beans, maize, peanuts). • 1994 - Built school of bamboo and mud with corrugated roof, now in state of disrepair.
GTZ	<ul style="list-style-type: none"> • Built concrete Health Post in 1996 (situated in neighbouring <i>Regulado</i>) which is used by Nhambita inhabitants.

Staff of Gorongosa National Park continue to have good working relations with the Nhambita community and other communities within the buffer zone. In addition GTZ is attempting to organise a scheme for the introduction of goats into the area.

7.1.3 Systems of Control

It is perceived by the community that the *Regulo* holds the highest level of authority within the *Regulado*. The *Regulo* inherits his position as it passes down from father to eldest son. The *Regulo* of Nhambita is Manica Luis Chicari who attained his position in 1994 on the death of his father. The *Regulo* forms the highest level of the system of control within the *Regulado*, though he also claims to have a level of responsible to the District Administrator (Gorongosa). The theoretical hierarchy of control in Nhambita is indicated in Figure 7.1 below.

Figure 7.1 Theoretical Hierarchy of Control



Chief x 3 (one in each zone)

M'fumo x 12

This therefore, theoretically represents a two way process in which all but the most serious problems within the local community are dealt with from the base of this hierarchy of control. Community and domestic problems are initially taken to the *M'fumo* and then ascend through the hierarchy until the *Regulo* himself becomes involved and convenes a meeting to discuss the problem. If the problem is of such magnitude or severity that the *Regulo* himself cannot deal with it, the problem is referred to the District Administrator. All reports made to the *Regulo* are verbal. The only written evidence of records seen was a piece of paper on which census information was written.

In the reverse direction the District Administrator informs the *Regulo* of changes in the law or of problems that need to be resolved. The *Regulo* then transmits these orders down the hierarchy in order that they can infiltrate back to the local community.

The most common local problems dealt with by the *Regulo* are reported to be stealing and domestic problems between husband and wife. One example of a problem that would be referred to the District Administrator is a serious offence such as a stabbing incident.

There is, however, a great deal of controversy in relation to the *Regulo* system at a national level and there is no official acceptance of the *Regulo* system as a legitimate form of governance. Traditionally, the Portuguese colonial system had to maintain a balance between recruiting forced labour for crop cultivation and attaining local co-operation. This balance was maintained through the *Regulo* system. In order to maintain their positions, power and special privileges the *Regulos* had to comply with the demands of the Portuguese. This involved the collection of hut taxes, recruitment of forced labour and the organisation of forced cultivation. In the post-independence period, FRELIMO attempted to restructure the bureaucratic hierarchy followed the Portuguese model. However, traditional leaders were excluded from this scheme and accused of collaborating with the Portuguese. During the civil

war RENAMO attempted to restore the traditional *Regulo* hierarchy in order to use the system in the same manner as the Portuguese: to ensure a supply of food and labour. The situation after the peace agreement is complex as the traditional system is recognised by those returning to rural areas, while the central government has re-established the state administrative system. At a national level steps are being taken to address this problem and incorporate traditional authorities into the system of local government (Brito et al 1996). Nevertheless, in certain areas of Mozambique, particularly the middle provinces, the *Regulo* system continues to operate as the *de facto* political system.

7.1.4 Resource Allocation, Access and Control, Conflict Resolution

From a series of interviews it became clear that the *Regulo*'s perception of land tenure is that land is owned by the Government and his function is to control the land on behalf of the Government. In theory, therefore, the Government is therefore at liberty to reclaim the land at any time.

If a new family decide that they wish to live within the Nhambita *Regulado* they must first approach the *M'fumo*. The matter is then discussed through the hierarchy with the Chiefs and the *Regulo* and a decision is made as to whether the family may settle.

When clearing land for the *machamba*, the entire area is cleared regardless of species and protection status. Several trees may be left due to the shade that they provide. These will therefore be the older and bigger trees with fuller canopies. Fruit trees may be planted, especially mango (*Mangifera indica*) which form a large canopy providing ample shade. Trees are therefore only left *insitu* because of their functional purpose, not because of the monetary value attributed to that particular species. Valuable trees are reportedly only cut down by others who exploit them on a large scale for cash. As one local remarked “*why would we cut down a protected tree for money? Who would we sell one tree to?*”

Though new families must gain permission to settle clear an area for agricultural purposes, this was not the case for *machamba* extension. If a family wanted to extend their *machamba* area into the forest, this could be done without first having to seek permission.

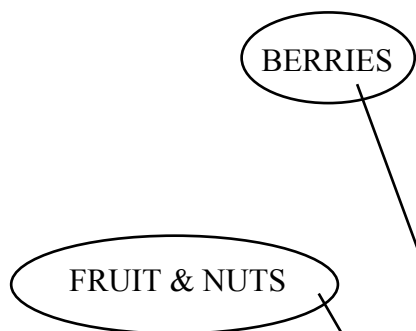
According to the *Regulo*, and others during interviews, there is no rigid system defining control of natural resources. Natural resources are regarded therefore as common property. It was also reported that “*it is only forbidden to use resources inside the National Park.*” However, if a person needed to use a natural resource such as a medicinal plant from a neighbour’s *machamba* then permission must first be gained. Any conflict which does arise as a result of natural resource use was commonly said to be resolved by the *Regulo*, however this did not appear to be a regular occurrence, possibly as resources in the area are still abundant and readily available.

7.2 Forestry Resources

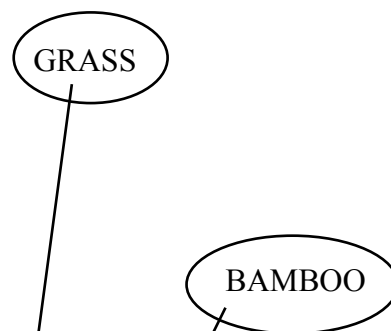
In observing the entire area from Boa Maria, the highest point within the *Regulado*, it can be seen that the terrain immediately surrounding the inhabited zones of the area is densely forested. The forest provides many resources to the people of Nhambita as can be seen in Figure 7.2 below.

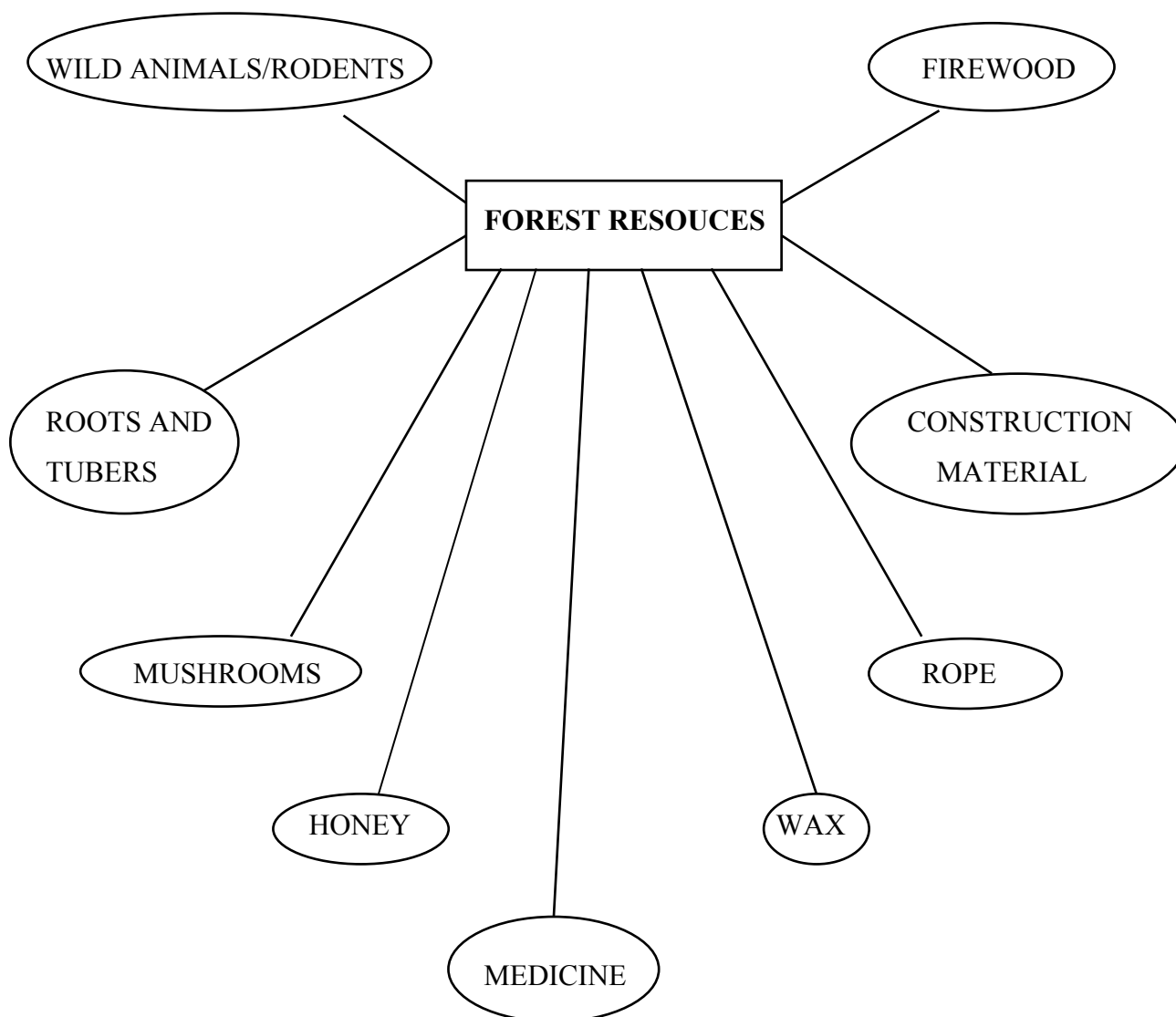
Figure 7.2 Edible and Non-Edible Forest Resources

EDIBLE PRODUCTS



NON-EDIBLE PRODUCTS





Resources available can be seen to vary greatly. They include food and non-food products, ranging from wild animals and rodents living in the forest which are hunted, to fruits and other natural growing food sources that are gathered, to medicines and the most widely acknowledged resource which is wood, utilised both for firewood and construction purposes.

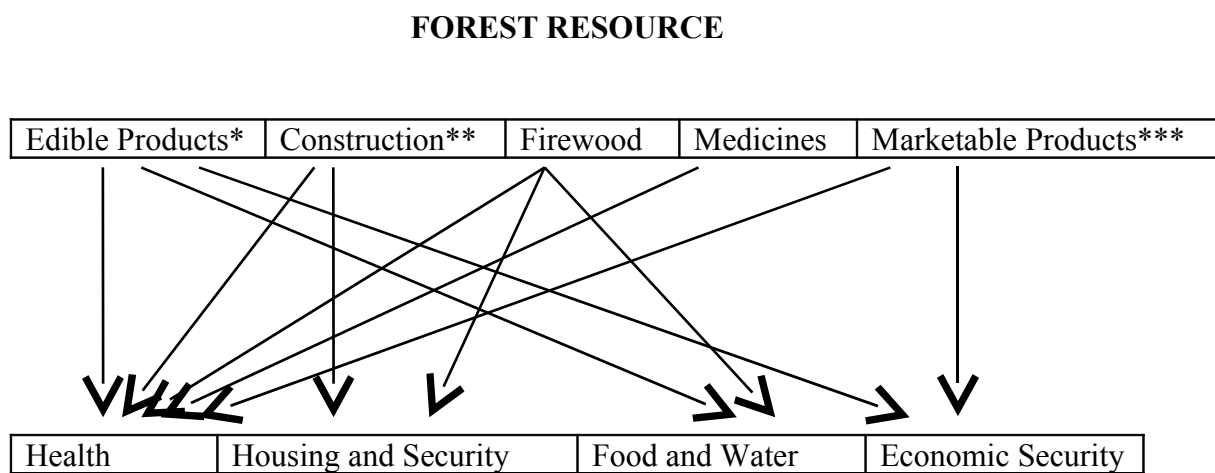
Within the constraints of the research programme it was impossible to accurately ascertain the importance of gathered food products to the dietary intake of the local community and the proportion of time which was spent on this activity. However, gathering was frequently both reported by individuals and observed by the research team. The research team were in no doubt of the importance of gathering edible products from the forest.

Without entitlement to access forest products, or if the forest products were overexploited and ceased to exist, the community of Nhambita could not as easily meet their ‘basic needs’. Basic needs can be described as “goals which for some reason or other it is believed that everyone either does or should try to achieve” (Doyal et al, 1991). For the benefit of this report the basic needs that are met through forest resources can be divided into the following:

- food and water
- housing and physical security
- economic security
- health.

Satisfying basic needs lead to improved quality of life. The following figure (in which forest resources are split into five distinctive groups) indicates ways in which access to and availability of forest resources help the community of Nhambita meet their basic needs:

Figure 7.3 Basic Needs met with Forest Resources



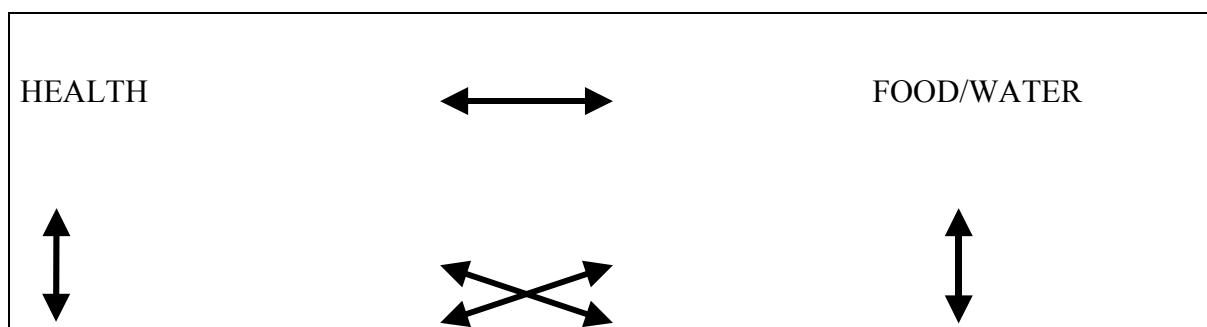
BASIC NEEDS

- * Edible products include: animals, fruit, nuts, berries, roots, tubers, mushrooms, honey.
- ** Construction products include: tree species, rope, grass, bamboo.
- *** Marketable products include: honey, wax, grass and bamboo.

It can be seen through this diagram that individual resources can contribute to fulfilling several basic needs or vice-versa that a basic need can be satisfied by several resources. In order to understand the complexity involved and the importance of forest resources a further level of analysis is presented in Appendix 1.

As indicated, forest resources improve quality of life in a multi-dimensional manner because as one basic need is fulfilled, this automatically enables an individual to satisfy other basic needs with greater ease. For example satisfying the need for health enables an individual, through their good health, to satisfy the need for housing as individuals who are in good health are more able to build a house. Simultaneously, building a good house provides shelter, so promotes health. Again, food promotes health; an individual with good health increasingly able to work on the *machamba* and gather forest products, so continue to have an improved food supply and maintain health. Health also leads to economic security as individuals are more able to work and therefore earn or exchange products. Simultaneously economic security leads to health though for example, improved diet. The following figure represents a simplification of this multi-dimensional process.

Figure 7.4 Satisfaction of Basic Needs as a Multi-Dimensional Process



ECONOMIC
SECURITY



HOUSING/
SECURITY

In examining the response to questionnaires, it became apparent that the level to which natural resources were exploited and the type of resources that were exploited within the local community varied from family to family. Areas from which resources were collected also varied. The following table is a representation of the number of families who reported exploitation of each available resource, places where they were taken from and economic activity associated with the product.

Table 7.2 Percentage of People Utilising Individual Resources, Area of Resource Exploitation and Economic Activity

Resource	Area of Exploitation (%)			Economic Activity (%)	
	Forest	Machamba	Riverbank	Sell	Retain
Grass	83	21	0	12	88
Sugar Cane	2	21	40	14	86
Bamboo	79	5	2	10	90
Medicine	43	5	0	2	98
Firewood	86	14	0	0	100
Honey	48	14	0	17	83
Fish	0	0	95	17	83
Hunting	5	5	1	0	100
Wild Roots	21	0	0	0	100

N.B. Certain families reported collecting resources from more than one area.

From this table it can be seen that firewood, grass and bamboo are collected by the highest percentage of people, mainly from the forest area but also from individual *machambas*. This is due to the importance of these products for the construction of houses. It can also be seen that fishing is of great importance to the local community with 95% of families involved in this activity. Collection of honey either from the forest or from hives (usually sections of hollow tree trunks) kept on *machambas* is also of importance. Both honey and fish can be seen to have economic importance to the local community as these are the products that are most often sold. Wild roots were frequently reported to be collected from the forest as a coping mechanism in times of food scarcity. Very few families reported hunting wild animals. This is discussed in greater detail in section 7.13.

7.2.1 Fuelwood Collection

The local area within the inhabited zones of Nhambita *Reguado* is reasonably well forested so that fuelwood collection was not reported to be exceptionally time consuming or problematic to members of the community. This is likely, however, be a consequence of the area being less populated during the civil war, which allowed for the natural regeneration of forest.

Firewood appeared to be collected either daily or every other day by most of the families observed. It was collected from either within or outside individual *machamba* areas. The firewood collected was either deadwood that is gathered from the ground or dead tree branches that were cut off with an axe. Alternatively, other families used wood that had been cut down from their *machamba* during clearing activities. Families who collected wood from outside the *machamba* collected from a different area each day. The following tables show average fuelwood data collected from 3 families during the research period:

Table 7.3 Fuelwood Data

No. family members	Amount of wood (Kg)	No. days use	Tree species	Time taken to collect (Mins)		Other Information
2 adults 1 child	22	2	<i>Piliostigma thonningii</i>	Walking	40	Dead wood chopped from tree. Collected by one man.
				Collecting	20	
				Total	60	
4 adults	25	1	<i>Piliostigma</i>	Walking	20	Dead wood from cleared

3 children			<i>thonningii</i>	Collecting Total	10 30	machamba. Woman carried 20Kg + child and breastfed baby at same time, man carried 5Kg.
6 adults 9 children	119	2	<i>Lonchocarpus capassa Albizia versicolor</i>	Walking Collecting Total	20 30 50	Dead wood collected from ground and chopped from trees. Women (1) and men (2) involved. Women carried 30-40Kg, men carried 40-50Kg. Women also gathered wild fruit.

Table 7.4 Total Wood Utilised Per Person Per Day

No. People in Family	Wood Collected	No. Days Use	Wood per Family per Day	Total Wood per Person per day
3	22 Kg	2	11 Kg	3.7 Kg
7	25 Kg	1	25 Kg	3.6 Kg
15	119 Kg	2	60 Kg	4.0 Kg
AVERAGE				3.76Kg

The table shows that though different amounts of fuelwood are collected, individual fuel use is actually very similar, ranging from 3.6 - 4.0 Kg with the average amount being 3.76 Kg per person per day. (Children are calculated as utilising the same amount as adults).

From this average figure of 3.76Kg per person per day it is possible to calculate the average annual volume of wood used per person and per average family with six members. The average volume depends on the density of the fuelwood which varies according to species. In Table 7.5 below, three types of fuelwood species each with differing densities have been used to highlight the variable volume according to density and give an average volume per person and family.

Table 7.5 Annual Volume of Fuelwood

Fuelwood Species	Density (Kg/m³)	Annual Volume per Person (m³/yr)	Annual Volume per Average Family (m³/yr)
<i>Lonchocarpus capassa</i>	770	1.8	10.8
<i>Piliostigma thonningii</i>	750	1.83	11
<i>Acacia Nigrescens</i>	1,100	1.25	7.5
Average		1.6	9.8

O'Keefe et al (1984) estimate that the average woodfuel needs per individual in Sofala Province range between 1.1 - 1.7m³/habitant/year. The average shown in the table above is therefore within this expected range. However, as Tables 7.7 and 7.8 show, *Lonchocarpus capassa* (pacassa) and *Piliostigma thonningii* (mucaqueca) are the most popular species for both fuelwood and construction. The average for these two species is 1.815m³/habitant/year, slightly higher than the cited average. This could however be explained by the fact that forestry resources are readily available and therefore utilised freely rather than with caution. Using the above figure of 1.815m³, the volume of required to address the needs of the entire Nhambita community can be calculated to be 1110.8m³/year.

Table7.6 Total Time Taken to Collect Wood

No. People in Family	Time Taken to Collect Wood	No. days supply	Total Time Taken per day (mins)	No. People collecting	Amount Carried Per Person
3	60	2	30	1	11 Kg
7	30	1	30	2	15 Kg
15	50	2	25	3 – 4	15-20 Kg
AVERAGE			28.3 Mins		14.5 Kg

From the above table it can be seen that the families observed all spend roughly equal amounts of time collecting firewood regardless of family size. It would appear that as family size increases more people are involved with in the collection of firewood. Additionally, the weight of firewood carried by each person increases.

7.2.2 Trees Used for Fuelwood

During the research period people were asked which species of tree they used as firewood. (This was investigated during group discussions and on individual questionnaires). The following table represents the ten most frequently cited tree species. (A full list can be found in Appendix 3). The figures give a representation of trees that were mentioned most often therefore most popular and/or most readily available in the surrounding environment. It is interesting to note that some of the trees mentioned are in fact protected species. On certain occasions individuals mentioned that a tree was protected, then went on to say that it was also used by their family as firewood.

Table 7.7 Commonly Cited Species of Tree Used for Fuelwood

SENA/PORTUGUESE	SCIENTIFIC NAME	% PEOPLE USED BY
Pacassa	<i>Lonchocarpus capassa</i>	47
Mucaqueca	<i>Piliostigma thonningii</i>	37
M'fute	<i>Brachystegia boehmii</i>	28
Panga-Panga	<i>Millettia stuhlmannii</i>	12
M'goa	<i>Acacia goetzei</i>	12
Psototo	<i>Lannea stuhlmannii</i>	9
Mussassue	<i>Podranea brycei</i>	9
Missanda	<i>Erythrophleum lasianthum</i>	7
Mutalala	<i>Lecaniodiscus fraxinifolius</i>	5
Mucanca	<i>Pachystela brevipes</i>	5

7.2.3 Trees Used for Construction

All structures within Nhambita *Regulado* are constructed using forest resources. Frames for buildings (ranging from latrines to chicken coops to houses) are constructed with wooden frames with bamboo walls that are occasionally covered with mud. Roofs are made from grass. The only concrete buildings seen were an old school that was war-damaged and reported to be surrounded by landmines, and the Health Post, which is outside Nhambita *Regulado*.

Table 7.8 indicates the ten most frequently cited tree species used for construction purposes. A full list of tree species used for construction can be found in Appendix 3 (Table 3.2).

Table 7.8 Commonly Cited Species of Tree Used for Construction

SENA/PORTUGUESE	SCIENTIFIC NAME	% PEOPLE USED BY
Mucaqueca	<i>Piliostigma thonningii</i>	35
Pacassa	<i>Lonchocarpus capassa</i>	14
Mucimbe	<i>Burkea africana</i>	14
Momba	<i>Pterocarpus brenanii</i>	9
Panga-Panga	<i>Millettia stuhlmannii</i>	9
M'fuma	<i>Diospyros mespiliformis</i>	9
Psototo	<i>Lannea stuhlmannii</i>	9
M'fute	<i>Brachystegia boehmii</i>	7
Umbila	<i>Pterocarpus angolensis</i>	7
Mutarara	<i>Lecaniodiscus fraxinifolius</i>	5

From examining Tables 7.7 and 7.8 above it can be seen that *Piliostigma thonningii* (mucaqueca) and *Lonchocarpus capassa* (pacassa) emerge as the species which are used most frequently for both firewood and construction purposes.

7.2.4 Medicinal Resources

A large variety of natural resources in the area are used as preventative and curative health remedies. Resources include flowers, plants, shrubs and trees. In addition to the Traditional Healer, many families interviewed had differing degrees of knowledge in terms of resources that were available to treat certain illnesses. Medicinal resources were mainly used to treat stomach problems, skin wounds, headaches and improve sexual performance. A complete list of resources that were identified can be found in Appendix 3 (Table 3.3).

7.2.5 Fruit Production

Fruit was found to be important to the local community mainly in terms of dietary intake. Fruit trees were found growing on all homesteads and occasionally on the boundary of *machamba* areas. One family had dedicated an entire area of their *machamba* to the production of papaya, which were then exchanged within the community for other products. In addition, fruit such as wild berries and tamarind were also gathered from the forest. Fruit growing on homesteads or *machambas* was considered to be the property of the family living on the homestead and working the *machamba*. Fruit gathered from the forest, however, was freely accessible to all and so regarded as common property. Fruits that were observed or reported to exist within the area include: guava, mango, papaya, tamarind and banana.

7.2.6 Forest Clearance

Forest clearance was noted to be taking place both on the fringes of the forest and within the *machamba* areas. Forest clearing activities were performed to establish new *machambas* for agricultural activities. In one case a new family had moved to the area and was clearing a *machamba* area into the forest. In another a family was clearing trees from the bank of the River Rapise in order to establish a second *machamba*. Some of the larger trees that were found to be growing on the riverbanks were 'ringed'. This process involves the removal of approximately 10cm of the xylem and phloem section of the tree. The nutrient supply to the tree is then cut off and the tree dies *insitu* making it easier to cut down. Chopping down large trees is hazardous and a special ceremony is held in order to provide protection to those involved in this activity.

7.2.7 Tree Planting Activities

On examining tree-planting activities within the local community it became apparent that the only trees being planted were fruit trees such as mango, papaya and banana. Such trees are relatively simple to propagate but were given little protection once planted onto the homestead. Trees for fuelwood or construction purposes were not planted, no doubt due to the abundance of such species in the nearby forest area.

7.3 Wildlife

Since the war the number of wildlife inhabiting areas around and within the *Regulado* has diminished considerably. Elders within the community recite tales of the days when elephants strayed into *machambas* to eat the crops. This, however, is no longer the case. Members of the community did, however, report seeing a variety of animals in the local area. Appendix 4 indicates the animals that were listed on questionnaires as being seen recently within the area. The main groups of animals mentioned were small monkeys, baboons and rats. Warthog and gazelle were also seen in the forest areas

7.3.1 Hunting

The importance of hunting – both to the diet and as an economic activity - was difficult to determine due to the sensitive nature of this information. Hunting within the National Park and buffer zone is forbidden. However, the Park Administration allow local communities to hunt within the buffer zone for subsistence purposes only. In future, there are plans to forbid all manner of hunting within the National Park, though subsistence hunting within the buffer zone may continue to be allowed. Hunting regulations are well known throughout the *Regulado* and for this reason individuals were reluctant to discuss their hunting practices.

Two people did admit to hunting in the forest and two also admitted to hunting on their *machamba*. The two cases where hunting within the forest was admitted both came from the Boa Maria area of the *Regulado*. This area is quite isolated and distant from the central administrative area of the *Regulado*. The first family reported that gazelle, baboon, small monkeys and rabbits were hunted from the forest. Hunting was said to be the responsibility of the older boys and the father of the family. Catapults, and dogs were used to hunt and in some cases traps were set. Meat from the animals was not however sold but was used for subsistence purposes. The second family also admitted to hunting gazelle and small monkeys, also for subsistence purposes. The two families involved in hunting on their *machamba* did so

for rats and baboon which were then consumed. In certain cases traps were set for this purpose.

In addition to information from the questionnaires, observation of homesteads and activities throughout the *Regulado* led the research team to believe that hunting were in fact relatively widespread. For example, wires from hunting snares were seen hidden on one homestead though the family denied any hunting activities. On another occasion the research team encountered a sole hunter very early one morning carrying his bow and arrow through the *Regulado*.

7.3.2 Fishing

Fishing within the National Park and buffer zone is also forbidden without an appropriate license. However, again the Park Administration has allowed local communities to continue fishing within the buffer zone for subsistence purposes only. Within Nhambita community fishing was found to occur mainly in the Pungue River, however, during the wet season people also fish in the smaller Rapise and Nhambita Rivers. Fishing was found to be an important activity for the community of Nhambita in terms of both dietary intake and economic income. In Table 7.2 above it can be seen that 95% of the population are involved in fishing activities and 17% of families sell fish that is caught. Fishing is, therefore, clearly not only carried out for subsistence purposes. The Park Administration has found fish poaching to be such a problem that measures will be taken to stop fishing completely within the national park and introduce mechanism to control and reduce activities within the buffer zone.

7.3.3 Attitude to Gorongosa National Park

Prior to the establishing of Gorongosa National Park in 1948 communities living in the area had unlimited access to natural resources. They could hunt and fish and gather forest products as desired. However, when the area was granted National Park status these activities became limited.

Within the community there appeared to be differing attitudes to Gorongosa National Park and the prospect of future rehabilitation according to individual groups of people. Each will be examined individually.

- **Elders**

When interviewed using RRA/PRA techniques it became apparent that this group, (of mainly men), continue to have strong memories of the time when the area became a National Park and communities were relocated. The group therefore continued to feel some antagonism towards the park. However, this antagonism appeared to be linked to the colonial period and to difficulties that were remembered from that time. For example, one elderly man associated this time with the forced labour imposed by Portuguese authorities in agriculture (cotton production) and construction of the roads leading to the National Park. He recalled that “*we had to carry the chief on our shoulders while he was reading a book, if we were tired we were beaten*”.

Other elder members of the community, however, reported that their quality of life was good in the time after 1948 when the National Park was fully functional. One of the main reasons for this was stated to be that the meat from trophy hunting within the park was shared with the local community. Also, elephants that strayed into *machamba* areas were occasionally destroyed by park rangers and again the meat was shared with the local community. However, it was reported that the presence of the National Park detracted from quality of life in that hunting of animals (both trapping and shooting with bow and arrow) was no longer allowed. As trophy hunting no longer took place and elephants no longer invaded *machambas*, locals had little access to fresh meat.

- **Regulo Chicari**

According to the *Regulo* it is only the old people who view the relocation from the National Park as an issue. He stated that resentment has now passed and that though hunting is now forbidden this is not a problem as “*hunting has been forbidden a long time and people have become used to it*”.

If there are any problems that involve the National Park and the local community, the *Regulo*

and the Park Administrator will meet and try to resolve the problem. Frequent meetings take place between the Park Administrator and the *Regulos* in the area in order to resolve problems and promote co-operation.

- **Younger Generation**

This group includes all people who do not remember the establishment of the Park and the subsequent expulsion of local communities. The opinion of this group differed quite significantly from the older generation. Opinions were generally positive. Many reported that the National Park did not have much impact on their lives but that they were generally optimistic that in the future, when the park is rehabilitated, there would be increased employment opportunities and an improved transport system. Many said that they were now accustomed to the protected status of the National Park and therefore did not object to the forbidding of resource exploitation. Some however, said that matters could be improved if there was more communication between the National Park and the community so that people were increasingly aware of the situation in the Park.

7.4 Farming Units/Systems

Each family unit typically has two *machamba* areas. The first *machamba* was in all cases the larger of the two and varied between one and five hectares in size. This *machamba* surrounds the homestead. The second is smaller, approximately half to one hectare and situated on the floodplain of the nearest river (Nhambita, Rapissa or Pungue) where the soil is more fertile. The boundary area of each *machamba* was delineated with either footpaths or loose hedges usually formed from tall growing bean plants. Various crops were both observed and reported to grow within Nhambita *Regulado* as shown in the table below.

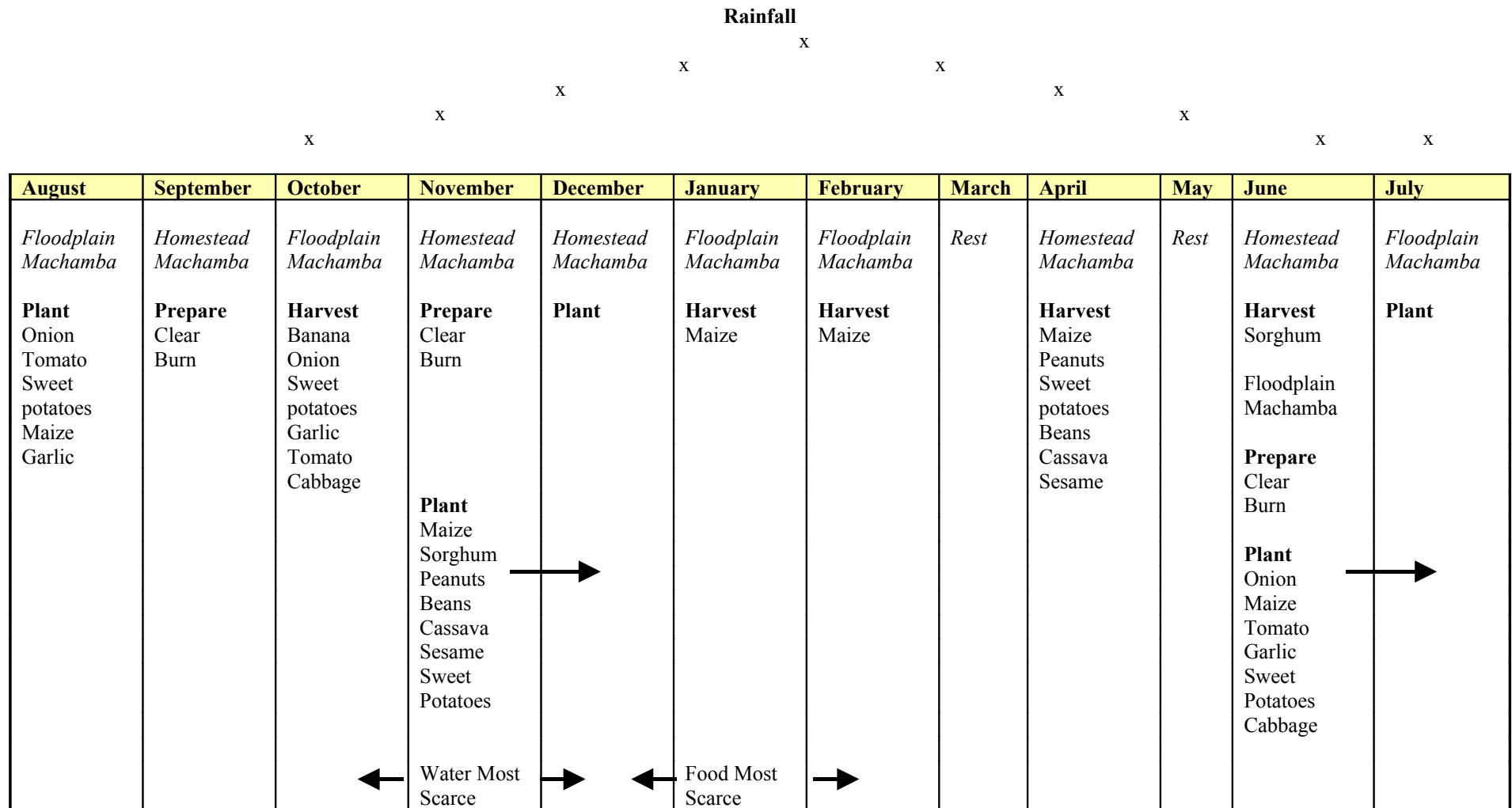
Table 7.9 Crops Cultivated in Nhambita *Regulado*

Grains/Oil Seeds	Tubers/Ground Crops	Fruit/Vegetables	Legumes (local varieties)	Other Field Crops
Millet Maize Sorghum Rice Sesame Sunflower	Yam Sweet Potatoes Cassava (roots and leaves eaten) Onions Garlic Peanuts	Tomatoes Cucumber Pumpkin Cabbage Water melon Honey melon Banana Mango Guava Papaya	Feijao jugo Feijao manteiga Feijao nhemba Feijao buenti	Tobacco Cotton Sugar cane Saffron Grass Bamboo

Maize and sorghum were found to be the most common crops that were grown. Tomatoes and onions were often grown on the floodplain *machamba* or occasionally tomatoes would be grown directly on the homestead and harvested as necessary.

Figure 7.5 overleaf indicates a generalised seasonal calendar for agricultural activity in Nhambita *Regulado*.

Figure 7.5 Seasonal Calendar



7.4.1 Land Preparation and Treatment

- **Shifting Cultivation**

Shifting cultivation is a form of agriculture in which soil fertility is maintained by rotating fields rather than crops. A piece of land is cropped until the soil shows signs of exhaustion or is overrun by weeds. The land is then left uncultivated (to fallow) in order that it can regenerate naturally while cultivation is carried out elsewhere. New sites are usually cleared by firing (slash and burn). This is the traditional farming technique in Nhambita. However, though this is a traditional farming method within Nhambita, the level of knowledge in terms of fallow systems and the length of time that families left areas of their *machamba* to fallow appeared to vary. This was thought to be a result of different farming techniques and traditions that had been adopted during periods of absence as a consequence of the civil war. In addition certain families who had returned to their *machambas* recently had returned to fertile soil which had already been rested for a long period in their absence so were unsure how long they would cultivate their land before leaving it to fallow. Other families, especially those comprising young siblings appeared to have little knowledge or experience of fallow so had not yet established a fallow routine. However, the rotation system was typically as follows: one area of land on the *machamba* is cultivated for between 5 to 10 years, or until the soil appears to decrease in fertility. After this time cultivation ceases completely and the area is left fallow for 5 to 10 years. The second area is then cultivated for the same period and then again left fallow.

- **Irrigation/Fertiliser/Pesticide/Composting**

Irrigation of any form was not seen or reported as being used. Chemical fertiliser and pesticide were generally not used as these products were either unavailable or outside the purchasing power of locals. One farmer did however report using DDT the previous year. This was however brought with him when he returned to the area after the war. He has now used up his supply and could not afford to buy more if it was available. Natural pesticide (such as a tobacco and water mixture) was not observed or reported as being used. Composting of waste was not seen anywhere within the *Regulado*.

- **Land Clearing**

After harvesting of crops had taken place the *machamba* areas were not immediately cleared. Vegetation was left to die off and degrade *insitu*. Fields were only cleared directly prior to planting the next crop of vegetables. In this case the area would be cleared using a wooden handled hoe with a metal edge. Waste materials would then be gathered together on separate piles and burned.

- **Planting**

Evidence of both intercropping and multi-cropping was frequently observed amongst the *machambas*. Maize and sorghum were commonly intercropped. Maize was initially planted in rows, approximately 20 - 50 cm apart. When the maize had reached approximately 30 cm in height sorghum was planted in the centre of each two maize stalks. As the maize and sorghum grew taller other vegetable such as tomatoes, pumpkin and sweet potatoes were planted in the shade forming a multi-cropping system.

7.4.2 Pests

Pests reported to affecting crop production are shown in the table below:

Table 7.10 Pests Affecting Crop Production

PEST	% AFFECTED	CROPS AFFECTED
Birds	50	Sorghum, maize (fresh and dried), rice, sugar cane.
Grasshopper	40	Maize, maize leaves, sorghum, pumpkin, cassava.
Rat	38	Maize (dried), sorghum, sweet potato, beans, groundnuts.
Small Monkey	33	Maize (fresh and dried), sorghum, sweet potato, pumpkin, papaya, cucumber.
Mice	31	Maize (fresh and dried), sweet potato, other ground seeds.
Baboons	14	Maize (fresh and dried), sorghum, pumpkin, papaya, cassava.
Maize weevil	10	Maize.
Gazelle	2	Nyemba beans, maize.
Caterpillar	2	Maize, sorghum.
Warthog	1	Maize, sorghum

The most often reported form of pest control involved banging an empty vessel with a hard object or clapping hands both intended to frighten birds away. It was difficult to estimate the specific amount of any particular crop that was lost to pests each harvests. Reports ranged from 10 – 50% of both maize and sorghum. Besides pests, many people said that the main problem in relation to agricultural production was drought.

7.4.3 Livestock

In addition to agricultural activities and hunting and gathering of forest resources, many families also kept livestock. The following table shows the type of livestock that was kept.

Table 7.11 Livestock Kept by Nhambita Community

LIVESTOCK	% of POPULATION
Chicken	83 %
Ducks	52 %
Pigs	29 %
Goats	9 %
Pigeons	5 %

Livestock was mainly kept on the homestead area. Although some were sold, generally, many appeared to be kept as an insurance measure and were only sold in times of food scarcity in order to attain income which was then spent on other staple food products. Many of those interviewed who presently do not keep chickens or ducks intended to keep them in the future.

7.4.3 Water Collection

Water is collected, by women, from whichever river source is closest. During the dry season the Rapise and Nhambita rivers are dry and water is collected from wells that are dug into the sandy riverbed. The rivers are dry from approximately April to November with October to November reported to be the driest time of year. The Nhambita river is the first to become dry, so during this time water is collected from the Rapise. Wells are then dug into the riverbed of the Rapise when it also becomes dry. The hand-dug waterholes along the Rapise are approximately 2 metres wide and one metre deep with 15cm of water in the bottom. Water is scooped out in a plastic vessel. Water that becomes dirty is thrown out and the well is allowed to refill with clean water. Two main waterholes in the Rapise were in use at the time of the research.

Filling a twenty-litre bucket of water from the water-hole takes approximately 15 to 20 minutes and the majority of families within Nhambita zone live no further than 10 to 15 minutes walk from the Rapise. Of fifteen families asked, time taken to collect water was reported to be between 30 minutes and 2 hours with an average of 48 minutes for the entire journey. A twenty-litre bucket of water is collected and returned to the homestead on average between 2 and 3 times per day depending on family size. However, the waterholes do not only provide water, they also serve as an opportunity for women to meet and socialise. Other activities are also performed at the waterhole. For example women wash their smaller children as they stand in buckets by the water hole and they also wash themselves, dirty dishes and the family clothing.

7.4.5 Division of Labour

There appeared to be a distinct division of labour within family units based on gender. Women and older girls were generally active around the homestead and *machamba* areas

while men and elder boys were increasingly engaged in activities within the forest. The table below indicates this division of labour more specifically.

The division of labour shown within the table represents only the local activities within and around the homestead, *machamba* and forest. It does not include a division based on economic activities nor does it extend to wider areas, such as local markets where economic activity takes place.

A brief examination shows, however, that women are mainly responsible for crop production and therefore economic benefits associated with this activity. Men are however responsible for collecting and selling of forest resources.

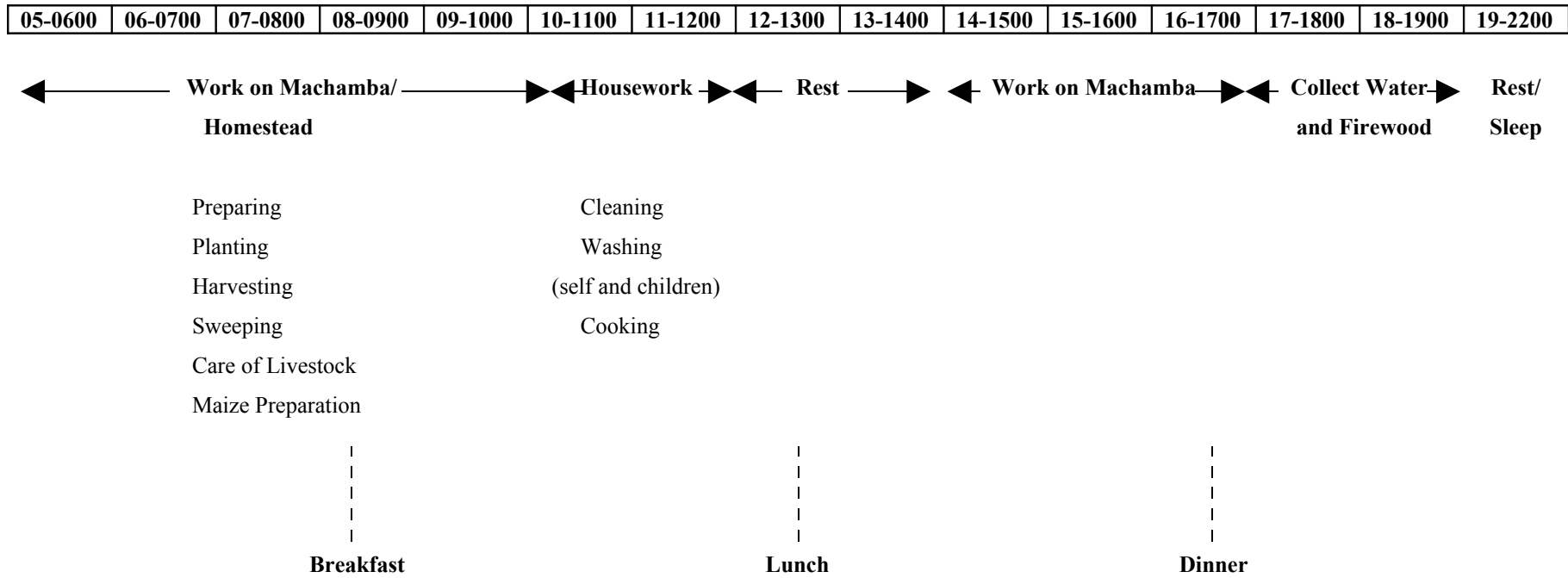
Table 7.12 Division of Labour within Nhambita

FEMALE	MALE
HOMESTEAD	HOMESTEAD
Collecting water	Building houses
Washing clothes	Thatching roofs
Sweeping homestead and house	Collecting/chopping firewood
Collecting/chopping firewood	Attending to livestock
Cooking	Bee-keeping
Washing plates/utensils	
Washing children	
Building fires	
Attending to livestock	

Grinding grain to flour (manually)	
Preparation of dry maize for milling	
MACHAMBA	MACHAMBA
Clearing	Felling trees
Burning	Clearing
Planting	Harvesting
Harvesting	
Storage preparation	
FOREST/OTHER	FOREST/OTHER
Carrying grain to mill	Hunting
Gathering forest products (fruit etc.)	Fishing
	Gathering honey from forest
	Collecting grass
	Collecting bamboo

The figure overleaf shows an approximate timetable of daily activities in which women are involved.

Figure 7.6 Women's Daily Timetable of Activities



7.5 Economic Systems

During Portuguese occupation the colonialists created a demand for agricultural products that determined economic activity in rural areas. *Regulo Chicari* reported that “shops that existed during colonial times were run by colonialists. Maize was exchanged at the shops for sugar, salt and children’s clothes. Maize was also sold and money was used to take children to hospital and pay for treatment. Honey, wax, sorghum, sunflower oil, peanuts, beans were also traded or sold”.

With the end of colonialism this economic activity ceased. The onset of the civil war and closure of the National Park disrupted the regeneration of any economic activities and eventually prevented agricultural and gathering practices from taking place. When the civil war ended and people returned to their *machambas* agricultural activities resumed and in some cases excesses of food are now produced. In terms of economic activity, the community is, however, thwarted mainly due to lack of local demand and lack of infrastructure to transport produce to other areas. These issues are explored in greater detail in the non-natural resource section of this report.

7.5.1 Livelihood Activities

Of the families interviewed 100 % gained their livelihood from *machamba* activities. Though individuals were sometimes employed in other occupations, farming and food production was still undertaken by other members of the family. Agricultural production was found to be completely for subsistence purposes. Though some excesses were sold, this was reportedly never more than was kept for the household. Table 7.13 shows other areas where income was generated.

Table 7.13 Income Generating Activities

Activity	% of families
Sale of livestock	33 %
Sale of natural resources/agricultural products	69 %
Additional employment (e.g. teacher, game warden)	16 %

It is anticipated that the number of people selling livestock would be higher in times of food shortage and famine. As mentioned previously, livestock was mainly kept as an insurance measure and sold in times of hardship.

7.5.2 Products Sold and Purchased

Various products were sold and purchased by the inhabitants of Nhambita. Products that were sold include crops, natural resources and livestock with maize being the most common crop sold. Alcohol made from sugar cane or maize is also sold. Six main products were purchased. These include soap, salt, clothes, sugar, oil and dried fish. Other products, such as paraffin, are purchased less often by fewer members of the community. Clothes are the most expensive products and many people reported difficulties in acquiring such items. Complete lists of products that were reported to be both sold and purchased, and an indication of various prices can be seen in Appendix 5. The following table indicates the areas where products could be both sold and purchased.

Table 7.14 Places Where Products Sold and Purchased

AREA	% of FAMILIES SELLING RESOURCES	APPROXIMATE DISTANCE (Km)
Local	60 %	
Nhamatanda	20 %	25
Villa de Gorongosa	3 %	20
Metochira	30 %	14
Pungue River bank	7 %	12

Some families sold and purchased products in more than one place. However, it can be seen that most products are sold and purchased locally. Others are sold and purchased in areas within walking distance or areas that are easily accessible by 'chappa' (local minibus).

7.5.3 Kiosks

There are three areas where kiosks exist within Nhambita *Regulado* and two others used by the community when attending the mill or health centre. The kiosks are all traditional mud huts and sell a range of products. The following table provides information regarding kiosks.

Table 7.15 Kiosks

ZONE/AREA	NUMBER OF SHOPS	COMMENTS
Nhambita	Four shops in one area	Only one shop ever seen open. Very poorly stocked with dried fish, salt, sugar, few clothing items.
Mussinawa	A series of four new shops built in one area	Three of four shops open selling <i>Neepa</i> , various items of second hand clothing, food and non-food products
Nhanganha	1	Closed
Mill (outside <i>Regulado</i>)	1	Well stocked with food/non-food resources. Fresh vegetables and bread also sold by separate individuals.
Near Health Post (outside <i>Regulado</i>)	1	Well stocked with food/non-food resources.

7.5.4 Average Shop Products & Prices

The following table shows the average prices found in kiosks for various products. Most products sold were identical or very similarly priced in each individual kiosk. It can be seen that most items were sold in small quantities in order that they are within the purchasing power of members of the local community.

Table 7.16 Prices of Products Sold at Kiosks and Mill

Product	Price (MT)
Small dried fish (10 cm x 2 cm) x 5	2,000.00
Block soap (10cm square) for clothes	2,000.00
Bar of soap (for personal washing)	3,500.00

Sugar (approx. 50g bag)	2,000.00
Sugar (approx.25g bag)	1,000.00
Salt (approx. 75g bag)	1,000.00
EC Cooking oil (approx. 25ml measure)	1,000.00
Cigarettes (Time/Kingsport brand, 20's)	5,000.00
Biscuits x 4 (two varieties)	1,000.00 or 3,000.00
Pencil	1,500.00
Comb	3,000.00
Children's sweets (each)	2,000.00
Pens	2,500.00
Batteries x 2	5,000.00
Fishing line (per metre)	1,000.00
Mothballs (each)	1,000.00
Breadroll	500
Large spring onion (x 4)	1,000
Large cabbage leaves (x 2)	1,000
Maize (uncooked/per head)	500
Tomatoes (per 6 -7)	500
Papaya (each)	500

7.6 Non-Natural Resource Use: Infrastructure/Amenities/Public Services

7.6.1 Health and Well Being

7.6.1.1 Poste de Saude (Health Post)

There is no Poste de Saude or Health Post within the Nhambita *Regulado*. The nearest Health Post is situated within a neighbouring *Regulado*. It is a well maintained, clean, concrete building that was constructed by GTZ in 1995. It has two rooms, one for consultation and one for examination and is open daily from 6 a.m. until 8.30 p.m. Treatments is mainly of minor problems and involves consultation and the distribution of medication. Operations are not performed. Consultation costs MT 5,000.

Though responsible for the building work, GTZ has no responsibility for the funding, medical supplies or functioning of the Health Post. The Health Post is funded by the Department of Health and medicines are provided by Gorongosa District. Medicines that are available are presented in Appendix 6.

The Health Centre offers a vaccination programme for BCG and polio, though this is only performed within the Health Post as there is no outreach vaccination programme. Measles vaccinations are only available in Villa de Gorongosa.

An outreach programme does exist in which health workers work with local communities offering health education and advice. Pregnant women are offered monthly examinations at the Health Post and a Traditional Birth Attendant is available to help during childbirth.

Reaching the Health Centre involves a long and difficult walk to the banks of the Pungue River and along the river into the next *Regulado*. Distance to the Health Centre from Nhambita Base Camp and back is approximately 18Km (15Km direct from point to point).

The time taken to walk to the Health Post is 2 hours and 30 minutes in each direction. It should, however, be taken into account that this trial walk was undertaken by three healthy individuals, walking at a fast pace, without rest. Sick people, especially if attending with small sick children and babies would take considerably longer. It is feasible to estimate that attendance by a sick person or family from the Nhambita Zone, including the waiting and treatment time at the Health Post would occupy a full day from sunrise to sunset.

Data was collected from the Health Post from the twelve-month period preceding the fieldwork in order to ascertain the most prevalent diseases. This complete data set can be seen in Appendix 6. Results from this data collection can be seen below:

A total of 87 people visited the health centre between August 1996 and July 1997 from Nhambita, Boa Maria, Nhanganha and Mussinhawa areas of the *Regulado*. People visiting the health centre are divided into categories on the basis of their age group. Visits to the health centre according to age group can be seen in the table below:

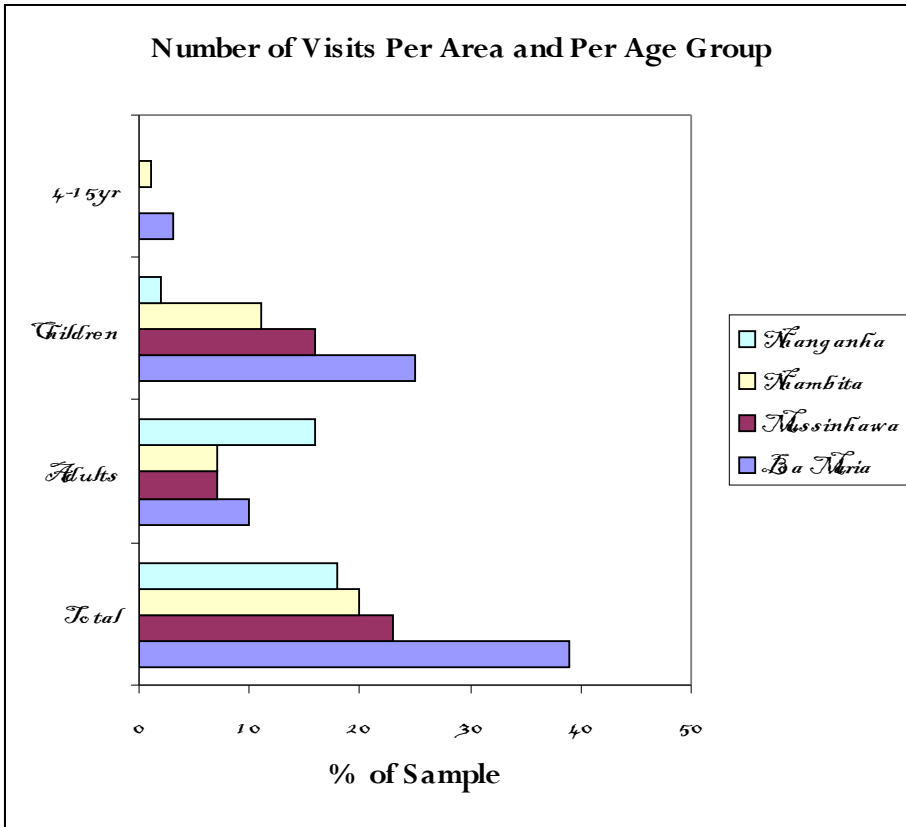
Table 7.17 Visits to Health Centre from Nhambita According to Age Group

Group	% of Sample
Adults	40
Children below 4 years old	55
4-15 year old	5

It can be seen that more children were treated at the health centre than any other group. The 4 to 15 year old category was significantly lower than that of children and adults.

The total amount of patients from each area within the *Regulado* also varied as can be seen from Figure 7.7 below.

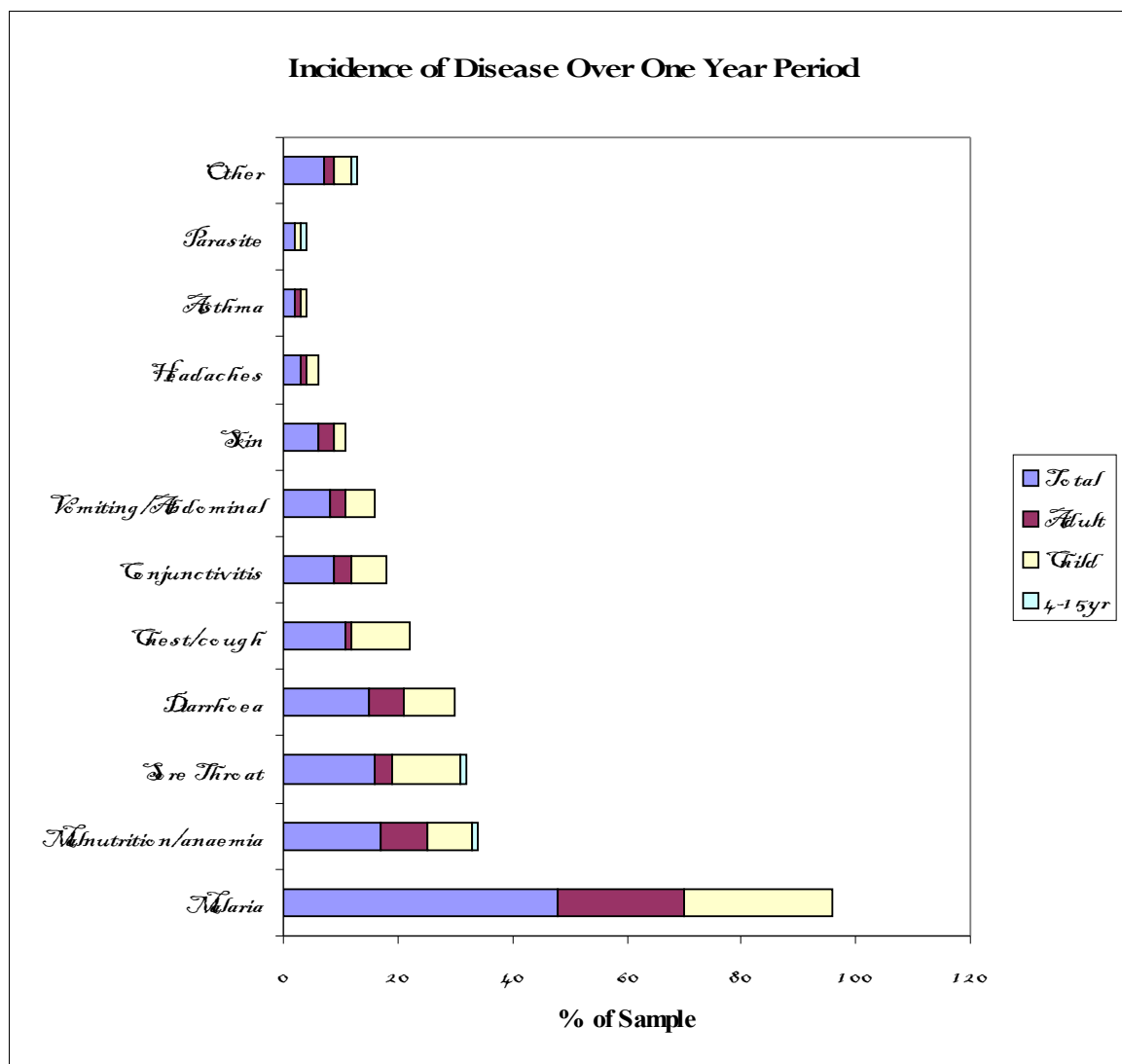
Figure 7.7



It is clear from this table that a large percentage of people visiting the health centre are from the Boa Maria area of the *Regulado*. This is of importance as Boa Maria is the least populated region of the *Regulado*. The result therefore indicates a high incidence of disease per capita within the population of Boa Maria. In children, the highest level of attendance is also from Boa Maria. The highest incidence of disease in adults is from the Nhanganha area.

Information collected showed that individuals presented at the health centre with a variety of problems. The total incidence of each problem and problems within each age group is presented in Figure 7.8 below:

Figure 7.8



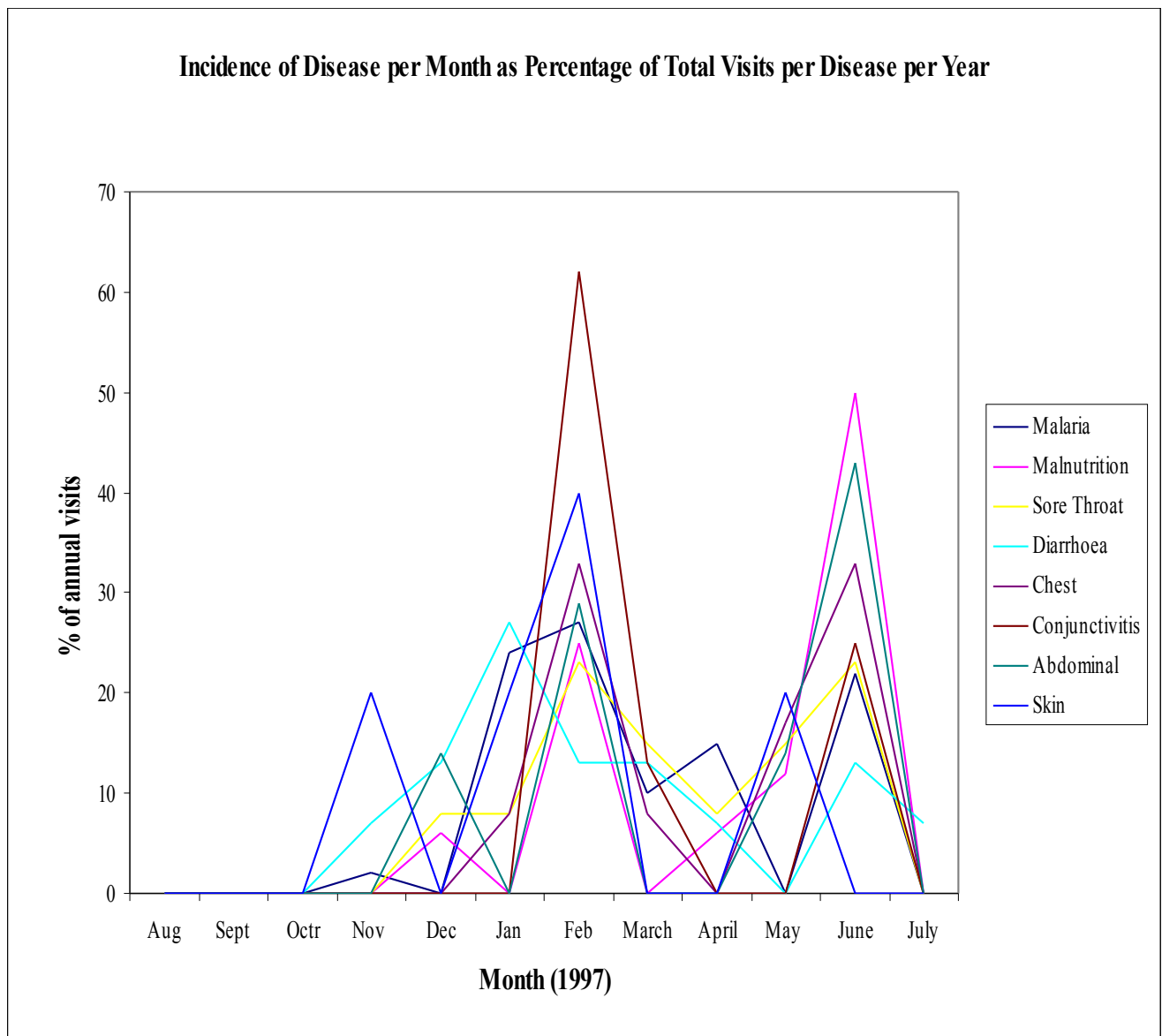
Clearly, malaria is the most common problem for members of the community, with slightly more children than adults seeking medical attention for this condition. Malnutrition and anaemia is also a large problem for both adults and children and was treated with vitamins, especially those containing iron compounds. Other main diseases can be seen to include upper respiratory infections, chest infections and coughs, conjunctivitis, abdominal problems (including vomiting, colic and parasites) and skin problems.

7.6.1.2 Seasonal Variations Relating to Disease

The figure below indicates the number of visitors at the health centre per month with each of the main specific categories of disease mentioned above. This provides information regarding the time of year or season when each particular disease is most prevalent within the local

community.

Figure 7.9



It can be seen in Table 7.21 above that there are two clear peaks in incidence of morbidity within the *Regulado* during the year. These occur between January and March and between May and June. During these two peak occasions incidence of illnesses increases significantly.

In attempting to assess the significance of these peaks it is beneficial to examine the health

data and seasonal calendar (in Figure 7.5) simultaneously. Seasonality is considered by some to affect the health status of individuals. Chambers (1993, p.40) argues that the “wet season is often the time when morbidity and mortality are highest (and) when people are most incapacitated by sickness”. The onset of the rainy season would explain the first peak in the annual health data. At this time mosquitoes flourish causing an increase in malaria. This season is also associated with outbreaks of cholera which may explain the increased incidence of diarrhoea.

In examining the seasonal calendar, it can also be seen that the wet season is the time when food is most scarce. It is possible that the increase in incidence of all diseases between the later peak between May and June is a result of poor nutritional intake during the wet season months. This leads to a weakening of the body’s natural immune system and therefore lowers resistance to disease causing an increase in illnesses that only becomes apparent in later weeks and months.

Infection and malnutrition are frequently associated with one another and it is argued by some that the effect of one state contributes to the deterioration of the other. The overall effect is not additive but synergistic. An individual experiencing malnutrition is increasingly therefore likely to suffer infection due to decreased resistance. Infection however then contributes to the development of malnutrition as diseases (such as malaria) are often accompanied by anorexia, vomiting, loss of appetite and malabsorption of nutrients. The peak of disease between January and March may have led to the increase in malnutrition reported during the second peak between May and June.

7.6.1.3 Anthropometry in Children

Anthropometry was used to measure nutritional status, i.e. the outcome of current and previous nutrition in terms of the failure of growth, in children under twelve years of age in Nhambita. Anthropometric measurements take into consideration the total mass of body tissue (weight) and a measurement of linear size (height). Weight shows the current state of the body’s stores of energy; height shows sums up the history of the body’s growth. These measurements are then related to the age and sex of the individual. The result is then compared to normative growth standards that are formulated from the same measurements in

healthy, well-fed Western populations. It is normal in such investigations to use three measurements as follows:

- Weight-for-age
- Height-for-age
- Weight-for-height

However, in less developed countries many adults and children are unaware of their date of birth or even year of birth or age. In children it is difficult therefore to accurately calculate weight-for-age and height-for-age measurements. Accordingly, weight-for-height data was used in isolation. Weight-for-height measurements show current nutritional status rather than past history. It should, however, be noted that this data does not however distinguish between, for example, a child suffering malnutrition and a tall and normally lean child as both have low weight-for-height.

Results of weight-for-height measurements were analysed using NCHS (US National Centre for Health Statistics) sex specific reference standards. Arbitrary cut-off points are used to decide at which point a child's height and weight fall outside the normal range. Z-scores, which measure the standard deviation from the median of the reference population, were used as cut off points with -2 representing the cut-off point for malnutrition. Z-scores define five categories of nutritional status as shown in the table below:

Table 7.18 Z-Score Indications

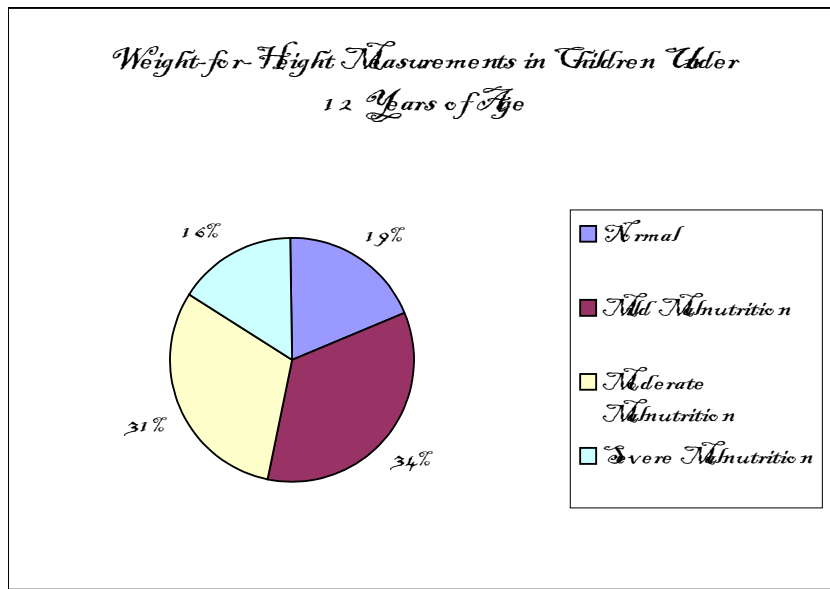
Z-Score	Nutritional Status
Less than -3	Severely undernourished
-3 to -2	Moderately undernourished
-2 to -1	Mildly undernourished
-1 to 1	Adequately nourished
Over $+1$	Over-nutrition

These grades represent levels of probability that individuals are small due to under-nourishment rather than as a consequence of different genetic constitutions or other reasons such as disease. Detailed results of nutritional analysis of children under twelve years of age

can be seen in Appendix 8.1.

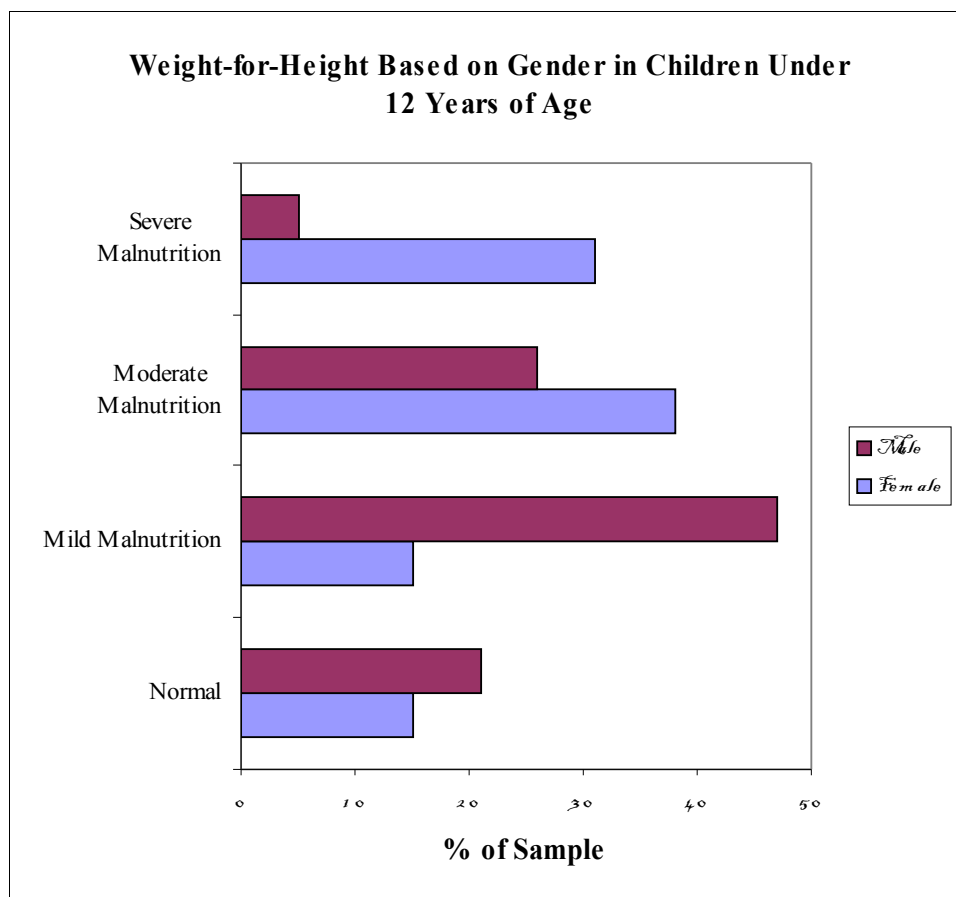
The following figure indicates the nutritional status of a sample size of 32 children under twelve years of age within Nhambita *Regulado*.

Figure 7.10



Without using age as a reference point and thus eliminating uncertainty, it can be seen that a larger proportion of children are suffering nutritional deficit, expressed as wasting, than have normal nutritional status within the population at Nhambita. There are also marked differences between female and male children as the figure below shows:

Figure 7.11



It can be seen that again more male children appear to have normal nutritional status or a mild degree of malnutrition. Female children, however, show a much higher proportion of moderate and severe malnutrition.

7.6.1.4 Anthropometry in Adults

Anthropometry was also used to measure the nutritional status and identify indications of chronic energy deficiency in adults. This was calculated using the BMI (Body Mass Index) equation of weight (Kg) divided by height (m) squared. Normal values and cut-off points indicating chronic energy deficit are shown in the table below:

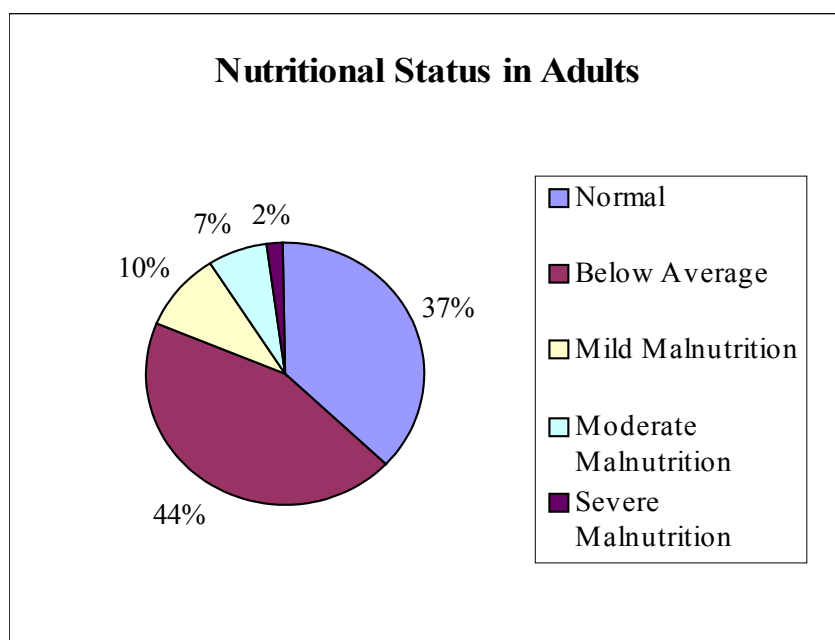
Table 7.19 Body Mass Index Cut-Off Points

BMI (Kg/m ²)	Indicator
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22	Normal female
20.8	Normal male
18.5 – 17.5	Mild malnutrition
17.5 – 16	Moderate malnutrition
16 and below	Severe malnutrition

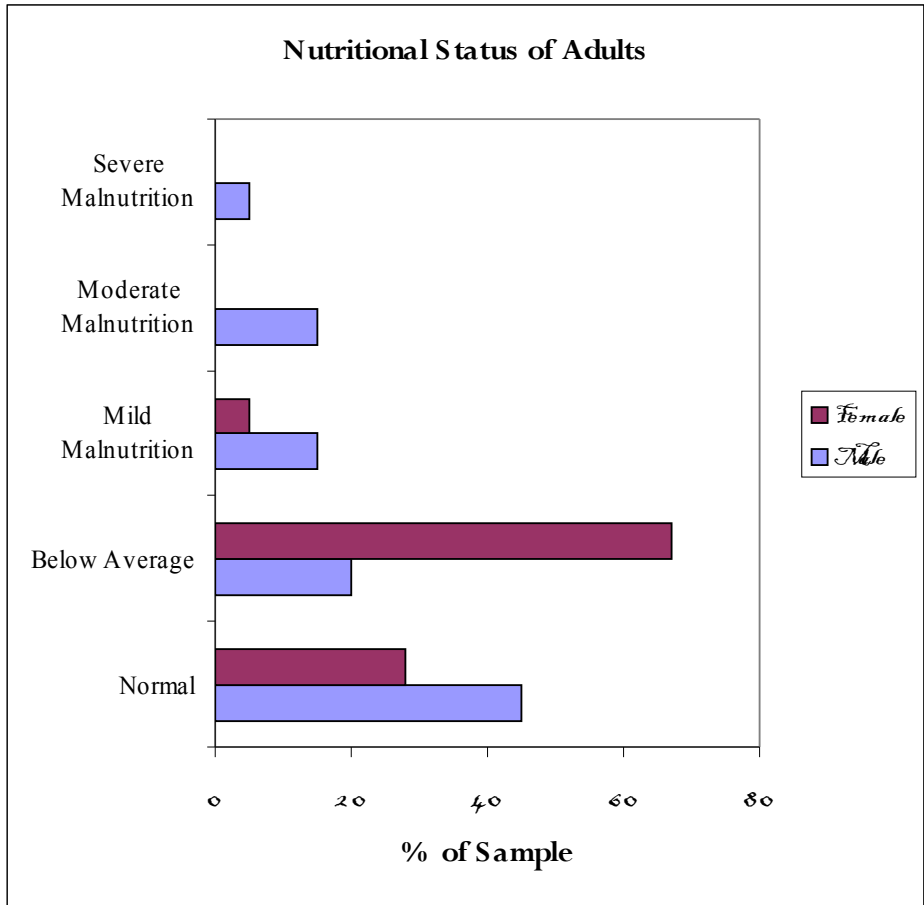
Detailed results of BMI measurements in adults are presented in Appendix 8.2. Overall results are as follows:

Figure 7.12



The table indicates that a smaller percentage of adults than children appear to be suffering mild, moderate or severe malnutrition and a larger percentage show normal values for height and weight. However, though not categorised as suffering malnutrition, a large percentage of adults can be seen to have BMI values below the normal average indicating lack of adequate nutrition. The data was further analysed to indicate differences in nutritional status according to gender. Results are presented in the figure below.

Figure 7.13



It can be seen from the table above that the incidence of malnutrition, including mild, moderate and severe, appears to be more common among male members of Nhambita community, with women only found to be suffering from mild malnutrition and even then to a lesser extent than men. It is interesting to note however, that greater numbers of men than women showed normal nutritional status and the number of women having BMI scores of below average greatly exceeded the number of men.

7.6.1.5 Further Points

It should be taken into account that the season in which the research was performed was the dry season when people reported food supplies to be limited though not scarce. Acute nutritional shortages discovered at this time of year could differ significantly from data collected for example, immediately after harvest. Any future research that is to be performed for the purpose of comparison (either in Nhambita or other areas) should either be carried out at the same time or at least take this factor into consideration.

It should also be taken into account that the NCHS growth standard that is used is a reference standard based on US children. It is not therefore genetically or culturally specific.

7.6.1.6 Traditional Healer

The Traditional Healer has been practising in the Nhambita *Regulado* for a long time. He learnt his skills from his mother who was the healer before him. In turn he is passing on his knowledge to several of his sons.

The Traditional Healer reports that the most common problems which he deals with are headaches and stomach problems. His most frequent visitors are women and children rather than men, who visit him less regularly. He uses a variety of flowers, plants, shrubs and trees (roots and bark) to prepare medicine, sometimes in combination. In his opinion there is no shortage of resources as everything which he needs is available in the area. He is able to prepare medication for the following problems: stomach aches, headache, snake bites, improvement of sexual performance (in males - both to improve erection and sexual performance and increase sex appeal so that a wife can be found), improved fertility (in women).

The traditional healer is not however, the only member of the community who uses natural resources to produce medication. The majority of adults within the community had some knowledge of plants that could be used to treat illnesses. Trees can be observed within the *Regulado* where sections of bark have been peeled away, for medicinal purposes, by members of the community. Roots of trees are also used and are thought to be increasingly potent and so have greater medicinal value. Soil is removed from around the root of a tree or shrub, a section of the root is removed and the soil is then replaced.

The Traditional Healer reports that an average of three people per week will visit him for treatment. He does not, however, charge members of the community for the service that he provides. He does not treat psychological/spiritual problems, nor does he have any treatment for malaria as he says there is nothing that can be done to treat this.

7.6.1.7 Observation and Enquiries

Many of the problems observed appeared to be related to young children. Many children had ulcers on their legs some were dry and healing while others looked wet and infected. All were exposed and covered in dirt. One small child had a burnt hand and ear, allegedly from the fire. This was dressed and bandaged and appeared to be healing well. Other children had swollen stomachs characteristic of protein energy malnutrition (PEM). Typically these were younger children who had probably been removed from the breast early due to the arrival of a younger sibling.

Though meat and fish did not appear to be prolific in the local diet, an abundance of beans were growing in the local area. These grew tall and lined most paths providing shade. This would suggest that protein is available, though its value in preventing PEM is not fully recognised by the local population.

7.6.2 Milling Facilities

There is no mill within Nhambita *Regulado*, however a mill did exist in the past and the war-damaged remains of the concrete building can still be seen. The dried maize kernels or sorghum must therefore be carried to the neighbouring *Regulado* that is situated across the Pungue River in order that it can be ground. The average weight which each person carries to the mill and other characteristics are shown below in Table 7.20.

Table 7.20 Average Weights Carried to Mill and Characteristics of Carrier

Gender, Age & Other Characteristics	Weight of Maize Carried (Kg)
Adult, female with baby	20
Child, female (11 years)	9
Child, female (9 years)	5
Child, female (7 years)	3.5
Adult, female with baby	20
Adult, female with baby	20
Adult, female	25

It can be seen that the carriers were all female with 75% of those of childbearing age also carrying a child that was intermittently breast-fed. The women reported that they would use the mill at least twice during any week and that the flour which was produced was for personal family use and not for sale.

Research was conducted during the dry season, at which time Pungue River measured approximately 60 metres in width and 1 metre in depth. Crossing the Pungue during this season involves wading on foot through strong currents whilst simultaneously carrying the maize and babies. The smaller children were anchored between two adults for safety. Wading is however only possible during the dry season. In the wet season the services of a boatman are required. This costs 5,000 MT per person in each direction.

The mill is situated within a small bamboo building. Maize is measured into large 20Kg tins or smaller 5Kg tins. The cost of milling grain is MT 8,000 for 20 Kg and MT 2,000 for 5 Kg. The total price for grinding the grain in the wet season is of course increased by the MT10,000 which must be paid to the boatman. Those that cannot afford to use the mill were observed at the homestead grinding grain manually between two stones.

The return journey to the mill from Nhambita Zone was measured using a Geographical Positioning System (GPS) and was found to be 11.9Km using a 'way-point' system. However, if the winding paths are taken into consideration, the distance is likely to be approximately 15-16Km.

The time taken to complete the activity was 5 hours 30 minutes, of which 4 hours 30 minutes was walking and one hour queueing/milling time.

7.6.3 School

The school within Nhambita Zone was constructed by the German NGO, AAA in 1994. The school is built with bamboo and mud walls and a corrugated iron roof and although in a state of repair, is still being used. The building is still used though it is now in a state of disrepair. There is one teacher and children of all ages are taught, together though there are different textbooks for juniors and seniors. Female children had mostly left the school by the time they were 12 years old, though some older boys stayed on longer. The teacher is employed by Gorongosa District.

7.6.4 Transport Infrastructure and Employment

Nhambita Regulado is accessible by road via a turn-off from the main road to Gorongosa National Park. Wet season access, is however, limited as the road is liable to flooding and erosion. The main Inchope-Gorongosa road, which links the park with the Beira Corridor continues to be troubled by mines. Immediately prior to the research period (July/August, 1997) mines were found, marked and professionally removed from the roadside. At around the same time another mine explosion caused the death of a vehicle operator. During the research period a grenade was found to be surfacing in the centre of the road to Chitengo.

A further problem with this road system is the state of disrepair of many of the bridges. Though there are plans to repair bridges in the near future many presently remain damaged as a consequence of mining activities during the wars. Several bridges are constructed from wooden slats, many of which are missing leaving gaping holes through to the riverbed below. The bridges continue to be used, however, even by large, heavy trucks bringing food supplies to people working in the area.

Prior to the park closing in 1973, Finnegan (1992) estimates that approximately 20,000 people per year visited the National Park. As can be imagined, many forms of transport passed by the entrance to Nhambita. Though this did not include public transport, residents of Nhambita were apparently easily able to obtain informal transportation both to the National

Park and to the nearest towns of Gorongosa and Nhamatanda. This enabled economic activity such as the selling of excess agricultural products to take place. It also facilitated employment outside the *Regulado*. One elderly member of the community reports that *“things were easier in the past because the facilities of the park were available. There was transport going into and from the park so we could catch a lift to the park or to Nhamatanda or Gorongosa and sell things there. There was also a shop in Gorongosa National Park. Now there is very little traffic going to and from the park. Now people must carry their produce to Gorongosa Town or Nhamatanda and sell it in order to purchase salt and sugar and other things.”*

The amount of vehicles travelling on the road to Gorongosa National Park is currently very limited - perhaps one to two vehicles per day. Residents of Nhambita must therefore walk to the nearest towns if they are to sell their produce or purchase resources. In terms of employment, three residents are employed by Gorongosa National Park as game guards. Five others are employed with a sustainable forestry venture situated approximately 15 Km from Nhambita towards the main Inchoppe/Gorongosa road. In each case the workers reside at their place of employment during the week, then return, usually on foot, to their families at the weekend.

Local people however, envisage that the rehabilitation of Gorongosa National Park will lead to improvements in the transport system and therefore employment and economic activity. It is hoped that the number of local people employed within the park will increase and that once the park attracts visitors again the transport problem will improve.

7.7 Most Significant Problems

In each questionnaire and during RRA/PRA sessions people were asked to list the five

problems within the community that were most significant to them. Surprisingly, natural resources were hardly mentioned. However, access to non-natural resources was considered most problematic to the local community. The following table shows the main problems perceived by the local community:

Table 7.21 Significant Problems as Perceived by the Local Community

PROBLEM	% of POPULATION
Hospital	88
Shop/Kiosks	85
Mill	81
Transport	57
School	42
Employment	26 (especially mentioned by younger people)
Water	14
Clothes	5
Food/Hunger	5

7.8 Discussion and Main Field-Study Conclusions

7.8.1 Systems of Control

Nhambita *Regulado* is situated within the buffer zone of Gorongosa National Park. It contains 612 people living within three zones. Though an unofficial and non-recognised form of governance, it was clear that the local community regarded the *Regulo* as the central political figure within the *Regulado*. This authority extended to the control, management and resolution of conflict in terms of natural resources.

7.8.2 Natural Resources

Natural resources within the forest are perceived as common property. In other words, they can be freely exploited by any member of the local community. Resources existing within individual homestead or *machamba* areas are, however, perceived as belonging to the family living on that homestead and working the *machamba*. Consequently, such resources can only be exploited with permission from that family.

At present, natural resource issues do not appear to be a source of conflict. In terms of problems perceived by the community, natural resources came very low on the list of priorities, with major problems pertaining to factors affecting economic development, such as infrastructure and transport networks, and service provision, such as suitable education, health and milling facilities.

There is, however, no doubt of the importance of natural resources to the local community in terms of the ability of individuals and families to satisfy their basic needs for food, health, housing and physical security and economic security. Without entitlement to access natural resources basic needs could not as easily be met and quality of life within the community would deteriorate.

7.8.3 Forestry Resources

Forestry resources are probably more abundant at present due to the out-migration of families during the civil war. This allowed the regeneration of the natural forest resources to take place and has consequently led to the absence of conflict in terms of resource allocation and use. This would also explain the higher than average daily fuelwood use. As resources are not scarce they are utilised freely rather than with caution. This does not appear to be problematic at present, however, in the future such activities could have serious implications in terms of the sustainability of the forest resource base. This is for several reasons:

- Initially, in terms of demography, displaced families have returned to the area and new families are moving into the region from urban centres. The end of the war has created a stability in rural areas that has been absent during recent decades. These issues each have implications in terms of population growth and consequently pressure that is exerted on the natural resource base as more of each resource is required to meet the needs of a larger population.
- Secondly, in terms of *machamba* extension, there is no system at present controlling extension of existing *machambas* into forest areas. In conjunction with population expansion this could possibly lead to the clearance of large areas of forest for agricultural purposes. This will again threaten the existing standing forest resource base and therefore

the sustainability of forest resources.

- Thirdly, the only trees that are presently being planted by the local community are fruit trees such as mango, papaya and banana. Forest resources are therefore being used as sources of fuelwood and construction material but are not being replaced by newly planted trees. This activity may be sustainable if natural forest regeneration exceeds the rate of exploitation. However, if population growth and therefore additional resource use is sustained there is a danger that exploitation of resources will exceed the natural regeneration rate. The resource base will therefore be overused and become degraded.

However, despite these factors, it may, arguably, be difficult to persuade local communities to plant trees for future fuelwood and construction purposes when there are presently adequate and easily accessible resources available nearby for these activities.

7.8.4 Wildlife and Attitudes to the National Park

The nature of information sought in terms of hunting was sensitive and actual practices were believed to differ from those reported to the research team by the local community. Hunting was in most cases denied though the research team observed that hunting activities did appear to be widespread. For example, a hunter with bow and arrows was seen within the *Regulado* and snares were seen hidden on homesteads. Reports from Gorongosa National Park staff confirmed these suspicions. Hunting that was admitted was, however, reported to occur for subsistence purposes rather than economic gain.

Although subsistence hunting is important to the local community as it provides a valuable source of protein, hunting for economic benefit in an unsustainable and unmanaged manner is a threat to the rehabilitation of the National Park. This is especially significant as the numbers of animals is presently diminished. Consequently, it is of importance that information regarding hunting practices is accurate in order that policy can be formulated and practice can be regulated effectively. However, the sensitive nature of this information renders it difficult to obtain accurate details of hunting practices. Consideration needs to be given to additional methods of investigation that would provide a clearer insight into hunting activities within the time-limit available. Formalisation of information gathered on hunting practices (such as

information gathered by the Park Administration from informal networks) and collaboration between components in terms of information sharing should promote a greater degree of reliable information.

Fishing was obviously important at a subsistence level for the provision of food and nutrients to members of the local community. However, in some cases fishing occurred for economic benefits rather than subsistence purposes. The Park Administration aims to introduce mechanisms to reduce and control such activities.

General attitudes towards Gorongosa National Park were optimistic, especially amongst the younger generation who believed that rehabilitation would, in the long run, bring increased employment opportunities and an improved transport network. It is considered that these factors will facilitate and lead to the introduction of increased opportunities for economic activity within the local area. One suggested example was that an increase in tourist traffic would give locals the opportunity to establish roadside stalls selling fruit or other local produce.

7.8.5 Agriculture and Farming Systems

Subsistence agriculture was practised throughout Nhambita *Regulado* with families having a minimum of two *machamba* areas. Most important crops were found to be maize and sorghum with an assortment of vegetables and oil producing crops grown in addition.

Several beneficial practices were observed to take place within agricultural systems, however, it was noted that improvements could also be made at low cost and with little external input. Fallow systems were used in the past, however, it appeared that traditional knowledge had been lost, especially amongst the younger generation, due to relocation to urban areas during the conflict period. On returning to Nhambita, many families had not yet re-established fallow systems and were unsure of the length of fallow required. Fallow periods of sufficient length are however important if the fertility of the soil is to be maintained. Re-establishment of such practices through the reviving and sharing of traditional information and knowledge should be given high priority.

Drought was seen to be the main constraint in terms of crop production though pests were also problematic, particularly birds, grasshoppers, rats and monkeys. The main form of pest control used however was the banging of tins and clapping of hands in order to frighten pests away. Introduction of natural home made pesticides is one option that could be given further consideration. Such natural pesticides have proved to be effective and low cost.

Evidence of multi-cropping and intercropping, both of which are beneficial practices, were observed. Allowing vegetation to remain on fields was found to be a further beneficial practice. The vegetation cover prevents soil erosion and improves soil fertility by allowing natural decomposition of vegetation and the re-incorporation of nutrients into the soil. Prior to planting however, the dead vegetation was cleared, gathered and burned in small piles. There was no evidence of composting of waste. Composting is a preferable practice to burning as burning provides only a temporary nutrient input into the soil and has the associated risk of forest fires. Gathering of waste and composting, however, provides a high quality, natural fertiliser for fields in which the nutrients are released in a sustained manner into the soil and soil structure is improved. Danger associated with forest fires is also avoided. However, this represents a greater work-load for farmers in comparison to burning as waste must be gathered and turned and watered at intervals, then re-applied to the cultivation area. Further consultation should occur to explore costs and benefits of such practices and thus the feasibility of introducing natural composting into local communities.

In exploring the division of labour within the household, it can be seen that women are responsible for much of the work around the homestead and *machamba*, while men are involved in gathering certain products from the forest, hunting and construction activities.

7.8.6 Economic Activities

A large majority of inhabitants of Nhambita are subsistence farmers who gain an economic income from the sale small proportions of their agricultural produce or livestock either within the local community or at nearby urban centres. Several people within the *Regulado* gained a livelihood from external employment, for example by the National Park.

Economic activity can be described as favouring risk minimisation strategies rather than profit maximisation strategies that are associated with high risk. Subsistence farmers do not

have adequate resources to survive the risks that a profit maximisation strategy would entail. For example, people grow both maize and sorghum in Nhambita *Regulado*. Maize is preferred though is dependent on moisture, therefore adequate rains, to produce a good crop. Sorghum, however, requires less moisture and will grow even if rainfall is low. Sorghum is therefore grown as an insurance measure in case of failure of the rains and subsequently an inadequate maize crop. Growing sorghum therefore minimises the risk of food shortage while still allowing a certain amount of the favoured crop to be grown. If farmers invested solely in maize during a year in which the rains failed, the family with no other insurance resources would be unable to meet their basic needs for food and would be at risk of starvation.

Livestock were also kept as a risk minimising strategy. A large proportion of the community were found to keep chickens and ducks with others keeping pigs and some goats. These were reported to be kept as an insurance measure, to be sold mainly in times of hardship in order to purchase other resources.

Most products were purchased at nearby kiosks within or in the immediate vicinity of the *Regulado* with less frequent trips to the nearby market. Soap, salt, sugar, dried fish and oil were most frequently purchased. These could be purchased in very small quantities therefore requiring minimal investments. Problems were reported in attaining clothing as this usually required a trip to the nearest market. However, a kiosk has recently opened within the *Regulado* selling second hand clothing that should relieve this problem.

The possibility of establishing links with other organisations, in terms of establishing development initiatives such as income generating activities, could be explored in order to promote sustainable economic development within the local area. One example of such an enterprise is a sustainable nursery project that has recently been established in the area. This initiative is employing local people (from Nhambita) and is searching for methods of increasing the involvement and empowerment of local communities and way in which profits can be reinvested into the local community. Trading initiatives supplying food supplies to such an organisation rather than transporting provisions from urban areas could also be a possibility that would again promote economic development.

7.8.7 Infrastructure, Amenities and Public Services

7.8.7.1 Health

The traditional healer has an active function within the community and it is apparent that many members of the local community have knowledge in terms of local, natural medicinal resources that are available to treat illnesses.

Anthropometric measurements using age are not always reliable as some people are unaware of their age or date of birth. Calculations were however carried out with information that was as accurate as possible, in order to ascertain a rough estimate of nutritional status. Results showed high levels of wasting and stunting and wasting on stunting amongst children under twelve years of age. Calculations using height and weight and thus eliminating the uncertainty of age appeared to confirm this result in terms of incidence of growth deficiency caused by long-term nutrient insufficiency and malnutrition. High levels of protein energy malnutrition were found despite the fact that a large amount of beans (with a high protein value) are grown within the local community and were seen surrounding homesteads. This may indicate a lack of education in terms of the nutritional value of food and methods of preventing malnutrition. In adults, only a small percentage were found to be suffering various degrees of malnutrition. However, a large percent were identified as being below average weight.

Data from the health centre over a one-year period show that only small amount of people sought medical attention from the health centre. A significant amount of visits were made from the Boa Maria area of the *Regulado* despite the fact that this has the least population. Malaria was the most frequent complaint. All incidences of disease increased in the wet season (January to April) which is also associated with malaria and cholera and is also the time of most food scarcity. A second increase during May and June occurred, possibly as a result of lack of nutrition during the rainy season, leading to a lack of resistance to disease.

One of the main constraints in terms of health is the distance that members of Nhambita community must walk to reach the health centre in order to obtain advice or and/or treatment. Lack of an associated outreach programmes also limits the level of immunisation and health education and therefore preventative health care that can be achieved within the community.

The possibility of creating linkages with other organisations could be explored with a view to promoting outreach programmes, immunisation and health education within the community. Implementing such programmes may be effective in preventing the occurrence of high levels of protein energy malnutrition.

7.8.7.2 Mill

The main problem with the mill is that it is situated a considerable distance from the *Regulado* and involves wading across the Pungue River in the dry season or paying for the services of a boatman in the wet-season. There is a fee associated with milling grain and as the mill is situated outside the *Regulado* the proceeds are being diverted from the local community.

There is little doubt that the inhabitants of Nhambita *Regulado*, especially the women and older female children would benefit from the installation of a mill. Installation of a mill would however, be most beneficial if it were paid for and thus owned by the local community rather than becoming the property of one individual. This could possibly be through a credit scheme, managed by the local community with the profits being ploughed back into the local community.

7.8.7.3 School

The school within Nhambita was built by an NGO using local materials with the exception of the corrugated iron roof. The state of disrepair appears to have arisen as a consequence of poor maintenance of the building. The building could be improved significantly by members of the local community. There is however, a distinct lack of textbook material for students to study.

7.8.7.4 Transport, Road Infrastructure and Employment

The road system leading to and from Nhambita remains in a significant state of disrepair, though plans have been proposed for local road improvements. In addition, a road re-grading programme is in operation along the Inchope/Gorongosa road. Completion of these improvements and an increasingly rehabilitated National Park is predicted to lead to an increase in the number of tourists visiting the park and an improved transport system. This should lead to an increase in employment opportunities within the local area and a greater ability to attain employment in more distant areas.

8.0 POST-FIELDWORK PRESENTATION AND WORKSHOP

In planning for the major socio-economic study a workshop was held to discuss the findings of the first study with the different components and project staff. This gave an opportunity for components to criticise and identify problems and shortcomings of the first study in order that these could be analysed and rectified prior to producing the proposal for the second study.

8.1 Additional Research Topics

It was suggested that certain aspect of community life should be explored in greater detail in order that information is increasingly useful to individual components. These include:

- Relationship between resources and people which should be in sufficient detail to facilitate the formulation of policy.
- Factors causing changes to occur in resource management which lead to unsustainable practices.
- Existence of alternative or substitutes activities and how can these be introduced to the local community.
- Quantitative evidence of the value of continued entitlement to access resource products in order to satisfy basic needs. For example, calorific intake from forest resources.
- Wider economic, trade and market activities that have an impact on the local community.
- Activities such as shifting cultivation, fallow systems, forest clearance and burning activities. In the case of shifting cultivation there was a difference of opinion regarding the sustainability of this practice between differing components. This would suggest that additional research is needed in terms of the logic, ecological and eco-social impact of shifting cultivation.
- Organised timber communities in terms of where such communities are situated, how they are financed and market and commercial issues. Issues relating to the regulation of such practices.
- Power structures that exist both within the community in terms of the official hierarchy and also kinship patterns, and external to the community in terms of political organisations. This should lead to the identification of the real power holders.
- Temporal issues that include, for example, the effects of continued warfare on a generation of people in terms of education, traditional practices, indigenous knowledge and land-management.
- Seasonal variation in terms of resource availability, use and management.
- Spatial issues that include, for example, the effects of displacement on populations and the effect of different social and cultural values that are brought back into the local environment.

- Clear identification of conflict issues and whether these exist between, for example, the people and wildlife resources, people and forestry resources or as a result of political and/or economic perceptions and activities.

While many of these topics are to some extent within the remit of the socio-economic study, others are obviously large research topics that would require detailed, in depth studies. Co-operation agreements and liaison with other external research organisations under the supervision of the socio-economic section would facilitate the gathering of a greater amount of relevant information. Such activities will be incorporated into plans for the large-scale socio-economic study.

8.2 Additional Problems

8.2.1 Honesty and Reliability of Data

Problems were identified in relation to the honesty and reliability of information, especially in terms of activities such as illegal hunting. It is, however, envisaged that improved co-operation between individual components will address this problem to a large extent. In addition, formalisation of informal information gathering techniques currently practised by individual components should lead to a further degree of cross-checking of information and increasingly accurate data.

8.2.2 Quantification of Data

In terms of methodologies, it became apparent that quantifiable data would be increasingly useful to components in terms of policy formulation. Consequently, questionnaires may be used to a greater extent in the future study, though information will be cross-checked using PRA, RRA and participant observation. Questions will be devised in collaboration with individual components in order that questionnaires will produce the information required in this respect.

8.2.3 Community Selection

It was initially agreed that the various components and the socio-economic section needed to work together in the same areas or at least overlap their activities. Information produced in

one area from an individual component would then be available for use in other components and contribute to an overall holistic, integrated interpretation of the area. It was also agreed that the study needed to take place in a variety of different areas in order that the activities of different types of communities could be examined. However, two problems were identified; firstly in terms of defining exactly what the community is and secondly in relation to the distinct community areas the study should examine.

Firstly, questions were raised as to how a community can be conceptualised, defined and isolated as a unit in term of carrying out a socio-economic study in a particular area. A community as defined by Redfield (1960) is distinct, small, homogenous and self-sufficient. However, in reality, no community meets these ideals. Complete self-sufficiency is, for example, not often encountered so market and trading links extend the boundary of the community. As such drawing boundaries around areas and classifying the area as a community is fraught with difficulties.

The second problem relates to land classification systems. Land can be classified, for example, in terms of its ecology, resource availability, utilisation, economic activities, demography or political and strategic factors. The way in which land is classified, however, obviously affects the areas that will be selected as study sites.

In order to solve these problems it was initially decided that the GERFFA land classification system would be utilised when selecting sites for the study. In this case land is classified into the following areas:

- Intensive land-use zones
- Extensive land-use zones
- Protected areas (including wetland and wilderness)
- Community zones
- Urban zones

Further workshop and discussion sessions will allow for the specific selection of sites that are agreed to be useful to all components and in which all components will be available to work or overlap activities, perhaps in the form of a ‘study-team’ that will provide multi-sectoral

presence. Drawing of boundaries around communities will again be agreed by all components and attempts will be made to include all areas of interaction made by the local community. An attempt will be made to select communities that appear to be representative of a particular location.

APPENDICES

Appendix 1: Recent Reports Produced in Sofala Province

Date	Organisation	Title	Author/Editor
1995	USAID/FHI	Sofala Province Extension and Agricultural Rehabilitation. Baseline Survey	T. Henderson
Oct 1995	World Vision	Household Food Sufficiency Status in the Zambesi Valley and Central Mozambique.	dTp Studies
Jan 1996	World Vision	Household Food Sufficiency Status in the Zambesi Valley and Central Mozambique	dTp Studies

1996	World Vision	Recommendations for the Advancement of Household Food Security in the Zambesi Valley and Central Mozambique.	dTp Studies
April 1996	USAID/FHI	Sofala Province Extension and Agricultural Rehabilitation Project. Mid-Term Survey	J. Lof and T. Henderson
Sept 1996	DNFFB	Socio-Economic Assessment of Gorongosa – Marromeu	Samuel Dos Santos & Charlotte Boyd
Oct 1996	GTZ-PPRS	Food Security Baseline – Gorongosa & Cheringoma. Household Questionnaire Survey.	Isabelle Schmidt Research Consultancy Services
Nov 1996	GTZ-PPRS	Agricultural Survey Gorongosa	Isabelle Schmidt Research Consultancy Services
Jan 1997	IUCN	Zambesi Delta – Diagnostic Overview of its Socio-Economic Characteristics	Isabel Schmidt Research Consultancy Services

Appendix 2 Resources Used to Satisfy Basic Needs

Table 2.1 Satisfaction of Basic Needs with Edible Resources

Resource	Edible Resources		
Basic Needs Fulfilled	Food and Water	Health	Economic Security

Benefits	<ul style="list-style-type: none"> Improves upon normal dietary intake. 	<ul style="list-style-type: none"> Improved dietary intake leads to better health due to increased calorie and nutrient intake. Increased warmth and energy. 	Improved/adequate dietary intake and thus health improves ability to participate in economic activities.
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Table 2.2 Satisfaction of Basic Needs with Construction Materials

Resource	Construction Materials	
Basic Needs Fulfilled	Housing and security	Health
Benefits	<ul style="list-style-type: none"> Enables housing/shelter and other structures to be constructed. 	<ul style="list-style-type: none"> Increased warmth. Provides protection, safety and security from weather, animals etc.

Table 2.3 Satisfaction of Basic Needs with Firewood

Resource	Firewood		
Basic Needs Fulfilled	Housing and security	Health	Food and Water
Benefits	<ul style="list-style-type: none"> Light from open fire promotes safety within house. 	<ul style="list-style-type: none"> Increased warmth and comfort. Smoke provides insect repellent (e.g. for ants and mosquitoes). 	<ul style="list-style-type: none"> Can be used to cook or dry edible resources. Facilitates storage as smoke is an insect repellent.

Table 2.4 Satisfaction of Basic Needs with Medicines

Resource	Medicines
Basic Needs Fulfilled	Health
Benefits	<ul style="list-style-type: none"> Promotes health and well being. Prevents ill-health. Restores health.

Table 2.5 Satisfaction of Basic Needs with Marketable Products

Resource	Marketable Products	
Basic Needs Fulfilled	Economic Security	Health
Benefits	<ul style="list-style-type: none"> • Sale of forestry products provides income that can be invested or used to buy other products. 	<ul style="list-style-type: none"> • Earnings may be used to purchase medication or improve lifestyle (e.g. by purchasing fish which is a good source of protein). This may lead to improvements in health.

Appendix 3 Species Used for Fuelwood, Construction and Medicinal Purposes

Table 3.1 Complete List of Tree Species Used as Fuelwood

SENA/PORTUGUESE	SCIENTIFIC NAME
Pacassa	<i>Lonchocarpus capassa</i>
Mucaqueca	<i>Piliostigma thonningii</i>
‘Fute	<i>Brachystegia boehmii</i>
Panga-Panga	<i>Millettia stuhlmannii</i>
M’goa	<i>Acacia goetzei</i>

Psototo	<i>Lannea stuhlmannii</i>
Mussassue	<i>Podranea brycei</i>
Missanda	<i>Erythrophleum lasianthum</i>
Mutarara	<i>Lecaniodiscus fraxinifolius</i>
Mucanca	<i>Pachystela brevipes</i>
Tanga-Tanga	<i>Albizia versicolor</i>
M'Fuma	<i>Diospyros mespiliformis</i>
Momba	<i>Pterocarpus brenanii</i>
Munangari	<i>Combretum imberbe</i>
Moimbe	<i>Rauvolfia caffra</i>
Nhabange	<i>Veronia sp.</i>
Vungute	<i>Kigelia africana</i>
Gunga	<i>Acacia sieberiana</i>
M'jare	<i>Sterculia appendiculata</i>

Table 3.2 Species Of Tree Used For Construction

SENA/PORTUGUESE	SCIENTIFIC NAME
Mucaqueca	<i>Piliostigma thonningii</i>
Pacassa	<i>Lonchocarpus capassa</i>
Mucimbe	<i>Burkea africana</i>
Momba	<i>Pterocarpus brenanii</i>
Panga-Panga	<i>Millettia stuhlmannii</i>
M'fuma	<i>Diospyros mespiliformis</i>
Psototo	<i>Lannea stuhlmannii</i>
M'fute	<i>Brachystegia boehmii</i>

Umbila	<i>Pterocarpus angolensis</i>
Mutarara	<i>Lecaniodiscus fraxinifolius</i>
Pau-Preto	<i>Dalbergia melanoxylon</i>
Tanga-Tanga	<i>Albicia versicolor</i>
Munangari	<i>Combretum imberbe</i>
Mutalala	<i>Lecaniodiscus fraxinifolius</i>
Munchongue	<i>Antidesma venosum</i>
Mutondo	<i>Cordyla africana</i>
Nhamutumore	<i>Diplorhynchus condylocarpon</i>
Potango	<i>Stereospermum kunthianum</i>
Bemba	<i>Tamarindus indica L.</i>
Nhacabare	<i>Markhamia zanzibarica</i>

Table 3.3 Indigenous Medicinal Resources Available for Use

(N.B. During fieldwork medicinal species were recorded, though often only a phonetic identification was possible. Therefore, it has not been possible to identify scientific names for all medicinal resources cited. However, rather than omit data the local (phonetic) names alone are reported in some cases within this table.)

(* Represents the medicinal resources that were mentioned by the Traditional Healer.)

RESOURCE	SCIENTIFIC NAME	USE
Panda (shrub)	<i>Strychnos henningsii</i>	Sexual performance
Chicumbite *(tree)	?	Headaches, stomach
Nhamutumore	<i>Diplorhynchus condylocarpon</i>	Sexual performance, stomach
Feijao buenti (bean)	?	Earache
Pau Preto (tree)	<i>Dalbergia melanoxylon</i>	Ferida, headache in infants
Banco/Buanco * (tree)	?	Sexual power, gastric
Guaguacho	?	Wounds
Munhanha (root)	?	Tuberculosis
Muconde	<i>Euphorbia halipedicola</i>	Stomach, wounds
Mini-mini	<i>Abrus precatorius</i>	Stomach
Mucaqueca	<i>Piliostigma thonningii</i>	Stomach, purger

Mussumbiva	?	Stomach
Muteme	?	Stomach
Mutundurulo	<i>Albizia versicolor</i>	Stomach
Mucogwa	<i>Artabotrys brachypetalus</i>	Stomach
Jenha	?	Stomach
Mbeshi	?	Skin
M'orle	?	Stomach
Fiti	<i>Combretum zeyheri</i>	Wound, cuts
Mbauku	?	Wound, cuts
Nhamimba	?	Wound, cuts
Mumcombocoro	<i>Bersama abyssinica</i>	Wound, cuts
Mole (shrub)	?	Diarrhoea, stomach- ache
In'sumbula (shrub)	?	Diarrhoea
Mugonzololo (shrub)	?	Sexual performance
Murumanhama	<i>Cassia abbreviata</i>	Stomach
Dungamira	<i>Bidens pilosa</i>	Wound
Goiabeira	<i>Psidium guajava</i>	Cut
Papaiera	<i>Carica papaya</i>	Wound
Chitegue	<i>Ipomoea pileata</i>	Stomach
Muchame	?	Headache
Chambakat	?	Cough
Chimanda	<i>Dalbergia boehmii</i>	Stomach
Bombue (tree)	<i>Neorautanenia mitis</i>	Sexual performance
Sumbati	<i>Parinari sp.</i>	Headache
Mcombocoli (plant)*	?	Stomach
Potango (plant)*	<i>Stereospermum kunthianum</i>	Headache
Mucongoda* (plant)	?	Stomach
M'fuma* (plant)	<i>Diospyros mespiliformis</i>	Stomach
Mussumbura* (plant)	<i>Cissampelos mucronata</i>	Stomach
Ngombimsani* (plant)	?	Anti-venom
Muculambira* (tree)	<i>Pterocarpus angolensis</i>	Sexual performance
Nufancori* (tree)	?	Sexual performance
Chungana* (tree)	?	Sexual performance
Chidze:dze* (tree)	<i>Entada abyssinica</i>	Female fertility

Appendix 4 Wildlife Inhabiting the Area

COMMON NAME	SCIENTIFIC NAME
Vervet monkey	<i>Cercopithecus pygerychrus</i>
Chacma baboon	<i>Papio ursinus</i>
Large rat	<i>Thryonomys swinderianus</i> , Cricetidae and Murindae
Mouse	
Bush pig	<i>Potamochoerus porcus</i>
Warthog	<i>Phacochoerus aethiopicus</i>
Oribi	<i>Ourebia ourebi</i>

Appendix 5 Products Sold and Purchased by Members of Nhambita Community

Table 5.1 Products Sold by the Local Community

PRODUCT	% of FAMILIES SELLING RESOURCES	AVERAGE PRICE (MT)
Maize	100 %	48,000/50Kg 16,000/20litres, 3,500/5 litres
Sorghum	43 %	55,000/50Kg
Chickens	33 %	15-25,000 each
Peanuts	33 %	25,000/5 litres
Beans	26 %	3-5,000/Kg
Sweet Potatoes	20 %	5, 000/1-2Kg
Cassava	20 %	5,000/1-2Kg
Honey	17 %	10,000/jar
Fish	17 %	Various
Ducks	13 %	20-40,000 each
Sesame	13 %	6,000/Kg
Maize beer	7 %	5-10,000/litre

Grass	7 %	5,000/bundle
Goats	1 %	25,000 each
Pigs	1 %	50,000 each
Tobacco	1 %	1,000/3 leaves
Melons	1 %	1,000 each
Tomatoes	1 %	500/6
Neepa (sugar cane alcohol)	1 %	10-15,000/bottle (500ml)
Onions	1 %	25,000/lata
Fresh corn	1 %	500 each
Cashew nuts	1 %	15-20,000
Banana	1 %	20-40,000/bunch
Papaya	1 %	1-5,000

Table 5.2 Products Purchased

PRODUCT	% OF POPULATION	AVERAGE COST (MT)
Soap	83	10-12,000 per 30cm stick
Salt	80	5,000/Kg
Clothes /Capalana	73	30-50,000 per capulana
Sugar	69	10,000/Kg
Oil	50	18,000/ Litre
Dried fish	31	10,000/Kg
Bread	12	1000 each piece
Dried prawns	7	1-2000 per piece
Sewing needles	9	1000
Beans	7	6,500/Kg
Cigarettes	7	5000/packet
Shaving blades	5	1000 each
Shoes	5	50-100,000
Paraffin	5	3-5,000/Litre
Watch	5	35,000 each
Matches	7	500/box
Rice	5	6-8,000/Kg

Plates	7	1-3,000
Fish hooks	2	3,500
Blankets	2	90-150,000 each
Ointment	2	5,000
Coconut	2	1,000
Biscuit	2	10,000/packet
Banana	2	1000 x 4

Appendix 6 Drugs and Equipment Available at Health Post

Drugs	Equipment
Ferrous sulphate (T)	Sutures
Chlordiazepoxide (T)	Tape
Acetylsalicylic acid (T)	Condoms
Cotrimoxazole (T)	Soap
Folic acid (T)	Sterile gloves
Paracetamol (T)	Weighing scales
Aminophylline (T)	
Bisacodyl (T)	
Mobendazole (T)	
Methylethergometrine (T)	
Nalidixic acid (T)	
Chlorpheniramine (T)	
Prednisolone (T)	
Tetracycline (ophthalmic ointment)	
Adrenaline (Inj.)	
Clotrimazole 1% (cream)	
Salbutamol (T)	
Vitamin A (T)	

Penicillin (Inj.)	
Chloroquine (T)	
Nystatin (Pessary)	
Water (Inj.)	
Lignocaine (Inj.)	
Probenead (T)	
Aluminium hydroxide (Elixier)	
Gention violet (Lotion)	
Methylergometrine (Inj.)	
Benzyl benzoate (Lotion)	
Whitfield (Lotion)	
Chlorhexadine (Lotion)	
Oral rehydration salts	
Amoxicillin (Powder for elixier)	
Hartmans solution (IV use)	

Key

T = Tablet

Inj. = Injection

IV = Intravenous

Appendix 7 Health Post Data

The table indicates reasons for attendance at Health Centre from 1st August 1996 until 31st July 1997, from Nhambita *Regulado* only.

MONTH	ZONE	STATUS	PROBLEM	TREATMENT
August '96				
September				
October				
November	Nhanganha	Adult	Malaria, diarrhoea	035, Z2, 038
	Nhanganha	Adult	Eczema	010, Z3
December	Boa Maria	Child	Diarrhoea	040, N2
	Boa Maria	Adult	Diarrhoea	027, Z2
	Boa Maria	Adult	Sore throat	010, Z2
	Boa Maria	Child	Parasites, anaemia	038, V4
	Boa Maria	4 - 15 yr.	Wound	Dressing
January '97	Mussinhawa	Adult	Eczema	010, Z3
	Mussinhawa	Child	Malaria	035, 039
	Mussinhawa	Child	Malaria	010, 035
	Boa Marria	Child	Malaria	035, Z3

	Boa Maria	Child	Malaria	035,
	Boa Maria	Child	Malaria, sore throat	035, 010
	Boa Maria	Adult	Malaria	035, Z2
	Boa Maria	Child	Malaria, diarrhoea,	010, N21, 035
	Boa Maria	4 - 15 yr.	Diarrhoea	010, 038
	Boa Maria	Adult	Malaria	035
	Boa Maria	Adult	Infection	024, Z3
	Boa Maria	Adult	Infection	024
	Mussinhawa	Adult	Diarrhoea	024
	Nhanganha	Adult	Malaria,	035, Z2
	Nhanganha	Adult	Diarrhoea	038, 010
	Nhanganha	Adult	Malaria, bronchitis	024, 035, Z2
	Boa Maria	Child	Oedema	V4, 024, Z3
	Mussinhawa	Child	Scald, burn	Dressing
Februray	Nhambita	Child	Malaria, conjunctivitis	T19, 035
	Boa Maria	Child	Head abscess	024, Z2, 038
	Boa Maria	Child	Asthma, cough	Z2, 010, J6
	Boa Maria	Child	Cough, febrile	024, 038
	Boa Maria	Adult	Head problem	010, Z2
	Boa Maria	Adult	Head problem	010, Z2
	Mussinhawa	Adult	Malaria, infection	035, 024
	Nhambita	Child	Malaria, conjunctivitis	T19, 035
	Nhambita	Child	Skin infection, diarrhoea	027, F2
	Nhambita	Child	Cough, malaria	035, 010
	Nhambita	Adult	Malaria, anaemia	035, Z2, V3
	Mussinhawa	Adult	Diarrhoea, conjunctivitis	T19, 010
	Nhanganha	Adult	Malaria, anaemia	035, V3
	Nhanganha	Adult	Headache, conjunctivitis	T19, F3
	Boa Maria	4 – 15	Tonsillitis	010, Z3
	Nhambita	Adult	Skin problem	010, 038
	Nhambita	Child	Vomiting, febrile	010, 038
	Nhambita	4 – 15	Parasite, anaemia	038, V3
	Nhanganha	Adult	Malaria, infection	010, 035
	Nhanganha	Adult	Malaria, sore throat	035, 010
	Nhanganha	Adult	Malaria, anaemia,	038, 035, V3
	Mussinhawa	Child	Malaria, sore throat, cough	024, 035
	Mussinhawa	Adult	Malaria, conjunctivitis	035, V3
March	Nhambita	Adult	Malaria	035, Z2
	Mussinhawa	Child	Tripanosomiasis, diarrhoea	038
	Boa Maria	Child	Malaria	035
	Boa Maria	Child	Sore throat, febrile	010
	Nhambita	Adult	Sore throat, febrile	010
	Nhambita	Child	Conjunctivitis, febrile	020
	Boa Maria	Adult	Diarrhoea with blood	010
	Nhanganha	Adult	Malaria, asthma	035, aminophyline
	Nhambita	Child	Malaria	035
April	Nhambita	Adult	Malaria	035

	Mussinhawa	Child	Sore throat, febrile	010
	Mussinhawa	Child	Malaria	035
	Mussinhawa	Child	Malaria	035
	Mussinhawa	Child	Malaria	035
	Nhambita	Child	Diarrhoea	010, Z3, N20
	Mussinhawa	Child	Malaria	035, 038
	Nhanganha	Child	Malaria, malnutrition	V3, 035
May	Boa Maria	Child	Anaemia, skin problems	038, 010, V3
	Mussinhawa	Child	Sore throat, cough, colic	038, 010, J6
	Mussinhawa	Child	Sore throat, cough	038, 010, V3
June	Boa Maria	Child	Cough, malaria, anaemia	038, 035, V3
	Boa Maria	Child	Cough, febrile	038, 010
	Boa Maria	Child	Cough, febrile	038, 040
	Boa Maria	Child	Cough, febrile	038, 040
	Mussinhawa	Child	Malaria, conjunctivitis	T19, 035, 038
	Boa Maria	Child	Diarrhoea, anaemia	010, V3
	Boa Maria	Child	Sore throat, vomiting	038, 035
	Boa Maria	Child	Sore throat	010, N27
	Boa Maria	Child	Sore throat, malnutrition	V3, 038, 010
	Mussinhawa	Child	Malaria, febrile	035, 010
	Nhanganha	Adult	Malaria, malnutrition	035, S19, 038
	Nhanganha	Adult	Malaria, malnutrition	035, S19, 038
	Nhanganha	Adult	Malaria, malnutrition	035, S19, 038
	Nhanganha	Child	Conjunctivitis	010, T19
	Mussinhawa	Adult	Malaria, colic, anaemia	010, 035, V3
	Boa Maria	Child	Malaria, diarrhoea, anaemia	010, 035, V3
	Nhambita	Adult	Abdominal pain	040, S10
	Nhambita	Child	Malaria	035, 010
July	Nhambita	Child	Diarrhoea	020

Drug Key

KEY	DRUG
V3	Ferrous sulphate
J6	Chlorambucil
040	Metronidazole
T19	Tetracycline ointment
Z2	Acetylsalicylic (aspirin)
S19	Multivitamins
038	Mebendazole
035	Chloroquine
010	Cortrimoxazole
N20	Glucose
S10	Intravenous electrolytes

020	Kanamicine
D5	Indomethacine
N2	Bicarbonate of soda
027	Tetracycline
V4	Folic acid
024	Penicillin
Z3	Paracetamol
T15	Pilocarpina

Appendix 8 Anthropometry

8.1 Anthropometric Data for Children Under 12 Years of Age

Sex	Age (if known)	Height (m)	Weight (Kg)	Z-Score	Nutritional Status**
M	11	1.27	25	-0.12	Normal
M	10	1.19	18	-2.11	Moderate
F	6	0.97	12	-2.02	Moderate
F	7	1.08	15	-1.69	Mild
F	7	1.17	17	-2.05	Moderate
F	7	1.06	11	-4.01	Severe
M	8	1.13	15	-2.77	Moderate
F	6	1.01	9.5	-4.08	Severe
F	10	1.22	18	-2.40	Moderate
M	6	1.09	13	-3.37	Severe
F	9	1.17	15	-3.18	Severe
M	7	1.12	14.5	-2.61	Moderate
M	9	1.26	20	-2.37	Moderate
M	6	1.11	16	-1.83	Mild
M	5	1.04	13	-2.63	Moderate
F	10	1.21	21	-0.65	Normal
F	6	1.06	11	-4.01	Severe

M	9	1.18	20	-0.80	Normal
F	6	1.02	12	-2.77	Moderate
F	6	1.07	13	-2.83	Moderate
F	10	1.35	26	-1.35	Mild
M	7	1.18	18	-1.92	Mild
M	10	1.24	22	-0.96	Normal
M	10	1.34	25	-1.59	Mild
M	2	0.85	11	-1.03	Mild
M	5	0.98	13	-1.67	Mild
M	6	1.08	15	-1.94	Mild
M	3	0.85	12	-0.11	Normal
M	1	0.66	6	-1.96	Mild
F	2	0.85	11	-0.78	Normal
M	4	0.85	10	-1.95	Mild
M	7	1.22	20	-1.60	Mild

** Indicates mild, moderate, severe malnutrition in children expressed as wasting, or normal nutritional status.

8.2 Anthropometry of Adults

Sex	Height (m)	Weight (Kg)	BMI Score	Nutritional Status
F	1.60	55	21.5	Below average
F	1.49	44	20.0	Below average
F	1.49	49	22.3	Normal
F	1.47	45	20.8	Below average
M	1.60	44	17.2	Moderate malnutrition
M	1.51	30	13.2	Severe malnutrition
M	1.70	53	18.3	Mild malnutrition
M	1.55	51	21.2	Normal
M	1.54	40	16.8	Moderate malnutrition
M	1.68	48	17.0	Moderate malnutrition
F	1.56	49	20.2	Below average
F	1.49	46	20.9	Below average
F	1.58	44	17.7	Mild malnutrition
M	1.61	54	20.8	Normal
M	1.72	61	20.6	Below average
F	1.59	55	21.7	Below average
F	1.64	55	20.4	Below average
M	1.80	65	20.1	Below average
M	1.74	63	20.8	Normal
F	1.61	56	21.6	Below average

M	1.63	62	23.4	Normal
M	1.68	50	17.7	Mild malnutrition
M	1.63	53	20.0	Below average
M	1.78	57	18.0	Mild malnutrition
F	1.55	55	22.9	Normal
F	1.43	53	26	Normal
M	1.58	52	20.9	Normal
F	1.51	46	20.1	Below average
F	1.55	48	20	Below average
M	1.58	54	21.7	Normal
M	1.61	51	19.7	Below average
M	1.62	58	22.1	Normal
F	1.49	45	20.4	Below average
M	1.73	70	23.4	Normal
F	1.60	59	23	Normal
F	1.50	47	20.9	Below average
F	1.66	61	22.1	Normal
F	1.38	37	19.5	Below average
F	1.57	56	22.8	Normal
F	1.51	43	18.9	Below average
M	1.55	53	22.1	Normal

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