

Government of the Republic of Mozambique
Government of the Republic of Zimbabwe
Swedish International Development Cooperation Agency (Sida)

*DEVELOPMENT OF THE PUNGWE RIVER BASIN
JOINT INTEGRATED WATER RESOURCES
MANAGEMENT STRATEGY*

MONOGRAPH REPORT

ANNEX XII

SECTOR STUDY ON:

SOCIO-ECONOMY



FINAL REPORT
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SWECO & Associates



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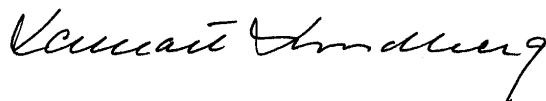
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The Pungwe Project

The Pungwe River Basin Joint Integrated Water Resources Management Strategy (IWRMS), the Pungwe Project in short, is a co-operative effort by the Governments of Zimbabwe and Mozambique to create a framework for the sustainable and equitable management, development and conservation of the water resources of the Pungwe River basin, with the objective of increasing the derived social and economic benefits for the people living in the basin. A key element in the development of this strategy by the Project lies in building capacity for its implementation and upgrading, to facilitate effective participatory management by both the authorities and stakeholders. The Pungwe River is in a shared watercourse between the two countries.

The Pungwe Project is financed by the Swedish International Development Co-operation Agency (Sida), through an agreement with Zimbabwe and Mozambique.

The project is implemented under the auspices of the Department of Water Development (DWD), in the Ministry of Rural Resources, Water Development and Irrigation (MRRWD&I), Zimbabwe, and the National Directorate of Water (DNA), in the Ministry of Public Works and Housing, Mozambique, on behalf of the two governments. The implementing agencies are the Zimbabwe National Water Authority (ZINWA) through the Save Catchment Manager's Office, and the Regional Water Administration of Central Mozambique (ARA-Centro), respectively.

The Pungwe project commenced in February 2002 and is being implemented in four phases, viz:

Phase 0 – Inception Phase

Phase 1 – Monograph Phase

Phase 2 – Scenario Development Phase

Phase 3 – Joint IWRM Strategy Phase

The Monograph Phase

During the monograph phase a large effort by the Consultant together with the implementing agencies in Zimbabwe and Mozambique was directed towards improving the knowledge base for the development of the water resources of the basin through a number of sector studies. The sector studies describe the present situation in the basin with regards to water resources, environment and pollution, water demand, infrastructure and socio-economy.

Activities to assess and strengthen the legal and institutional capacities of the implementing agencies have also been carried out. These activities that are an on-going process throughout the Project have, among others, included the development, technology acquisition and training in the use of GIS and hydrological modelling management tools.

Dissemination of information about the Project as well as consultations with stakeholder groups in the basin have been carried in order to increase the awareness of the Project and to facilitate stakeholder participation in IWRM of the Pungwe river basin.

List of Documents

The Monograph Report includes the following documents:

Main Report

- Annex I** Sector study on: **Surface Water Resources**
- Annex II** Sector study on: **Hydrometric Networks**
- Annex III** Sector study on: **Hydrological Data Quality & Modelling**
- Annex IV** Sector study on: **Groundwater Resources**
- Annex V** Sector study on: **Dams and other Hydraulic Works**
- Annex VI** Sector study on: **Water Quality and Sediment transport**
- Annex VII** Sector study on: **Water Demand for Water Supply & Sanitation**
- Annex VIII** Sector study on: **Water Demand for Irrigation and Forestry**
- Annex IX** Sector study on: **Fisheries**
- Annex X** Sector study on: **Conservation Areas, Wildlife and Tourism**
- Annex XI** Sector study on: **Infrastructure**
- Annex XII** Sector study on: **Socio-economy**

APRIL 2004 FINAL REPORT

TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	1
1.1	Aims and objectives	2
1.2	Settlements	2
1.3	Demography	3
1.4	Socio-economic conditions	3
1.5	Health	4
1.6	Education	4
1.7	Gender and poverty	5
2	INTRODUCTION	6
2.1	Background	7
2.2	Objectives	8
3	SETTLEMENTS, ADMINISTRATIVE FRAMEWORK AND NATURAL RESOURCES	10
3.1	Overview of Pungwe River basin settlements	11
3.2	Settlements in Mozambique	11
3.3	Settlements in Zimbabwe	17
4	DEMOGRAPHIC PROFILE OF THE PUNGWE RIVER BASIN	24
4.1	General overview	25
4.2	Distribution of present Pungwe River basin population	26
4.2.1	Pungwe River basin in Mozambique	26
4.2.2	Pungwe River basin in Zimbabwe	28
4.2.3	Population Distribution in the Pungwe River Basin by Gender	32
4.2.4	Migration Patterns in the Pungwe River basin	33
4.3	Projected population in the Pungwe River basin	33
4.3.1	Pungwe River basin in Mozambique	33
4.3.2	Pungwe River basin in Zimbabwe	33
4.3.3	The Impact of HIV/AIDS on Basin Demography	34
5	SOCIO-ECONOMIC CONDITIONS IN THE PUNGWE RIVER BASIN	36
5.1	Overview of socio-economic conditions	37
5.2	Local economy	37
5.2.1	Economic Activities	37
5.2.2	Income and Employment	41
5.2.3	Development initiatives and use of the available water resources in the Pungwe River basin	50
6	HEALTH	55
6.1	Existing health infrastructure	56
6.1.1	Health Infrastructure in Mozambique	56
6.1.2	Health Infrastructure in Zimbabwe	57
6.2	Common diseases in the Pungwe River basin	57
6.2.1	Diseases in the Pungwe River basin in Mozambique	57

APRIL 2004 FINAL REPORT

Annex XII: Socio-Economy

6.2.2	Diseases in the Pungwe River basin in Zimbabwe	59
6.2.3	HIV/AIDS	59
6.3	Water supplies	62
6.3.1	Pungwe River basin in Mozambique	62
6.3.2	Pungwe River basin in Zimbabwe	64
6.4	Sanitation	66
6.4.1	Pungwe River basin in Mozambique	67
6.4.2	Pungwe River basin in Zimbabwe	69
7	EDUCATION	71
7.1	The significance of education to basin development	72
7.2	Education facilities in Mozambique	72
7.3	Education facilities in Zimbabwe	74
8	GENDER AND POVERTY	76
8.1	Gender dynamics in basin development	77
8.2	Poverty	79
8.2.1	Pungwe River basin in Mozambique	79
8.2.2	Pungwe River basin In Zimbabwe	83
8.3	Strategy for poverty alleviation	85
9	CONCLUSIONS AND RECOMMENDATIONS	87
9.1	Conclusions	88
9.2	Recommendations	89
10	REFERENCES	91
APPENDIX 1	Distribution of Population in the Pungwe River basin in Zimbabwe	

1 EXECUTIVE SUMMARY

APRIL 2004 FINAL REPORT

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Page 1 (94)



1.1 Aims and objectives

Water resources play a strategic role in the development of communities. Their sound management or lack of it has a profound impact on poverty, community health and equity in the distribution of wealth. For sustainable development, the management of water resources requires gender mainstreaming through the incorporation of women's as well as men's concerns and experiences in any planned actions, including policy and legislation. This approach will enhance the creation of wealth in general while ensuring that women and men benefit equally.

The Pungwe River is a shared watercourse between the two riparian states of Zimbabwe and Mozambique. The middle reaches in Mozambique are largely undeveloped and sparsely populated, with a potential for irrigation agriculture, tourism and wildlife development. The upper parts in Zimbabwe support intensive agriculture in the densely populated Mutasa Communal Lands, Nyanga National Park, including an inter-catchment water transfer scheme for the city of Mutare's water supply. In the lower part of the basin, the floodplain, there are major natural resource, economic and social interests comprising the Gorongosa National Park (GNP), a large sugar cane irrigation estate, Beira/Dondo City water supply, and prawn farming and fishing around the estuary. In the floodplain, below the Bué Maria Dam site, there is a huge potential for agricultural development due to the fertile soils and the possibility of a major dam, and the rehabilitation of eco-tourism in GNP and adjoining areas.

The objectives of the socio-economic sector study are to create an inventory of the population dynamics in the Pungwe River basin, and to provide an overview of socio-economic conditions, and the potential for development, in order to create a basis for the formulation of development scenarios concerning the water sector.

1.2 Settlements

Settlements in the Pungwe River basin consist of rural village communities, a few scattered urban centres, small towns and growth points, as well as commercial farms. The city of Beira in Mozambique is the main urban and industrial centre.

Administratively, the basin covers parts of Sofala and Manica provinces in Mozambique, and a large part of Mutasa Rural District in Zimbabwe, as well as Nyanga National Park. A small portion of the basin in Zimbabwe falls in Nyanga Rural District.

Settlements are concentrated along the river valleys, floodplains and zones with agriculturally suitable soils, as well as in the proximity of existing infrastructure such as roads and administrative centres or posts.

1.3 Demography

Population distribution in the basin is influenced by the availability of water, arable land and infrastructure services such as main roads and administrative centres. As at year 2003, the Pungwe River basin has an estimated total population of **1 199 567**, broken down as shown in the table below:

Basin Country	Population	% of Basin Total	Sub-basin Area [km ²]	% of Sub-basin Area to Total Basin Area
Mozambique	1 103 698	92%	29 690	95.3%
Zimbabwe	95 869	8%	1 461	4.7%
Total	1 199 567		31 151	

Of conservation significance in the Pungwe River basin in Mozambique, is the concentration within the GNP of the populations of Gorongosa, Muanza and Cheringoma Districts in Sofala Province, and Macossa District in Manica Province, where they practice shifting cultivation. Any future development plans should address the issue of conservation in the national park to ensure the protection of the floodplain ecosystem for the benefit of these communities.

Demographic analysis shows that women in the basin have remained in the rural areas and are responsible for food production and general family upkeep. Their role in the successful implementation of the Pungwe River basin development strategy is therefore critical.

1.4 Socio-economic conditions

Economic activities in the Pungwe River basin are largely based on agricultural production, small-scale and commercial livestock production, wildlife and forestry resources utilisation, and fishing. Agriculture is dominated by subsistence dry land farming and irrigated cash crop production. With the exception of the large-scale commercial tea and forestry plantations in Zimbabwe, and Mafambisse Sugar Estate in the Pungwe estuary in Mozambique, the majority of the basin population relies on subsistence agriculture for its livelihood.

The abundant water supplies in the basin, good soils and rich ecosystems that depend on water provide a good basis for social and economic development, provided wise water management is practised.

1.5 Health

The quantity and quality of water plays an important role in the health and well being of basin communities. Water-borne diseases can be reduced and controlled by providing access to safe drinking water and adequate sanitation. This is closely linked to the availability of health facilities, and the influence they exert in relation to diagnosing and treating illness, as well as health education for disease prevention.

In Mozambique five out of the 11 districts in the basin are served by a district hospital. The number of health centres and health post is somewhat larger, with Sofala Province being better served than Manica. Consequently, serious illnesses and injuries are therefore considerably underprovided for. In Zimbabwe, access to health facilities is comparatively good. However, the provision of health services is deteriorating due to the shortage of drugs and qualified health personnel. The HIV/AIDS pandemic is adding considerable pressure to already stressed health services in the basin.

The National Water Policy (PNA, 1995) of Mozambique provides the legal and institutional framework for the creation of conditions for implementing sustainable interventions in the water and sanitation sectors. However, progress in increasing access to safe water in the rural areas continues to be slow. In Zimbabwe the rural water supply programme has made significant inroads in the provision of safe drinking water in the basin. Regrettably the impetus experienced in the 1980s has now waned due to diminishing resources.

Sanitation facilities in the basin are still generally basic, and largely based on the pit latrine or open bush. Coverage is variable, with more facilities in Zimbabwe compared to Mozambique. Major constraints in the provision of sanitation are poverty and lack of education.

1.6 Education

In Mozambique, the formal education network is still developing, with remote areas poorly served. In comparison, 90% of the children in Zimbabwe attend primary school. Manicaland Province, in which the basin in Zimbabwe is located, has one of the highest educated populations in the country.

Education disparities between the basin countries will need to be addressed to ensure equitable development in the long term.

APRIL 2004 FINAL REPORT

1.7 Gender and poverty

While gender concerns men and women, the role played by women as managers of natural resources, domestic and income generating activities should receive special attention. Development strategies and poverty alleviation programmes invariably falter in their initial stages because of their failure to explicitly refer to gender. The success of these strategies lies in managing conflicting gender interests in the face of limited resources and varied entitlements. Thus mainstreaming gender, through affirmative action, will be needed to ensure the sustainable success of the Pungwe River Basin Integrated Water Resources Management Strategy.

In Zimbabwe, although representation in the decision-making bodies such as the Save Basin Committee and the Pungwe River basin sub-committee favour men, the few women who are on those committees continue to play a key role in water management issues. The water sector in Mozambique recommends that women be included on the water committees chosen by the communities to ensure the correct management and maintenance of the water sources. There is therefore scope for the project to build on these initiatives and policies to promote the participation of women in water management.

Poverty continues to be a scourge in sub-Saharan Africa. Water and other resources derived therefrom can provide the key to the sustainable eradication of poverty.

2 INTRODUCTION

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Page 6 (94)



2.1 Background

The principal aim of the Pungwe River Basin Joint IWRM Strategy is to create a vehicle for the *sustainable*, equitable and participatory management of the water resources of the Pungwe River basin, with the objective of increasing the derived social and economic benefits for the people living in the basin. Water resources play a strategic role in the development of communities. Their sound management or lack of it has a profound impact on poverty, community health and equity in the distribution of wealth. For sustainable development, the management of water resources requires gender mainstreaming through the incorporation of women's as well as men's concerns and experiences in any planned actions, including policy and legislation. This approach will ensure that women and men benefit equally.

The Pungwe River is a shared watercourse between the two riparian states of Zimbabwe and Mozambique. The middle reaches in Mozambique are largely undeveloped and sparsely populated, with a potential for irrigation agriculture, tourism and wildlife development. The upper parts in Zimbabwe support intensive agriculture in the densely populated Mutasa Communal Lands, Nyanga National Park, including an inter-catchment water transfer scheme for the city of Mutare's water supply. In the lower part of the basin, the floodplain, there are major natural resource and economic and social interests comprising the Gorongosa National Park (GNP), a large sugar cane irrigation estate, Beira/Dondo City water supply, and prawn farming and fishing around the estuary. In the floodplain, below the Bué Maria Dam site, there is a huge potential for agricultural development due to the fertile soils and the possibility of a major dam, and eco-tourism in GNP and adjoining areas.

Figure 1 below shows a map of the Pungwe River basin.

Currently, there is a sensitive equilibrium between water related developments in the upper parts of the basin on one hand, and the vital Pungwe water dependent socio-economic interest in the lower reaches on the other hand. The proliferation of shifting cultivation in Gorongosa mountain slopes and surrounding areas threatens the sources of water on which the diverse ecosystem in the floodplain depend. The strategy evolved by the Project is expected to foster the sustainability of that equilibrium, by developing an understanding and appreciation of the underlying hydrological and ecological processes, and socio-economic interests, as well as institutional structures that will ensure the orderly development of the basin's water resources, while embracing a gender perspective.

2.2 Objectives

The objectives of the socio-economic sector study are outlined below:

- To create an inventory of the population dynamics and associated demography in the Pungwe River basin for application in the estimation of water demand, and formulation of sustainable development scenarios.
- To provide an overview of the basin's economic activities related to agriculture, fisheries, forestry, tourism, mining, industry, commerce and others, and their dependence on water.
- To describe the general socio-economic conditions in the basin, with particular emphasis on employment, incomes, education, health, gender and poverty, as well as their significance on water management.
- To establish household and community practices, as well as preferred participatory approaches in matters concerning natural resources management, with emphasis on water affairs, including practices for the management of disaster and emergency situations such as droughts and floods.
- To assess the significance of water in the socio-economic development potential of the basin and its impact on water resources.

Annex XII: Socio-economy



Figure 1 Map of Pungwe River basin

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3 SETTLEMENTS, ADMINISTRATIVE FRAMEWORK AND NATURAL RESOURCES

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Page 10 (94)



3.1 Overview of Pungwe River basin settlements

Settlements in the Pungwe River basin consist of rural village communities, a few scattered urban centres, small towns and growth points, as well as commercial farms. The city of Beira in Mozambique is the main urban and industrial centre. It has, however, been negatively affected by the current economic recession in Zimbabwe.

Administratively, the Pungwe River basin covers parts of Sofala and Manica provinces in Mozambique, and a large part of Mutasa Rural District in Zimbabwe, as well as Nyanga National Park. A small portion of the basin in Zimbabwe falls in Nyanga Rural District.

Settlements are concentrated along the river valleys, floodplains and zones with agriculturally suitable soils, as well as in the proximity of existing infrastructure such as roads and administrative centres.

3.2 Settlements in Mozambique

The Pungwe River basin in Mozambique is largely composed of rural settlements and villages, with the exception of the Beira/Dondo urban area.

The majority of the population resides in scattered small village settlements. Outside the Beira and Dondo metropolitan area, only about 18% of the basin population are found in quasi-urban areas, which are usually constellations of villages with less than 20,000 inhabitants. The village communities are serviced by a town centre, which is normally the main focus for commercial activity, with services such as water supply, schools and health facilities. The surrounding village communities are completely rural with traditional residential areas that often lack basic infrastructure such as modern water supply and sanitation facilities. The typical town centre is usually located along the main road and is often the location for district headquarters.

Outside the quasi-urban areas, conditions are completely rural.

The two provinces that straddle the Pungwe River basin in Mozambique have altogether 37 wards, 23 administrative posts, ten districts and three cities. **Table 1** below lists the rural districts and urban areas that either wholly or partially fall inside the basin.

A total of 12 sub-basins have been identified, each with its own specific hydrological, climatic, agro-ecological and demographic characteristics, which have an influence on the existing and potential socio-economic activities. These are given in **Table 2** below, by province and district, including the administrative centres or posts that fall inside each basin.

Annex XII: Socio-economy*Table 1 Administrative Districts in the Pungwe River basin in Mozambique*

Province	District
Sofala Province	Beira City
	Dondo City
	Búzi
	Cheringoma
	Dondo
	Gorongosa
	Muanza
Manica Province	Nhamatanda
	Barué
	Gondola
	Macossa
	Manica

Annex XII: Socio-economy

Table 2 Pungwe Sub-basin, their Districts and Administrative Centres

Sub Basins	Manica Province		Sofala Province	
	District	Admin Posts	District	Admin Posts
<i>Pungwe Zimbabwe</i>	Manica	Machipanda, Mavonde		
<i>Honde</i>	Manica	Machipanda, Mavonde		
<i>Upper Pungwe</i>	Manica	Vanduzi		
	Barué	Mavonde		
		Catandica		
		Choa		
<i>Nhazonia</i>	Barué	Catandica		
		Nhampassa		
	Macossa	Nhamagua		
<i>Upper Middle Pungwe</i>	Manica	Vanduzi		
	Macossa	Nguawala		
		Nhamagua		
<i>Lower Middle Pungwe</i>	Gondola	Amatongas		
		Cafumpe		
		Matsinho		
		Gondola		
<i>Gorongosa-Sa (Vunduzi)</i>	Macossa	Nguawala	Gorongosa	Sede Nhamadze
		Sede,		
		Nhamagua		
<i>Nhandu-Gue</i>	Macossa	Nhamagua	Gorongosa	Vanduzi
		Sede		
<i>Urema</i>			Gorongosa	Sede Vanduzi
			Muanza	Sede
			Cheringoma	Sede
<i>Lower Pungwe</i>	Gondola	Inchope	Dondo	Mafambisse
		Amatongas	Nhamatanda	Sede Tica
			Gorongosa	Sede
<i>Muda</i>	Gondola	Amatongas, Inchope	Nhamatanda	Sede
<i>Pungwe Estuary</i>			Buzi	Sede
			Nhamatanda	Sede
				Tica
			Dondo	Sede
				Mafambisse
			Dondo City Beira City	

Each of the above districts in the Pungwe River basin are further divided into wards. The characteristics of each sub-basin, which have an influence on water demand and the potential for development, are briefly outlined below.

Pungwe Zimbabwe

This sub-basin covers the Mozambique-Zimbabwe border areas of Manica Province. Settlements are scattered and sparsely populated because of mountainous terrain. Administrative posts are Machipanda and Mavonde.

Honde Sub-basin

Honde sub-basin covers part of Manica province. Administrative centres are located at Machipanda and Mavonde. The predominantly uneven terrain in this sub-basin renders it unsuitable for settlements. Population densities are therefore very low. The main economic attraction to the area is the presents of alluvial gold deposits in the Nyamakwarara River, which is informally mined. This has a negative impact on water quality.

Upper Pungwe Sub-basin

The Upper-Pungwe sub-basin occupies the high altitude areas in parts of Manica and Barue districts. There are four administrative posts that cater for the sub-basin populations at Vanduzi, Mavonde, Catandica and Choa. Despite above average rainfall, settlements are sparse due to the predominantly mountainous relief. However, the sub-basin has economic significance and potential for irrigation agriculture, wich is currently developped by Ausmoz, a large-scale agricultural operations company using large amounts of water.

Nhazónia Sub-basin

This sub-basin, which straddles the districts of Barue and Macosa, has administrative centres at Catandica, Nhapassa and Nhamagua. It has a very high potential for agricultural production because of good rains and fertile soils. Consequently, it contains the highest settlement density in the Pungwe River basin in Mozambique. Approximately 92% of the inhabitants of Barué district, and almost the entire population of Catandica and Nhapassa are located within Nhazonia sub-basin.

Notwithstanding its suitability for agricultural production, farming is still predominantly subsistent, with very few large-scale commercial operations.

Upper-middle Pungwe Sub-basin

The Upper-middle Pungwe sub-basin is sparsely populated. It covers parts of Manica and Macossa districts. The administrative posts of Vanduzi, Nguawala and part of Nhamagua fall inside the sub-basin. The majority of the inhabitants reside at Vanduzi, while the hinterland areas are largely uninhabited. These areas are mostly occupied by forests where game animals are also abundant.

Lower-middle Pungwe Sub-basin

This sub-basin covers part of Gondola District, where 55% of the district population is located. The majority of the inhabitants in the sub-basin are settled at Cafumpe, Matsinho and Vila de Gondola. Gondola district is considered to be one of the richest districts of Manica Province because of its high agricultural productivity. Part of the district falls inside the Buzi/Revue basin. At present, the main activity is subsistence farming, with a gradual trend towards the production and marketing of cash crops comprising cereals, vegetables and fruit.

Gorongosa Sub-basin (Vundúzi)

This sub-basin straddles Manica and Sofala Provinces. It covers parts of Macossa and Gorongosa districts. Administrative Centres are Nguawala, Sede, Nhamangua and Nhamadze. The majority of the inhabitants (approximately 89%) in this sub-basin are located in Gorongosa district where the climate is more suited to agricultural production. The rest of the sub-basin is poorly inhabited because it falls in the drier areas of Macossa District, occupied by forests. Game animals are also abundant.

Nhandugué Sub-basin

This sub-basin is poorly inhabited, with very few scattered settlements. It covers parts of Macossa District in Manica Province, and Gorongosa District in Sofala Province, with the largest part located in the former. Administrative centres are Nhamagua, Sede and Vanduzi.

Urema Sub-basin

This sub-basin is located in Sofala Province, and covers part of Gorongosa District, as well as Muanza and Cheringoma districts. Part of the sub-basin in Gorongosa District falls inside the Gorongosa National Park, which was previously unsettled. Currently, numerous settlements are beginning to sprout in and around the park. Any development plans within the national park will need to consider the sensitive nature of the ecosystem therein, as well as

requiring extensive consultations with the Parks authorities. Administrative centres in the basin include Sede and Vanduzi.

Lower Pungwe Sub-basin

This basin straddles Manica and Sofala provinces, within the districts of Gondola, Dondo, Nhamatanda and Gorongosa. It has the second highest population in the Pungwe River basin, the majority of which are located in Nhamatanda District. There are several administrative centres that support the sub-basin.

The sub-basin covers the fertile Pungwe floodplain, which has a very high agricultural potential. Part of Mafambisse Sugar Estate falls inside the sub-basin. Despite the high agricultural potential in sub-basin, there are only a few established large commercial farms and livestock breeders, including one group of small-scale commercial producers, which is in its early stages of development. The majority of the population practices subsistence farming. Riparian communities also undertake small-scale fishing operations. In some cases, communal farmers have been organised into farming associations, which use pedal pumps that are being promoted by NGOs, as well as the Provincial Department of Agriculture and Rural Development.

Pungwe Estuary Sub-basin

The Pungwe Estuary sub-basin, which is entirely located in Sofala Province, is the most populous in the Pungwe River basin in Mozambique, due to the existence of the densely populated urban centres of Beira and Dondo cities. In addition to being supplied with water from the Pungwe River, inhabitants of the two cities also use the floodplain for agricultural production. Nearly the entire population of Mafambisse administrative centre, as well as the majority of the population of Tica are located in the estuary.

Economic activities include subsistence farming and small-scale fishing. The community residing at Mafambisse administrative is a source of labour for Mafambisse Sugar Plantation. There are also commercial farms in Dondo District in Mandruze Valley.

Land-use in the Beira metropolitan area is a combination of urban settlement and agricultural activities. A household survey undertaken in 1998³ showed that 64.8% of the households owned land in the green areas in Beira City or in other districts and neighbour provinces. The green land in Beira City is being rapidly developed for housing purposes. Consequently, in the future, many

³1998 study involving 950 households in the City of Beira under the Beira-Dondo Structuring Plan.

families are likely to seek farming land beyond Beira. This will increase the pressure on existing resources in the basin, particularly land, forests, wildlife and water.

In general, district boundaries in the basin usually coincide with watercourses. Consequently, in contiguous sub-basins there is a tendency for district domains to straddle two or more sub-basins. In view of existing development disparities between districts, and within sub-basins, as well as the different levels of establishment and organisation of the private sector and civil society, the formulation of development scenarios on the basis of the sub-basin unit may not be feasible. The inherent disparities would make it impractical for the different stakeholders at district level to contribute equally towards development initiatives at the sub-basin level. A more feasible approach is the integration of sub-basins into larger zones, on the basis of socio-economic indicators such as hydrological characteristics, agricultural potential, the productivity of fisheries, and other natural resources associated with conservation areas, taking into account settlement densities and local government areas.

3.3 Settlements in Zimbabwe

The Pungwe River basin in Zimbabwe is largely mountainous, with valley incisions along which numerous watercourses have formed. This characteristic relief and associated physiography has had a profound influence on the distribution of settlements. The prevalence of high rainfall and the perennial nature of local streams have led to the development of fairly intensive small-scale dry land and irrigated agriculture.

In general, village settlements are concentrated in the valleys along watercourses, and on hillsides endowed with arable soils. Their nature is almost completely rural, with the exception of Hauna growth point, which is in the process of urbanisation. A service centre, which often has health, educational, and water supply services support each constellation of villages.

Administratively, by far the largest part of the basin falls inside Mutasa Rural District. The northern section falls within Nyanga National Parks. A very small uninhabited enclave is part of Nyanga Rural District. Mutasa District is divided into several wards, demarcated on the basis of political representation, of which 14 either wholly or partially fall inside the basin. The Pungwe River basin map covering Zimbabwe in **Figure 2** shows the ward boundaries in Mutasa Rural District, including the distribution of village settlements.

Land use is characterised by the following activities:

- Communal area semi-subsistence farming spanning the central part of the basin in a north-easterly direction;
- Large-scale tea and coffee plantations in the north-east;
- Nyanga National Park in the north-west;
- Large-scale forest plantations in the west and south-east.

Annex XII: Socio-economy

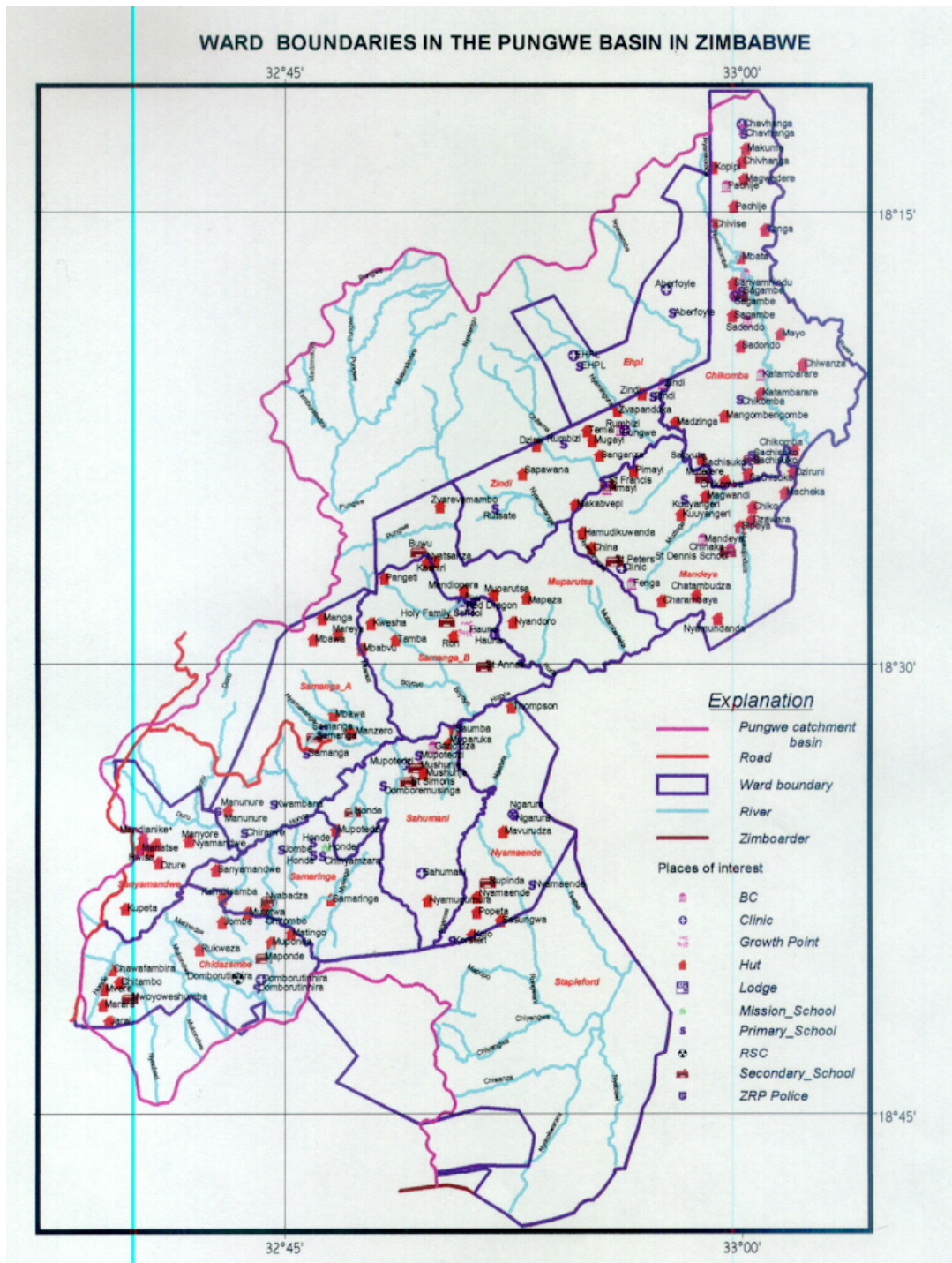


Figure 2 Ward Boundaries in the Pungwe River basin in Zimbabwe



A brief description of settlements in the Pungwe River basin in Zimbabwe is given below, by ward:

Chikomba – Ward 1

This is the most densely settled ward in the Pungwe River basin in Zimbabwe. Traditional village communities are located along the Ruera River, which forms part of the boundary with Mozambique, and its tributaries. Communities draw most of their water for domestic and irrigation purposes from the Ruera and its tributaries, the Mtangaza and Nyamkombe. A smaller portion is sourced from the Pungwe River. Once river flow reaches the Pungwe, abstraction in the absence of pumping becomes difficult due to the steep sided stream banks and valley.

Eastern Highlands Plantations - Ward 2

This area consists of the large-scale commercial Aberfoyle tea plantations. The tea plantation estate operates a club, a clinic and primary school, and Wamba tea processing factory. Two main rivers, the Nyawamba and Nyamhunga, flow through the estate to join the Pungwe River, which forms the southern boundary of Ward 2. A large dam has been developed by the estate on the Nyawamba River for irrigation and domestic purposes.

Zindi - Ward 3

This ward is characterised by steep-sided river valleys, such that settlements tend to be scattered on arable hill-sides. The main rivers are Nyamhingura, Chitema and Nyamawanga, which enter the Pungwe River on the southern boundary of the ward. In addition to communal area subsistence farming, there is also a small-scale tea scheme at Rumbizi, which is operated by nearby settlers. Communal villagers have an out-growing arrangement with the larger Aberfoyle tea estate.

Mandeya - Ward 4

In this ward, village communities are mainly concentrated along main roads, with subsistence farming being practised along river valleys and on hillsides. Mandeya ward has the highest coverage of hill-side cultivation. The major tributaries are the Nyamatsupa and the Muzinga rivers which enter the Pungwe River along the northern boundary of the ward. Numerous perennial streams drain the cultivated hillsides into the Nyamatsupa River, and have been extensively exploited for irrigation by village communities by means of make-shift installations. The ward is serviced by several business centres, schools and health centres.

Muparutsa - Ward 5

This ward is bounded by the Pungwe River to the north, the Honde River to the south, and Ruda and Marirangwe rivers to the west and east respectively. Settlements are concentrated along the Ruda River and main roads. Due to the hilly nature of the landscape, cultivation is largely undertaken on hillsides. The Ruda River and its tributaries supply most of the domestic and irrigation water to the settlements, since access to Pungwe and Honde River water is limited by the banks and steep valley sides.

Samanga A - Ward 6

This ward lies between Nyanga National Park to the north, Honde River to the south, Ruda River to the east and north-east and Mtarazi River to the west. Village communities are concentrated along main roads, the Ruda River, Boyoyo River, and in the Honde Valley. The latter supports extensive agricultural activities under irrigation from the numerous mountain tributaries of the Honde River. Several piped schemes also draw water from the Ruda River to supply village communities, including Hauna growth point, which is situated in the ward.

Hauna Growth Point is in its transitional stage of full urbanisation. It is the main centre for commercial and agricultural marketing activities in the fertile Honde Valley. Due to its status as a growth point, provisions have been made in the town plan for modern housing, institutional, commercial and industrial development. Over the years, the centre has experienced phenomenal growth in the housing and commercial sectors.

The ward also has another large business centre at Gatsi, located on the main road to Katiyo Tea Estate.

Samanga B - Ward 7

Samanga B ward is bounded by Mtarazi River to the east, Duru River to the west, the Honde River to the south and Nyanga National Park to the north. Village settlements are concentrated on hillsides to the north of the main road to Katiyo Tea Estate, which are heavily incised by numerous mountain streams, mostly tributaries of the Nyamakanga River, that supply both irrigation and domestic water. Other settlements are found along the main road to Katiyo and in the higher areas of the Honde Valley. In the latter, dry land farming is largely practiced due to the difficulty associated with abstracting irrigation water from the main Honde River.

The Manunure irrigation scheme, a major agricultural development in the district, is located in the ward. It draws water from the Duru River. The

aesthetic Duru Falls, on the boundary with Sanyamandwe Ward have a good potential for hydroelectric power generation.

Sanyamandwe - Ward 11

Sanyamandwe Ward is located between the Honde River to the south, Nyanga National park to the north and Duru River to the east. Land use consists of forestry plantations to the north-east owned by wattle company, statelands and scattered communal area settlements on flatter ground to the south and east. Agriculture in the communal area is predominantly dry land.

Nyamaende - Ward 9

This ward is located south of Honde River and is bounded by the Zimbabwe-Mozambique border to the east. Terrain is very hilly, with settlements scattered on hillsides and a small section of the Honde Valley. A major tributary of the Honde, the Ngarura River, flows north through the ward. It has numerous mountain tributaries that supply both irrigation and domestic water. The divide between the Honde and Nyamakwarara river systems lies to the south of the ward, where it spans in a north-easterly direction. Agriculture is generally limited by the rugged hilly terrain.

Sahumani – Ward 8

This ward, which is bordered by the Honde River to the north, is drained by the Ngarura River to the west and the Mupenga River to the east, both major tributaries of the Honde. The upper drainage areas of the two tributaries are mountainous, very rugged, and thus unsuitable for settlements. Isolated village settlements are found in the middle reaches, which increase in density towards the Honde river. These are accompanied with cultivated areas on the hill slopes and in the Honde valley. The numerous mountain tributaries provide extensive scope for irrigation, albeit constrained by limited arable land.

Samaringa - Ward 10

This ward is bounded by Mupenga River to the east and Honde River to the North. The former drains rugged mountainous terrain in the south-east, with limited availability of arable land despite abundant water. Settlements are concentrated in the middle reaches of the Mupenga River where hill slopes become milder. The north-western part of the basin largely lies in the Honde Valley. It is moderately settled and supports mainly dry-land farming. Although irrigation water is available from the Honde River, it is not possible to divert it by gravity because of the steep sided deep valley.

The famous Honde Mission is located in the north-eastern part of the ward, including the thriving Honde business centre. Government institutions such as the Agricultural Extension Services are also found at the centre.

Chidazembe - Ward 19

This ward consists of communal area settlements to the north and resettlement area communities to the south. Relief is generally flat and undulating across the few drainage channels. The headwaters of the Honde River originate in this ward. Other smaller tributaries of the Honde are Matinedza, Manama and Mucheri Rivers. Agriculture is predominantly dry land practised by the few scattered settlements.

Stapleford - Ward 27

This ward covers Stapleford Forest, which is owned and operated by the Forestry Company of Zimbabwe. Settlements comprise workers' compounds and administrative offices, including the John Meikle Forestry Research Centre, Mukandi forestry nurseries, Rupinda School and Old Maguwa School.

The landscape is mountainous and densely incised by numerous watercourses, which form tributaries of the Nyamakwarara River. Land use is entirely a mixture of indigenous and exotic forest.

Odzani - Ward 18

This ward forms a small enclave in the south-eastern corner of the Pungwe River basin in Zimbabwe. Land-use is entirely large-scale commercial forest plantations. Settlements consist of workers' quarters and other ancillary buildings.

4 DEMOGRAPHIC PROFILE OF THE PUNGWE RIVER BASIN

APRIL 2004 FINAL REPORT

**SWECO, ICWS, OPTO, SMHI, NCG,
CONSULTEC, IMPACTO, UCM, Interconsult
Zimbabwe**

Page 24 (94)



4.1 General overview

The respective population data for the Pungwe River basin in Mozambique and Zimbabwe has been obtained from the 1997 and 2002 population censuses, to district and enumeration area levels.

The previous section showed that, with the exception the Beira/Dondo metropolitan area, basin settlements are predominantly rural. Their distribution is generally influenced by the availability of water, arable land and infrastructure services such as main roads and administrative centres.

As at year 2003, the Pungwe River basin has an estimated total population of 1 199 567, broken down by basin country as shown in **Table 3** below.

Table 3 Summary of Pungwe River basin Population

Basin Country	Population	% of Basin Total	Sub-basin Area [km ²]	% of Sub-basin Area to Total Basin Area
Mozambique	1 103 698	92%	29 690	95.3%
Zimbabwe	95 869	8%	1 461	4.7%
Total	1 199 567		31 151	

From Table 3, above, it is evident that in general, population density in the Pungwe River basin in Zimbabwe is higher than that for Mozambique. Notwithstanding this generality, the distribution of population in Mozambique tends to be denser in hinterland areas around towns and administrative centres, and along main roads. The remote areas are thus even more sparsely populated. In Zimbabwe, abundant water and fertile soils in the Honde and Pungwe valleys are conducive to intensive agriculture, which supports the higher population density.

In general there is a higher potential for new water resources and conservation based developments in Mozambique compared to Zimbabwe. Nevertheless, in the latter, there are opportunities to build on ongoing agricultural based activities through investments in more efficient irrigation systems and value enhancing food-processing and related industries.

The distribution of Pungwe River basin population and projections thereof are given in the following subsections.

4.2 Distribution of present Pungwe River basin population

4.2.1 Pungwe River basin in Mozambique

Current Population

Table 4 below gives the population by district for the Pungwe River basin in Mozambique from the 1997 National Census and projections for year 2003.

The study has identified 12 sub-basin areas of the Pungwe River basin in Mozambique described in the previous section (see Table 2). **Table 5** below gives the estimated population sizes for each sub-basin for year 2003.

Table 4 Population by District for the Pungwe River basin in Mozambique

District	Estimated Population	
	1997 Census	2003 Projection
<i>Sofala Province</i>		
Beira/Dondo City	451 466	539 074
Búzi district	855	997
Cheringoma D.	2 139	2 495
Dondo Dist.	46 276	53 981
Gorongosa D.	75 902	88 540
Muanza Dist.	4 563	5 323
Nhamatanda D.	139 247	162 431
<i>Total For Sofala Province</i>	<i>720 448</i>	<i>852 841</i>
<i>Manica Province</i>		
Barué Dist.	72 782	85 898
Gondola Dist.	105 497	124 508
Macossa Dist.	11 000	12 982
Manica Dist.	23 274	27 468
<i>Total for Manica Province</i>	<i>212 553</i>	<i>250 857</i>
Total for Basin in Mozambique	933 001	1 103 698

The three urban centres of Beira and Dondo account for the highest population in the basin. Although they partially fall inside the basin, their source of water is entirely from the Pungwe River¹. Chimoio also partially falls

¹ In the City of Beira, the population of Nhangau administrative post was not considered a rural areas therefore it is not likely that it will receive water supplies using a piped water system.
APRIL 2004 FINAL REPORT

inside the basin. However, the bulk of its water supply comes from the Chicamba Dam in the Buzi River basin.

Table 5 Estimated Population of Pungwe River basin in Mozambique by Sub-basin

Sub-basin	Estimated Population 2003 Projection
Pungwe Zimbabwe	840
Honde	6 249
Upper Pungwe	18 816
Nhazonia	80 629
Upper Middle Pungwe	8 775
Lower Middle Pungwe	68 949
Gorongosa-Sa (Vunduzi)	42 090
Nhandu-Gue	14 929
Urema	47 788
Lower Pungwe	152 093
Muda	41 363
Pungwe Estuary	621 176
Total Population	1 103 698

The districts of Gorongosa, Nhamatanda and Dondo in Sofala Province almost entirely fall inside the basin. Between them they account for nearly 30% of the basin population in Mozambique.

In Manica Province, Barué District has the largest area in the basin at 70%, but accounts for only 7% of the basin population. Population density in the portion of the district within the basin is therefore sparse. On the other hand, Gondola District with 58% of its area inside the basin accounts for 11% of the basin population. Outside the urban areas of Beira/Dondo, it therefore has the highest population density. This is due to its location on the plateau, which has fertile soils and good climate. It is also strategically positioned along the Beira Corridor.

Of conservation significance, is the concentration within the GNP of the populations of Gorongosa, Muanza and Cheringoma Districts in Sofala Province, and Macossa District in Manuka Province, where they practice shifting cultivation. Any future development plans should address the issue of conservation in the national park to ensure the protection of the floodplain ecosystem for the benefit of these communities.

The most populated sub-basin is the Pungwe Estuary, which accommodates 56.3% of the Pungwe River basin population. This is due to the high

APRIL 2004 FINAL REPORT

population density in the Beira/Dondo urban area, which is part of the sub-basin. As expected Pungwe Zimbabwe sub-basin has the least population with 0.8% of the basin total due to the mountainous terrain.

Urban population from Beira and Dondo cities accounts for nearly 49% of the basin population, while the other 51% is rural population. Presently, the rural populations in Mozambique do not make extensive use of water from the basin but in the future there could be an increase pressure on water supplies from the basin, as the consumption of clean water in the rural areas and the use of irrigation techniques in farming and cattle raising are on the increase.

4.2.2 Pungwe River basin in Zimbabwe

As mentioned earlier, by far the largest part of the Pungwe River basin in Zimbabwe lies in Mutasa Rural District, with a small, unpopulated area situated in the Nyanga Rural District. The latter comprises largely unpopulated commercial forest, national park and state lands.

There are no major cities or towns within the basin, with the exception of Hauna growth point. The rest of the basin contains rural villages, small service centres and institutions such as schools. Although the city Mutare draws part of its water from the Pungwe River, through a fixed water permit, it is located outside the basin. Its population dynamics will therefore not be considered in this study.

Population estimates for the Pungwe River basin in Zimbabwe have been based on the results of the 2002 National Census. Census data is available to the level of enumeration area. These are discrete domains within a single ward, usually demarcated on the basis of the location of village settlements. The distribution of population in the district largely depends on land use, and is characterised by dense population clusters along streams, and in pockets of arable land. The terrain is mountainous, and incised by fertile valleys that form perennial streams.

Table 6 below gives the breakdown of population in the district wards that fall inside the Pungwe River basin in Zimbabwe.

Table 6 Pungwe River basin Population in Zimbabwe by Ward

Ward	Population 2002
Ward 1:Chikomba	16 518
Ward 2: E/H Plantation	4 494
Ward 3: Zindi	9 403
Ward 4: Mandeya	12 091
Ward 5: Muparutsa	7 577
Ward 6: Samanga A	9 385
Ward 7: Samanga B	8 547
Ward 8: Sahumani	6 225
Ward 9: Nyamaende	5 902
Ward 10: Samaringa	3 996
Ward 11: Sanyamandwe	4 742
Ward 19: Chidazembe	6 554
Ward 27: Stapleford	435
TOTAL	95 869

Demographic analysis of the district as a whole based on the intercensal period 1992 to 2002 indicates that its population has risen from 165 969 to 167 462, a paltry increase of 0.9%. This lends credence to demographic trends throughout Zimbabwe that show increasing rural to urban migration over the years. There may also be other influencing factors on rural demography such as HIV/AIDS. Thus it is likely that the rural population may remain static or even decrease in the foreseeable future.

To facilitate the evaluation of water demand from the numerous perennial streams, the Pungwe River basin in Zimbabwe has been divided into sub-basins based on the major tributaries of the Pungwe and Honde rivers. These are shown on the map in **Figure 3**. The population falling inside each sub-basin is estimated from the enumeration area (EA) population for the recent 2002 census. **Table 7** gives the current population for the Pungwe River basin in Zimbabwe by sub-basin area. A breakdown by enumeration area is given in **Appendix 1**, which also shows the wards straddled by each sub-basin area.

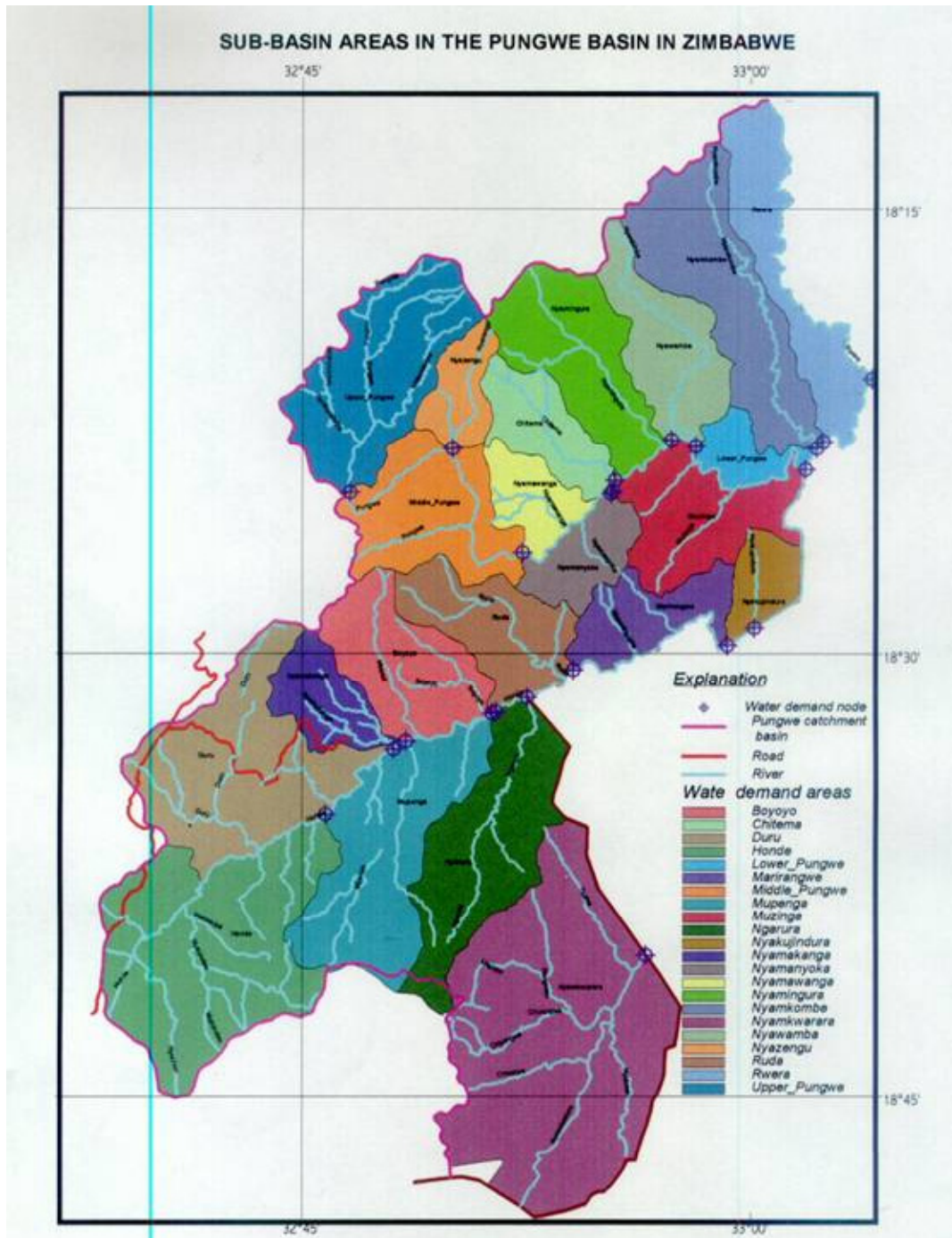


Figure 3 Sub-basins of the Pungwe River basin in Zimbabwe

Annex XII: Socio-economy*Table 7 Population Distribution by Sub-basin in the Pungwe River basin in Zimbabwe*

Sub-basin Area	Population
1. Ruera River	4 751
2. Nyamkombe R	7 894
3. Lower Pungwe	3 283
4. Nyawamba R	4 290
5. Nyamhingura R	4 184
6. Chitema River	2 245
7. Nyamawanga R	3 083
8. Middle Pungwe R	2 217
9. Nyazengu R	0
10. Upper Pungwe R	0
11. Muzinga R	4 109
12. Nyamanyoka R	4 289
13. Nyakujindura R	2 415
14. Marirangwe R	3 633
15. Ruda River	7 573
16. Boyoyo River	4 215
17. Nyamakanga R	2 232
18. Duru River	8 290
19. Nyagura R	5 201
20. Mupenga River	7 995
21. Honde River	11 831
22. Nyamakwarara R	2 139

Note that Nyazengu and Upper Pungwe sub-basins, which fall inside the national park and the southern portion of Nyanga Rural District, have no population due to the absence of settlements.

The most populous sub-basins are the Honde, Duru, Mupenga, Nyamkombe and Ruda. This is because of the wide valleys, which provide more arable land, coupled with larger quantities of water from the numerous tributaries. The Duru River has a large irrigation scheme, which caters for residents of Manunure Village. Hauna growth, including several schools and business centres, falls inside Ruda sub-basin. The Nyamakwarara sub-basin has the lowest population despite having the largest area. This is because most of it is uninhabited forestland.

4.2.3 Population Distribution in the Pungwe River Basin by Gender

Table 8 below shows the distribution of population by gender in the basin, by district and province.

Table 8 Population Distribution by Gender in the Pungwe River basin

District/City	Pungwe River basin Population Distribution by Gender				
	Total	Men		Women	
	Population	Population	%	Population	%
<i>Sofala Province (1997 Census)</i>					
Cities of Beira, Dondo	451 466	232 630	51.5	218 836	48.5
Búzi District	855	406	47.5	449	52.5
Cheringoma District	2 139	1 117	52.2	1 022	47.8
Dondo District	46 276	23 883	51.6	22 393	48.4
Gorongosa District	75 902	36 108	47.6	39 794	52.4
Muanza District	4 563	2 454	53.8	2 109	46.2
Nhamatanda District	139 247	67 769	48.7	71 478	51.3
<i>Total for Sofala Province</i>	<i>720 448</i>	<i>364 367</i>	<i>50.6</i>	<i>356 081</i>	<i>49.4</i>
<i>Manica Province (1997 Census)</i>					
Barué District	72 782	34 412	47.3	38 370	52.7
Gondola District	105 497	52 076	49.4	53 421	50.6
Macossa District	11 000	5 105	46.4	5 895	53.6
Manica District	23 274	11 347	48.8	11 927	51.2
<i>Manica Province</i>	<i>212 553</i>	<i>102 940</i>	<i>48.4</i>	<i>109 613</i>	<i>51.6</i>
<i>Zimbabwe</i>					
Mutasa District (2002 Census)	95 869	44 387	46.3	51 482	53.7

From the table it is evident that the male population is higher in the cities compared to rural areas. Some rural districts in Sofala Province such as Dondo, Inhaminga and Muanza show higher male populations than female. This is probably due to their proximity to the metropolitan area of Beira/Dondo and the Mafambisse Sugar Refinery which offer opportunities for male employment.

The generally higher female population in the rural areas could be due to urban as well as cross-border migration. The latter occurring in Mozambique during the struggle for independence and the civil war that followed soon after. Internal migration may be due to male migration to the cities in search of formal and informal employment.

In both basin countries, women have remained in the rural areas and are responsible for food production and general family upkeep. Their role in the successful implementation of the Pungwe River basin development strategy is therefore critical.

4.2.4 Migration Patterns in the Pungwe River basin

In Mozambique, there is a growing tendency for households to migrate from the large urban areas such as the cities of Beira/Dondo and Chimoio to other districts situated along the Beira Corridor, which have conditions suitable for farming. In many cases the movement involves part of the family, usually wives. The income from agricultural production supplements that earned through formal or informal employment by the male members of the family who remain in the city.

Another observed migration pattern is related to the movement of people within or to other districts in search of employment in the large cities or to find markets for crops. In the districts of Nhamatanda in Mozambique and Mutasa in Zimbabwe, floods have often resulted in migration of people to other neighbouring districts. In Zimbabwe the resettlement exercise under the land distribution programme has also led to population migration.

4.3 Projected population in the Pungwe River basin

4.3.1 Pungwe River basin in Mozambique

Table 9 below gives projected population in the Pungwe River basin in Mozambique to year 2023 by province and district. The projected population of 1 933 698 is nearly double the current population, all things being equal.

4.3.2 Pungwe River basin in Zimbabwe

As indicated earlier, there was a very small increase of 0.9% in the population of the Pungwe River basin in Mozambique over the intercensal period 1992 to 2003. This suggests a levelling out of population growth, most probably due to rural to urban migration, combined with higher mortality resulting from HIV/AIDS. The impact of the latter on population growth in the basin is discussed in the following subsection.

Annex XII: Socio-economyTable 9 Projected Population for the Pungwe River basin in Mozambique district²

District/City	Year				
	2003	2008	2013	2018	2023
<i>Sofala Province</i>					
Beira/Dondo City	465 753	539 936	625 933	725 628	841 202
Búzi district	997	1 134	1 289	1 466	1 666
Cheringoma D.	2 495	2 837	3 225	3 667	4 169
Dondo Dist.	53 981	61 373	69 777	79 332	90 196
Gorongosa D.	88 540	100 664	114 449	130 121	147 940
Muanza Dist.	5 323	6 052	6 880	7 822	8 894
Nhamatanda D.	162 431	184 674	209 963	238 715	271 405
Total Sofala Province	852 841	981 668	1 130 055	1 300 984	1 497 897
<i>Manica Province</i>					
Barué Dist.	85 898	98 616	113 218	129 981	149 226
Gondola Dist.	124 508	142 943	164 108	188 406	216 302
Macossa Dist.	12 982	14 904	17 111	19 645	22 553
Manica Dist.	27 468	31 535	36 204	41 565	47 719
Total Manica Province	250 857	287 999	330 641	379 597	435 801
Total for Mozambique	1 103 698	1 269 668	1 460 696	1 680 581	1 933 698

4.3.3 The Impact of HIV/AIDS on Basin Demography

HIV/AIDS has had and continues to have a profound impact on population dynamics and productive capacity in the Pungwe River basin through increased mortality and morbidity.

According to a report by the CSO (1989) of Zimbabwe, the prevalence of HIV and related illness in Zimbabwe was on the increase over the previous years. In Mozambique, it is estimated that between 1990 and the year 2000 the rate of HIV infection in the central region of the country rose from 3% to 16.5%. It was higher in the southern region at 13.2% compared to the northern region of the country⁴ which registered an infection rate of 5.7%. Manica and Sofala

² An annual growth rate of 3% was used for the cities of Beira and Dondo. For the rural areas of Sofala and Manica Provinces, the rates of 2.6 and 2,6% respectively, were used.

⁴ The central region of Mozambique consists of four provinces: Sofala, Manica, Tete and Zambézia

Annex XII: Socio-economy

provinces were respectively rated in the first and third place in the country for HIV prevalence, with rates of 21.1% and 18.7% respectively (INE, Ministry of Health, 2002). In 2000, 45 000 people died from of HIV related illnesses in Mozambique. About 33 300 or 74% of those deaths occurred in the central region. It is estimated that in 2001 the number of deaths in Mozambique increased to 57 000, with 38 900 or 68% occurring in the central region.

Women and children are the most affected by the AIDS pandemic. In Mozambique, women between the ages of 15 and 29 have a higher HIV infection rate. It is estimated that in 2000 there were 60 000 cases of new orphans due to maternal deaths from AIDS, 43.7% of which occurred in the central region (ditto in 2002). It should be noted that some of these orphans are also HIV positive, while others are HIV negative. Notwithstanding, all of them require special care.

If the present trend in infection incidences continues, HIV/AIDS will have a major impact on population dynamics in the Pungwe River basin. According to the Ministry of Health and Child Welfare of Zimbabwe, a child who is born now has a 50% chance of dying from AIDS at some stage of his life. The life expectancy in Zimbabwe, which had increased before the advent of HIV/AIDS is now in decline. It is anticipated that it will reach 45 years of age in the not too distant future. In Mozambique it is predicted that life expectancy will drop from 43.5 years of age in 1999 to 36.5 in 2010. It is estimated that in the absence of HIV/AIDS, the life expectancy would be 50.3 years in 2010.

The risk of infection and death from the disease is compounded by the problem of poor access to the existing health network, which is failing to respond to the preventive and curative needs of the population.

The increase in death rates and the decrease in life expectancy have implications for the use and management of water now and in the future. The break-up of the structure of rural and urban families caused by infection and death, primarily among their economically active members, could further exacerbate poverty levels. This is because the families will face increased difficulties in using natural resources such as land and water to improve their well being. It should be noted that women are fulfilling many family and community roles relating to the use and management of water. Consequently their importance to the overall development strategy for the basin cannot be understated.

5 SOCIO-ECONOMIC CONDITIONS IN THE PUNGWE RIVER BASIN

APRIL 2004 FINAL REPORT

**SWECO, ICWS, OPTO, SMHI, NCG,
CONSULTEC, IMPACTO, UCM, Interconsult
Zimbabwe**

Page 36 (94)



5.1 Overview of socio-economic conditions

Socio-economic conditions are an indicator of the level of and potential development in any society. The status of the health of communities has an influence on that development, and is often reflected by the quantity, quality and management of water supplies.

As mentioned earlier, the Pungwe River basin communities are predominantly rural, with the exception of the Beira/Dondo metropolitan area in Mozambique. Outside the metropolitan area, industrial and mining activity is limited. The small towns and growth centres have small-scale industrial operations, which offer a base upon which major industries can evolve in the future.

Economic activities in the Pungwe River basin are largely based on agricultural production, small-scale and commercial livestock production, wildlife and forestry resources utilisation, and fishing. Agriculture is dominated by subsistence dry land farming and irrigated cash crop production. With the exception of the large-scale commercial tea and forestry plantations in Zimbabwe, and Mafambisse Sugar Estate in the Pungwe Estuary in Mozambique, the majority of the basin population relies on subsistence agriculture for its livelihood. Women play an important role in subsistence agriculture in urban and rural areas as they participate with a large amount of labour in farming and in the use of other natural resources such as forestry and water.

The local economy of the basin is examined in the following subsections.

5.2 Local economy

5.2.1 Economic Activities

5.2.1.1 Economic Activities in the Pungwe River basin in Mozambique

Table 10 below shows the main economic activities for Sofala and Manica Provinces in Mozambique as recorded in the 1997 population Census³, and measured on the basis of the proportion of the population partaking in each activity, segregated into rural and urban communities.

The following observations are made:

The highest proportion of the population practice agriculture, forestry and fisheries, in the urban and rural communities of both provinces. The main

³ The data from the 97 census relating to the sphere of activity and main occupation are not categorised by district, which is why only figures for each province are presented, and are split by residential area classified into urban area and rural area.
APRIL 2004 FINAL REPORT

Annex XII: Socio-economy

activity in the rural areas is agriculture. It is worth noting that around 39% of people living in the urban areas are involved in agriculture, forestry or fishery. In most cases, these are people living in the cities whose main occupation is that of rural farmer, using land in the green areas of the cities and in districts located along the Beira Corridor and in Pungwe River basin.

Women play an important role both in household food security and in management of natural resources in urban and rural areas, as they are largely involved in agriculture, forestry and fisheries activities. In the urban areas of Sofala and Manica women account with 28.5 and 23% out of a total of 39% of population involved in the agriculture, forestry and fisheries sector. In the rural areas of the two provinces women account with 53 and 51% out of a total of 88% of population involved in agriculture. This shows that in the present and in the future women have to be taken into account as an important actor in the management of natural resources such as land and forestry

As expected commerce and finance are the second largest sectors in both urban and rural areas. Their low level in the rural area reflects the subsistence nature of agricultural operations.

Manufacturing comes third. Compared to other urban areas in the region, it is still very low. There is substantial scope for the development of urban and rural based manufacturing, particularly if the rural population is brought into the cash economy through improved agricultural output and marketing practices.

Annex XII: Socio-economy

Table 10 Economic Activities in Sofala and Manica Provinces (Source: 1997 National Census)

Sector of Economic Activity	% Population in Each Activity				
	Sofala		Manica		Average
	Urban	Rural	Urban	Rural	
Agriculture, forestry and fisheries	39.0	88.7	39.5	88.1	63.8
Mining	0.1	0.1	0.4	0.4	0.3
Manufacturing industry	6.6	3.1	10.0	2.5	5.6
Energy	0.4	0.0	0.8	0.1	0.3
Construction	3.5	1.2	6.1	2.0	3.2
Transport and Communication	6.8	0.4	3.5	0.4	2.8
Commerce, Finance	25.0	3.5	24.6	3.2	14.1
Administrative services	10.0	1.1	9.2	1.3	5.4
Other services	5.3	0.5	3.4	0.5	2.4
Unknown	3.4	1.3	2.7	1.5	2.2
Total	100.0	100.0	100.0	100.0	100.0

Administrative services are ranked fourth on average. These are usually related to government services. They are rated very low in the rural areas despite the higher populations, which suggests poor coverage and hence service delivery. Government structures are vital for the effectiveness and future success of the basin's development strategy.

The remaining sectors are all still in the very low levels of development. This is because they feed on key areas such as agriculture, which is still virtually at subsistence level.

5.2.1.2 Economic Activities in the Pungwe River basin in Zimbabwe

Economic activities in the Pungwe River basin in Zimbabwe are almost entirely based on agriculture due to the rural nature of the basin's communities, and the good rains and fertile soils prevalent in the region. The main sub-sectors include large-scale commercial tea, coffee and forestry plantations, and small-scale irrigation for a variety of crops, including tea, coffee, fruit and vegetables. Nyanga National Park plays a major role in the basin's tourist activities.

In year 2000, the STABEX Coffee Research and Training Trust (SCORITT) Board approved and allocated a grant of approximately Z\$26.1 million for the implementation of seven irrigation schemes through EU funding. The selected schemes were Buwu, Chiteme A, Duri, Masara Heights, Rupinda A and C,

APRIL 2004 FINAL REPORT

Samanga and Dumba all in the Honde Valley area of the Pungwe River basin. The works commenced in the same year with a pilot scheme at Duri, extending to the rest of the scheme soon after.

The basic scheme comprised one hectare irrigation plots per family. Water was diverted from perennial mountain streams by means of masonry weir structures and pipelines into night storage, for distribution to irrigation plots. The Trust funded materials for the diversion structure, pipeline, and the main storage that was designed as a brick tank. The irrigators were responsible for the provision of all labour and infield development. The pilot scheme at Duri has since been completed and is operating successfully growing a variety of crops which include coffee, sugar beans, tomatoes and green maize. The rest of the schemes are yet to be completed, with construction having been hampered by funding problems.

The Honde Valley Coffee Growers Co-operative Society Ltd was established in 1982. Since that time up to 1991, the membership has increased from 65 to 2 400. However, only 400 are active members. *Such structures will need to be consulted in the formulation of development scenarios.*

In the Pungwe River basin in Zimbabwe, commercial and industrial activities are centred at Hauna Growth Point where supermarkets, general dealer shops and agricultural marketing take place. Some of the agricultural products are transported to the city of Mutare and countrywide for consumption and food processing. The Mutasa Rural District Council administers the growth point. Water is supplied from Ruda River by ZINWA. Hauna is also one of the main centres in the district for government administration and extension services.

Vegetables such as tomatoes are grown in abundance in the communal area under irrigation. Banana fruit are also found in abundance along the numerous watercourses. Good quality guavas grow in the wild because of the temperate climate. When ripe, these agricultural products are picked and moved to central locations where they are collected by food processing companies from Mutare.

There are plans to develop a value adding food industry at the centre such as fruit and vegetable canning, as well as coffee hulling and grading. These plans can be used as a basis by the Project to formulate sustainable scenarios for future development. The activities will have a major impact on water supply in the basin.

Honde Valley is not suitable for livestock production due to lack of grazing land, and only few families have animals. The Honde Valley Dairy Milk Scheme, the only such project in the area, was initiated in 1985 with 150 members from three wards participating. Currently, only 26 are active

members. They supply fresh milk, sour milk and yoghurt to Hauna Development Unit.

There are small-scale fishing projects that use nets for fishing. Each catch produces about 100 kg and fishing is carried out once per month. However, fishing is not a significant economic activity.

Employment and incomes from economic activities in the basin are discussed in the following subsection.

5.2.2 Income and Employment

5.2.2.1 Mozambique

Table 11 below gives the main areas of employment in the basin by the proportion of the population employed in each sector. By far the highest proportion of 61.4% is classified as farmers. An interesting feature of this category is the high proportion found in the urban areas. This confirms the mixed rural/urban nature of urban areas in the basin in Mozambique and the importance of farming to urban people's incomes.

The lowest proportions, even in the urban areas are artisans. This implies a low level of industrialisation in both the rural and urban sectors. Agricultural personnel are also proportionally few in relation to the high proportion of rural farmers, confirming the subsistence nature of the latter sector.

Annex XII: Socio-economy*Table 11 Distribution of Sectoral Employment as a Percentage of Total Population for Rural and urban Areas (Source: 1997 National Census)*

Main Occupation	% of Population Employed				Average
	Sofala		Manica		
	Urban	Rural	Urban	Rural	
Senior management levels	1.4	0.2	0.9	0.1	0.7
University personnel	1.7	0.1	1.3	0.2	0.8
Non-University staff	3.4	0.5	3.5	0.6	2.0
Administrative	5.0	0.3	3.6	0.3	2.3
Non-agricultural employees	17.1	3.9	21.3	5.3	11.9
Independent artisans	0.3	0.4	0.6	0.6	0.5
Small business people	16.5	2.8	18.6	2.5	10.1
Service staff	13.6	3.5	9.3	2.2	7.2
Domestic workers	1.6	0.1	1.1	0.1	0.7
Rural farmers	36.2	86.3	37.2	85.9	61.4
Agricultural personnel	0.5	0.7	0.8	0.8	0.7
Others, unknown	2.8	1.2	1.9	1.4	1.8
Total	100	100	100	100	100

Another interesting feature of employment in the urban area is the large number of small business people. This suggests a thriving informal sector on which future large businesses can evolve both in the commercial and industrial sectors.

The largest employment sector, rural farming, is still largely at subsistence level, with only a few large-scale commercial concerns. It, however, has the potential to produce most of the raw materials required for the manufacturing sector as well as supporting both upstream and downstream industries. Consequently, its development, through increased production will have a positive impact on overall employment in the basin as well as incomes.

In line with observations made with respect to the role of women in the agriculture, forestry and fisheries sector, women also play an important role in as rural farmers in urban and rural areas. In Sofala they represent 28 and 53% out of a total of 36 and 86% of rural farmers in urban and rural areas, respectively. In Manica they represent 23 and 51% out of a total of 37 and 86% of urban and rural farmers. Another interesting feature is that women play a growing role in small business, mainly in the informal sector. In Sofala, 4.7 and 0.5% of women have small business out of a total of 16.5 and 2.8% in urban and rural areas respectively. In Manica small business women are 6 and

Annex XII: Socio-economy

0.7% out of a total of 18.6 and 2.5% of people involved in small business in urban and rural areas, respectively.

Current incomes from the rural farming sector are discussed below.

Table 12 below gives quantities produced and average income accrued by the small-scale rural farming sector for maize and other cash crops, as well as the districts in the basin in which they are produced.

Table 12 Average income from small-scale production – maize and cash crops

Crop	District	Production & Income per Household			Source of Data
		Kilograms	MT	US\$*	
Maize	Nhamatanda	698	891 780	37.2	Foundation against Hunger, Sofala
	Gorongosa,				
	Marromeu				
	Caia Districts				
Bananas	Gondola	-		43.2	TechnoServe, Manica
Cotton	Cheringoma	900	2 700 000	112.5	National Cotton Co,
	Nhamatanda				
	Gorongosa				
	Gondola				
	Macossa				
Sesame	Barué				
	Dondo		3 000 000	125	PROMECA, Austrian Co-operation, Sofala
	Búzi				

* Applicable exchange rate 24 000 MT per US\$

From the above table, it is evident that the diversity of crops grown by small-scale farmers is limited, and the yields and associated incomes low, even when they grow cash crops such as fruit, vegetables, cotton, sesame, tobacco and maize. Given, the abundant water resources in most of the basin, the scope for expansion is immense.

Due to the location of the Beira Corridor in the basin, small-scale farmers along the regional transport route are poised to exploit the local, regional and international markets for cereal, cotton, fruit and vegetable produce. Maize producing areas have a traditional market in the south of the country (Inhambane, Gaza and Maputo provinces) that is generally supplied by a network of formal and informal traders. In addition, over the past few years, large maize buyers such as Mobeira and V&M have set up operations in the area.

APRIL 2004 FINAL REPORT

Annex XII: Socio-economy

The promotion of traditional cash crops such as cotton, sunflower seed and other more recently introduced products such as honey, bananas, vegetables, piri-piri, sesame and tobacco, has also had a positive impact on the income of the rural farmers. Access to markets, however, largely depends on the existing rural road network. Producers situated in the interior of the district face more problems with gaining access to the markets than those living closer to national motorways or secondary roads that are in good condition. Communications will therefore play a major role in relation to access to markets, as well as the movement of production inputs.

As indicated in **Table 11**, about 43% and 46% of urban employees in Sofala and Manica Provinces are respectively employed as public or private sector employees, in most cases as non-agricultural workers or service personnel. The remaining 47% to 44% of the urban dwellers are mainly small-scale traders, mostly in the informal sector, or rural farmers.

In general, income earned from employment other than rural farming in the basin is low. This is largely due to the low proportion of the population of about 38.6% in formal or informal employment. **Table 13** below gives average monthly incomes for various sub-sectors in Sofala and Manica provinces for the years 1996 and 1999 respectively.

Annex XII: Socio-economy

Table 13 Average monthly income of salaried employee

Sub-sector	Average Monthly Income			
	Sofala Province		Manica Province	
	MT	US\$*	MT	US\$**
Fishing	693 000	62	-	-
Mining	277 000	25	1 178 000	93
Industry	757 000	68	662 000	52
Food, drink and tobacco	765 000	69	-	-
Textiles, clothing and leather articles	860 000	77	-	-
Wood and cork	544 000	49	-	-
Paper, graphic arts and publications	870 000	78	-	-
Chemicals and oil products	628 000	56	-	-
Non-metallic minerals	904 000	81	-	-
Metal products	726 000	65	-	-
Electrical And Water Energy	702 000	63	3 107 000	245
Construction	424 000	38	619 000	49
Financial And Insurance Services			5 356 000	423
Commerce, Restaurants , Hotels	947 000	85	-	-
Transport And Communication	823 000	74	-	-
Total	660 000	59	1 092 000	86

Sources: 1 - National Institute of Statistics, and Quarterly Workforce and Salary Surveys, 1996

2 - National Institute of Statistics, Manica Provincial Department/ Provincial Department of Labour, Annual Statistics Report, 1999, Manica Province.

* Applicable exchange rate 11 140 MT per US\$

** Applicable exchange rate 12 673 MT per US\$

The above table shows more diverse income sources for Sofala compared to Manica. Whereas total income is much higher in the latter, primarily due to large contributions by the mining, construction and electricity sub-sectors. These discrepancies are rather too large and could be a reflection of the absence of data.

5.2.2.2 Zimbabwe

The main sources of income were identified in the Pungwe River basin in Zimbabwe, as follows:

- Agricultural sales
- Salaries and wages
- Informal Sector
- Remittances from employed relatives
- Pensions and other retirement packages

Details are outlined in the following paragraphs.

Agricultural Sales

Table 14 below gives a summary of the income from agricultural sales in the basin, including, where data is available, the main markets, local and export sales values.

Table 14 Indicative Annual Income from Agricultural Sales in the Pungwe River basin in Zimbabwe

Crop	Income Z\$/annum	Remarks
Tea	20 000	514 producers with 90% exported
Coffee		2 to 1000 kg produced per farmer with earnings of Z\$165 000 per tonne
Sweet Potatoes	18 000	
Bananas	90 000	
Sugarcane	90 000	
Vegetables	40 000	
Avocado Pears	18 000	
Pineapples	30 000	
Guavas		Picked in the wild and sold to Cairns (Pvt) Ltd at Z\$30.00 per pack
Beans	8 000	
Dairy products	120 000	
Fish		Z\$100 000 per month shared among club members

Although the above table is indicative, due to the lack of properly researched data, it shows the significance of agricultural produce to the income of communal area basin communities in Zimbabwe. The table does not include product sales income from the large-scale tea, coffee and timber plantations. There is scope for further development to boost the above incomes through increased access to water, its efficient use, and the establishment of more ready markets. Additional income can also be realised through the establishment of small-scale food processing operations at local level. Hauna offers the ideal environment for such enterprises.

Salaries and Wages

The major areas of salaried employment in the Pungwe River basin in Zimbabwe are the forestry and tea estates, tourism, commerce and administrative services. Income varies widely depending on employment position.

Forestry

Table 15 below gives a summary of employment statistics in the timber industry for Manicaland Province during the period 2001 to 2002. Separate figures for the Pungwe River basin were not available.

Table 15 Number of employees in the timber Industry in Manicaland Province

Grade	Number of Employees			
	Sawmills	Processing & Depots	Other	Total
Permanent	5 120	641	2 259	8 020
Contract labour	4 402	236	756	5 394
Total	9 522	877	3 015	13 414

The majority are employed at sawmills, which are normally located within the plantation estate. About 50% of employees are seasonal labourers, most of whom leave their homes in the communal area to work on the estates during labour intensive production phases. The income from seasonal employment supplements that from agricultural activities in the communal areas. It should be noted that because of the nature of timber plantation work, mostly males are involved, leaving behind the females to look after the homes. It is therefore imperative that gender dynamics be an essential element in the planning for future development in the basin.

Stapleford Plantation, owned by the Forestry Company of Zimbabwe, has 230 permanent employees. Including their dependants, more than 1 000 people live on the plantation. The average monthly income is between Z\$15 000 and Z\$16 000. Most of the employees are from Honde Valley, Muchena, Chimanimani and Inyanga, with some from as far as Masvingo in the south of Zimbabwe.

Employment in the Tourism Sector

In the Eastern Highlands of Zimbabwe, there are several hotels, inns and lodges of international and local repute. Among the best known are Troutbeck Inn, Pine Tree Inn, Inn on the Rugarara and Rhodes Nyanga.

The pristine nature of Nyanga National Park, with its natural woodland and beautiful scenery of the Pungwe Falls and Gorge, under normal times attracts thousands of local, regional and foreign tourists. The spectacular view of Honde Valley is a favourite attraction for visitors to the area.

Tourism has contributed significantly to the economic development of the eastern highlands by creating employment for the local population. The current poor image of the country, artificial exchange rate, shortages of fuel and foreign currency, and inadequate air transport have had a negative impact on overall earnings from tourism due to a drastic reduction in visitors. The potential for growth still exists. The excellent climate, scenery and existing infrastructure provide a basis upon which new tourism initiatives can be made to improve the livelihoods of basin communities.

Employment in the Agricultural Sector

The cool humid climate in the Eastern Highlands is suitable for tea and coffee production. Aberfoyle Tea Estates (Eastern Highlands Tea Estate), the largest single tea grower in the basin, employs 3 000 permanent workers and an equal number of contract workers. On average, a tea picker earns Z\$14 000 per month (January 2003), while other employees earn Z\$12 300 per month. The salaries are reviewed on a quarterly basis. Communal area farmers also act as out-growers for the tea estate, which runs a tea processing plant.

Another large plantation is Katiyo Tea Estates on the border with Mozambique. It draws water directly from the Pungwe River for irrigation. Permanent employees receive a regular monthly salary.

Small-scale tea and coffee producers in Honde Valley employ 30 permanent workers in the nurseries. They have plans to develop a plant for processing tea and coffee at Hauna to add value to their products. The plant when

completed will employ 60 people from Honde Valley, thus boosting local employment. It is also likely to spawn downstream industries at the centre.

Income from various informal activities

Interviews were conducted in Masara village and Murara business centre, in Muparutsa Ward to establish the nature of informal economic activities.

To a large extent, the informal sector in the Pungwe River basin in Zimbabwe relies on a variety of river resources. These are exploited for building, art and craft, basket making, metalwork, firewood, food and medicine. Raw materials from river resources are used to make finished products in make-shift home industries, which are sold to tourist visitors and the local communities.

Fishing is an important source of protein and income. At Masara Village in Muparutsa Ward, about 30 families conduct fishing activities, catching an average of 60 to 70 fish per day per family. Most of the catch is eaten in the family. Some is sold, generating earnings of up to Z\$300 000 per year. The types of fish caught include tiger fish, bream, salmon, silver fish, maboshwe, ngurusi and mangare.

Basket-making is another important income generating activity. At Musara Village, about 15 members of the community collect reeds from the banks of the Pungwe River to produce baskets and mats. Each basket is sold for between Z\$200 and Z\$300 (January 2003 prices) each.

Six *carpenters* operate at Murara business centre where they produce chairs, doorframes and walking sticks. Most are sold locally, although some of the raw materials are obtained from Border Timbers in Mutare. In addition, several carpenters use the natural wood resources found in the surrounding woodlands.

Savings Clubs dominate the rural informal financial sector. There are wide variations in the financial capacity of each savings club. In Murara village, there are three Savings Clubs, namely, Budiro, Kumboyedza and Ruremekedzo with 20, 32 and 32 members respectively. The clubs are the result of the initiative of local women who obtain their income from marketing agricultural produce. Most of the savings are used to buy agricultural inputs, books, uniforms and to pay school fees. Agricultural input and other essential items are procured in bulk to take advantage of discount offers for such purchases.

Originally, two licences were issued by the authorities for *gold panning* in the Nyamakwarara River. Over the years, these activities have attracted other unlicensed minors, including employees of the forest estates, and the new

resettled farmers. The Forestry estate is now patrolling the area on a regular basis to control these activities. In January 2003 earnings average Z\$8 000 per gram, or Z\$32 000 per month per miner.

Remittances from Employed Relatives

Most women in the basin find themselves heading households because the men are employed in the formal or informal sectors, away from home. The younger generation of men also prefers to work in the city centres. Remittances from husbands and other relatives contribute significantly to local income. Regrettably, the current harsh economic climate is rapidly eroding the value of that income due to inflation. Workers in the urban centres are struggling to survive on dwindling real values of income.

Pensions and other Retirement Packages

A large number of men in the basin have a history of formal employment in the urban centres, tourist areas and mining centres around Zimbabwe. On retirement to their rural home, some received pensions and other benefits which have become a source of income in their old age. During economically healthy times, this income has been more than ample to sustain them and their families. Regrettably it has now been eroded by inflation because of the current economic downturn in Zimbabwe.

The number of banks operating in Hauna Growth Point is a good indicator of the economic activities taking place in the basin. There are four financial institutions serving the area: the POSB, Western Union, Agri Bank and Zimbank.

5.2.3 Development initiatives and use of the available water resources in the Pungwe River basin

5.2.3.1 Beira Development Corridor

Beira Development Corridor is an initiative that has been developed since the end of the 1980s, when the Beira harbour was rehabilitated. The project include improvement of the railways that connect Mozambique and Zimbabwe, as well as construction and rehabilitation of the roads that connect Mozambique to Zimbabwe, Malawi and Zambia.

The South African Department of Trade and Industry (DTI) and the Development Bank of Southern Africa (DBSA), together with the Mozambican authorities, took the initiatives to this regional development. This project has however faced difficulties of progressing for the concrete actions due to the

economic retraction in Zimbabwe after the agrarian reform, which had an intense impact over exports and imports of this country through Beira harbour.

A great part of the initiatives foreseen has not yet materialized. Anyhow if materialized they will have a intense influence in water demand:

- Construction of iron factory in an industrial free trade zone to be built in the Savane area, Administrative Post of Nhangau, Beira City.
- Construction of aluminium factory in the axis Beira–Dondo, by a South African company. Recently such perspective was also announced by a Brazilian company.
- Implementation of anchor projects in the area of agriculture and cattle raising, estimating that there are about 6 million hacters in Manica and 3.5 million in Sofala with potential for agriculture development. The identified anchor projects are rice production and processing in the Pungwe flood plains, cattle breeding and meat processing, production of chicken and wood processing.

In spite of these constraints, some initiatives have been taken that can be framed in the scope of the Beira Development Corridor. They are:

- The reconstruction of the Dondo–Muanza railways as an initiative in the scope of the reconstruction of Sena railway. It connects the city of Beira to the north districts of Sofala Province (Cheringoma, Marromeu, Caia and Chemba), to the coal mines of Moatize in Tete Province and to the neighbouring countries Malawi and Zambia.
- The bidding launch for Sena and Beira-Machipanda railway reconstruction and management.
- The construction of the road Centre - Northeast between Inchope and Caia Village in the Zambezi river, which will allow the connection between the south, the centre and north of the country.

5.2.3.2 Small Scale Irrigation Project

It is an initiative of National Directorate of Agricultural Hydraulics and of the Government of the Sofala Province, financed by the African Bank of Development that will have an effect in the use of basin water resources

The Project will build small irrigation schemes in the districts of Chibabava, Gorongosa, Nhamatanda and Dondo, the three last districts located in the

basin. In total, it will be built 674 hacters of irrigation, divided in the following way:

District	N° of hacters watered	Local where will be built
Chibabava	125 hacters	Chibabava chief town
Gorongosa	200 hacters	Nhambiriri, Murombozi
Nhamatanda	300 hacters	Muda Macequece, Muda Mufo & Metuchira Pita
Dondo	49	Mandruze

In the three districts that are part of the basin, the irrigation area to be built will be of 549 hacters. The irrigation to be built will use the system of gravity irrigation in the Gorongosa district and by flood in the others cases (use of petrol engine for irrigation) and its main users will be the peasants organized in associations.

The Project is at this time in the phase of topographical raisings preceding the construction work, as well as of selection of the organization that will facilitate and give support to peasants' organization.

5.2.3.3 Hauna Growth Point

This growth point has been expanding rapidly. There has been an increase in the number of residential stands and commercial stands. Presently the growth point has more than 1 300 households, with stands measuring 15 m x 40 m and 20 m x 40 m.

Hauna Growth Point draws water from Ruda River. There are a number of individuals that have installed piped water schemes. The major problem however is that meters have not been installed yet to determine the amount used per household/commercial enterprise or institution.

The growth point occasional experiences water shortages. This is largely due to breakdowns. The Red Dragon Hotel situated at the growth point experiences water shortage when communities along the hotel pipeline route dig a hole on the pipeline and let the water flood their furrows. This is also an indication that more communities require irrigation facilities.

Annex XII: Socio-economy

Monthly and quarterly consumption at Hauna Growth Point in 2002:

Monthly consumption (m ³)			Quarterly consumption (m ³)			
October	November	December	January – March	April – June	July – September	October – December
8 966	7 457	11 488	30 508	26 522	23 025	27 911

6 HEALTH

APRIL 2004 FINAL REPORT

**SWECO, ICWS, OPTO, SMHI, NCG,
CONSULTEC, IMPACTO, UCM, Interconsult
Zimbabwe**

Page 55 (94)



6.1 Existing health infrastructure

The quantity and quality of water plays an important role in the health and well-being of basin communities. Water-borne diseases can be reduced and controlled by providing access to safe drinking water and adequate sanitation. This is closely linked to the availability of health facilities, and the influence they exert in relation to diagnosing and treating illness, as well as health education for disease prevention.

6.1.1 Health Infrastructure in Mozambique

Table 16 below gives the health network in the districts that fall within the Pungwe River basin in Mozambique.

Table 16 Health care facilities in Sofala and Manica provinces (2003)

District	Population		Health Centres				Number. of Beds			Beds/ 1000 persons
	District Total	Within Basin	Hospital	Health Centre	Health Post	Total	Wood	Other	Total	
City of Beira	474 478	465 753		9	9	18	86	66	152	0.3
Dondo ^(b)	139 011	127 302		6	6	12	41	72	113	0.8
Nhamatanda	162 431	162 431	1	10	6	17	45	113	158	1.0
Gorongosa	90 843	88 540		9	7	16	34	44	78	0.9
Búzi	166 987	997	1	10	11	22	53	72	125	0.7
Cheringoma	24 257	2 495	1	4	2	7	25	44	69	2.8
Muanza	17 857	5 323		3	9	12	16	14	30	1.7
Total Sofala	1 075 865	852 841	3	51	50	104	300	425	725	0.7
Barué	95 599	85 898	1		10	11	34	54	88	0.9
Gondola	217 901	124 508	1	1	9	11	39	27	66	0.3
Macossa	16 486	12 982		1	2	3	7	16	23	1.4
Manica	183 795	27 468		2	16	18	42	102	144	0.8
Total Manica	513 781	250 856	2	4	37	43	122	199	321	0.6

Source: Sofala and Manica Provincial Health Departments

(a) maternity hospital

(b) health sector covers the Dondo City and District

Out of the 11 districts in the basin, only 5 are served by district hospital. The number of health centres and health post is somewhat larger, with Sofala Province being better served than Manica. However, health posts only offer basic out-patient services and often lack adequate qualified health personnel. Considering an overall bed ratio of 0.6 per thousand patients, serious illnesses and injuries are therefore considerably underprovided for. Patients must travel long distances to hospitals and health centres to receive medical attention for serious ailments where facilities may not be adequate. The proliferation of

HIV/AIDS cases in the basin in Mozambique exacerbates an already undesirable situation.

The objective of the health sector policy in Mozambique is to gradually increase the number of health centres, where out-patient and in-patient facilities are more extensive, and to reduce the number of health posts. Any development scenarios must take into account the current poor provision of health services in the basin in Mozambique.

6.1.2 Health Infrastructure in Zimbabwe

The Pungwe River basin in Zimbabwe is serviced by Mutasa Rural District Hospital, Hauna Hospital, Honde Mission Hospital, and several clinics and health centres. Serious cases are referred to Mutare General Hospital, which is the provincial referral hospital. Within the basin almost every established business centre has a clinic or health centre. Access to health facilities is good.

Currently, the provision of health services is deteriorating due to the shortage of drugs and qualified health personnel who have emigrated to green pastures in the region and abroad, as well as the scaling down of donor support. Despite the availability of clean water for most communities, the provision of health service continues to deteriorate in line with national trends. Even when drugs are available, their cost is often out of reach of the generality of the population.

The HIV/AIDS pandemic is adding considerable pressure to already stressed health services.

6.2 Common diseases in the Pungwe River basin

6.2.1 Diseases in the Pungwe River basin in Mozambique

The most common diseases in the Pungwe River basin in Mozambique, diarrhoea and cholera, are related to access to safe drinking water. **Table 17** below shows cases of diarrhoea and cholera diagnosed by the national health system network. The table shows that children up to the age of 4 years are the most vulnerable group. The city of Beira, Nhamatande and Manica districts are the most affected by cholera.

In general the major problem concerning health in Mozambique is related to the following factors:

- access to services and the quality thereof;
- access to clean water and adequate sanitation;
- lack of education on disease prevention;
- low literacy levels;
- poverty and its link with poor diet and nutrition.

Rural communities in remote areas and those in peri-urban areas of the large cities are the most affected by these factors. The following is required to improve the health status of these disadvantaged communities:

- improving services available on the health network;
- focus on effective health education programmes, in particular those related to the prevention of water borne diseases;
- dissemination of information on nutrition, based on locally produced foods;
- improved access to safe water and adequate sanitation.

Annex XII: Socio-economy

Table 17 Diarrhoea and Cholera Cases, Sofala and Manica Provinces - 2002

District/ City	Diarrhoea						Cholera	
	up to 4 years		5-14 years		15 years		C	O
	C *	O **	C	O	C	O		
Beira	7 190	-	1 206	-	5 363	-	3 167	4
Dondo	1 946	1	1 236	-	1 101	-	180	-
Nhamatanda	5 615	-	2 133	-	3 849	-	258	-
Gorongosa	2 867	-	875	-	1 174	-	-	-
Búzi	2 981	2	521	-	1 930	-	74	-
Cheringoma	2 326	2	905	-	421	-	-	-
Muanza	284	-	905	-	421	-	-	-
Sofala total	23 209	5	6 978	0	13 988	0	3 679	4
Rate of fatalities		0.002		0		0	-	0.11
Barué	3 325	1	331	-	1 225	1	-	-
Gondola	3 844	-	424	-	1 241	-	54	-
Macossa	255	-	30	-	154	-	-	-
Manica	3 479	-	580	-	2 425	1	84	-
Manica total	10 903	1	1 365	0	5 045	4	138	0
Rate of fatalities		0.009		0		0.079		0

Source: Sofala and Manica Provincial Health Departments

* Cases

** Deaths

6.2.2 Diseases in the Pungwe River basin in Zimbabwe

The main diseases in the Pungwe River basin in Zimbabwe are STDs, respiratory infections, Diarrhoea, HIV/AIDS and cholera. Access to safe water has improved over the years due to the construction of several pipelines that supply treated water to villages. There is, however, no data on the number of cases of these diseases. Infections and death are likely to be on the increase due to the deterioration of health services.

Zimbabwe has an extensive health network that lacks adequate resources to function effectively.

6.2.3 HIV/AIDS

HIV/AIDS is a major problem on the health of basin communities in both Mozambique and Zimbabwe. Its impacts on the productive ability of communities are profound because the most vulnerable section of society is

APRIL 2004 FINAL REPORT

also the most productive. **Figure 4** below illustrates the impact of HIV/AIDS on water resources management.

Although some progress has been made in increasing the communities' knowledge and awareness of water-related issues, the targeted communities are also the most affected by HIV/AIDS. Consequently, the loss of qualified personnel from the disease will require substantial financial resources to train new people. Skills have been lost through HIV/AIDS related deaths at various levels of the water management sector, which include the following institutional areas:

- Managers and experts in central, provincial and district government level;
- Practitioners in the private sector, NGOs and Community Based Organisations;
- Stakeholders in water user associations and community groups responsible for the management and maintenance of water points.

To address the negative impacts of HIV/AIDS, the following initiatives have been identified for possible implementation by the water sector in the basin rural areas, through its partners and stakeholders involved in water resources management.

- Review and implementation of the national HIV/AIDS strategies in the water sector;
- Identification and implementation of specific programmes for prevention, counselling and treatment;
- Incorporation of HIV/AIDS education in training and development programmes for the water sector at all levels.

Annex XII: Socio-economy

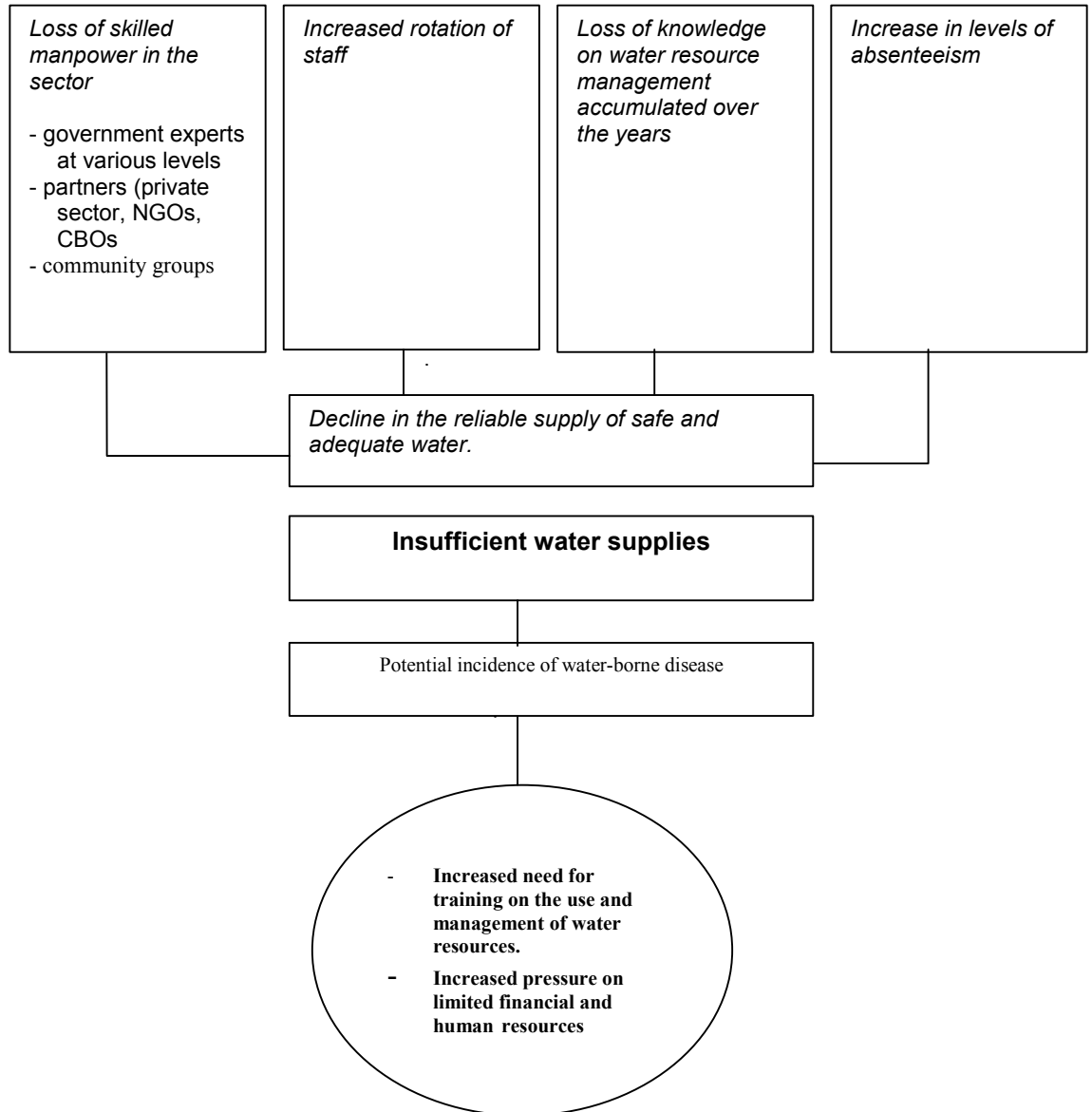


Figure 4 Impact of HIV/AIDS on Water Resources Management

6.3 Water supplies

6.3.1 Pungwe River basin in Mozambique

The National Water Policy (PNA, 1995) of Mozambique provides the legal and institutional framework for the creation of conditions for implementing sustainable interventions in the water and sanitation sectors. It requires that rural and urban households shall have access to clean water and adequate sanitation on demand. A further objective of the policy is to promote sustainability in the provision and management of water and sanitation facilities through community involvement.

The Rural Water Transition Plan (PTAR) specifies the strategic and institutional actions required to implement the National Water Policy. These include the following aspects:

- capacity building in the water sector at provincial and district level;
- building technical and administrative competencies at the higher levels and among the district administrations;
- private sector involvement in awareness-building within the communities, the construction and maintenance of the infrastructure, and the development of a communication strategy as a fundamental component of the ongoing process of transforming the country's rural water sub-sector.

Although the National Water Policy and Rural Water Transition Plan have facilitated increased access to safe drinking water by the rural communities to a modest degree, based on the principle of sustainability, progress in the rural areas continues to be slow, as shown in **Table 18** below.

Due to the sparsely populated nature of the basin, it is likely that for most water sources, the total number of users may be below 500. Consequently, coverage indicated below may be an overestimation.

Table 18 shows low coverage with respect to the provision of safe drinking water for the following administrative centres:

- Inchope, Cafumpe and Matsinho in Gondola District;
- Nhampassa and Choa in Barué District;
- Nguawala in Macossa District;

Annex XII: Socio-economy

- Machipanda and Mavonde in Manica District.

Table 18 Access to Safe Drinking Water in Rural Areas (Dec 2003) – Mozambique

Location	Estimated Population 2003	Isolated sources*				Population served		
		B/holes	Wells	Springs	Total	Isolated sources	PSAA	Theoretical coverage**
<i>Sofala Province</i>								
Dist./City of Dondo	135 211				151	75 500		56%
Búzi	162 755				238	119 000		73%
Cheringoma	23 643				45	22 500		95%
Gorongosa	88 541				52	26 000		29%
Muanza	17 404				25	12 500		72%
Nhamatanda	158 315				238	119 000		75%
Total Sofala	585 869				749	374 500		64%
<i>Manica Province</i>								
Catandica Adm Post	55 239	12	67	1	80	40 000		72%
Choa Adm Post	14 184	0	0	0	0	-		0%
Nhampassa A Post	23 572	13	0	2	15	7 500		32%
Total Barué Dist.	92 995	25	67	3	95	47 500	4 275	51%
Gondola Adm post	30 285	18	21	0	39	19 500		64%
Amatongas A Post	36 665	37	0	0	37	18 500		50%
Cafumpe Adm Post	27 800	16	8	0	24	12 000		43%
Inchope Adm Post	19 995	13	2	0	15	7 500		38%
Matsinho Adm Post	26 726	9	14	0	23	11 500		43%
Total Gondola Dist.	141 471	93	45	0	138	69 000		49%
Macossa Adm Post	7 154	10	0	0	10	5 000		70%
Nguawala Adm Post	1 760	2	0	0	2	1 000		57%
Nhamangua A Post	7 124	11	0	0	11	5 500		77%
Total Macossa Dist.	16 038	23	0	0	23	11 500		72%
Machipanda A Post	40 326	4	14	19	37	18 500		46%
Mavonde Adm Post	45 154	3	1	0	4	2 000		4%
Vanduzi Adm Post	14 448	29	7	0	36	18 000		125%
Total Manica Dist.	99 928	36	22	19	77	38 500		39%
Total Manica Prov	350 432	177	134	22	333	166 500		48%

Source: Sofala and Manica Provincial Departments of Housing – Water and Sanitation departments.

*The wells and springs were only listed in cases where they are considered protected

** Theoretical coverage based on an estimate of 500 people per source.

With the exception of Catandica administrative centre, water supplies in the rest of the centres are based on boreholes equipped with manual hand pumps, usually located in the centre of the town and in residential suburbs. Hinterland areas, which also contain large populations, draw their water from

unprotected shallow wells, or directly from the rivers. Water harvesting is practised during the rainy season. During the dry season, when the shallow wells and rivers dry up, communities rely on boreholes. Since these boreholes are often located in and around the administrative centres, some household in the outlying areas must travel long distances to fetch water.

The following two-pronged strategy is recommended to increase access to safe drinking water for rural communities in the Pungwe River basin in Mozambique:

- The installation of new water supplies and rehabilitation of existing schemes in the district capitals and towns of a similar size and administrative importance, and the creation of management and maintenance systems thereof, to ensure their reliability.
- Development of new water sources to supply rural villages and to increase access to safe drinking water, based on community participation for both implementation, and operation and maintenance of the schemes.
- The private sector and NGOs could form partnerships with communities to facilitate funding and the necessary training required for the operation and maintenance of the schemes.
- The water sector should also be strengthened at district administration level to enable it to fulfil its role in overseeing the planning, implementation and general monitoring of water programmes.

6.3.2 Pungwe River basin in Zimbabwe

In Zimbabwe, by far the largest source of water is the numerous perennial mountain streams that generally contain water of good quality. Other supplies include shallow wells located in wetlands, public and private boreholes, and natural springs. There are several pipe schemes that supply villages, schools and business centres from the perennial streams. Some of these schemes also provide water for irrigation. Details of existing piped schemes are given in Annex VII. In addition to formal schemes enterprising villagers have installed makeshift structures across streams that divert water by means of flexible piping to irrigation plots. The same water is used for domestic purposes.

Table 19 below gives the distribution of domestic water sources in the Pungwe River basin in Zimbabwe by ward, other than piped schemes.

Annex XII: Socio-economy

Table 19 Distribution of Water Sources in the Pungwe River basin in Zimbabwe by Ward

Area	Deep Wells	Open Wells	Family wells	Springs	Boreholes
Sahumani	12	0	0	0	24
Samaringa	22	0	0	0	5
Samanga A	1	0	14	2	4
Samanga B	2	0	6	18	14
Nyamaende	0	3	3	2	0
Chikomba	4	4	0	0	2
Sanyamandwe	5	23	8	1	33
Chidazembe	4	3	0	0	20
Total	50	33	31	23	102

In areas with distribution system, several homesteads are connected to water supply by means of standpoints. The numbers of known individual house connections in the basin are given below by ward or scheme.

Sahumani	-	16
Honde Army Camp	-	282
Zindi	-	116
Hauna	-	256
Mupotedzi	-	61
Samanga	-	41

Despite concerted efforts to develop and maintain safe water sources, a large number of people still rely on water drawn directly from rivers and streams.

Although water quality in the Pungwe River basin in Zimbabwe is generally good, there is increased danger of pollution from agricultural chemicals, and detergents used to wash clothes. Underground water sources are limited by poor yielding aquifers, and the high cost of borehole drilling.

In view of abundant surface water supplies in the basin, the most effective strategy in the provision of safe drinking water supplies for rural communities is to increase coverage of treated piped water supplies, through community based approaches as proposed above.

6.4 Sanitation

By definition, sanitation is the safe management of human excreta, which includes the “hardware” (latrines, sewers etc) and “software” (regulation, hygiene etc) required to reduce faecal-oral disease transmission. Sanitation, or lack of it, has a direct impact on the health of communities, and indirectly, on their capacity to produce. Lack of it undermines development and the dignity of mankind. Like water, sanitation is a public good and should therefore be taken into account in community development strategies.

A key element in sanitation programmes is the consideration of gender as part of the efficient implementation of programmes. In particular, women play a significant role in family decisions to improve sanitation systems, because they are often the ones tracking the day-to day problems caused by the evacuation of household wastewater. Furthermore, better sanitary conditions provide real benefits for women through greater privacy, convenience, safety, dignity and safe hygiene practices in the family unit. This has the potential to release their time and energy for the general care of the family. Thus improved sanitation has a vital contribution to play in the sustainable development of family livelihood, especially for the poor and vulnerable.

The following types of sanitation facilities are found in the Pungwe River basin.

Mozambique

- Ventilated latrines
- Dry/ecological latrines
- Improved pit latrines
- Traditional pit latrines
- Flush and non-flush toilets
- Septic tanks
- Conventional sewers

Zimbabwe

- Blair ventilated latrines
- Simple pit latrines
- Waterborne toilets discharging to septic tanks
- Waterborne toilets discharging to public sewers and treatment plant

General sanitation conditions in the basin are outlined below.

6.4.1 Pungwe River basin in Mozambique

The most common form of sanitation among rural communities in Mozambique is the traditional pit latrine. It is also used in some sections of the main urban areas that are not covered by waterborne systems, as well as district administrative centres. Despite the presence of these facilities, many members of rural communities still use the bush to defecate and urinate. This practice is common in the floodplain areas where the groundwater is close to the surface, particularly in low altitude areas with a high population concentration.

In general, sanitation coverage in the Pungwe River basin in Mozambique is still very low. In Manica Province, coverage is estimated at 1.1%, and 2% for Catandica Administrative Centre. A very small percentage of rural households own improved pit latrines.

In recent years, ventilated pit latrines have been introduced at Level 1 and Level 2 Primary Schools (EP1 and EP2) for school children and at health centres for patients. Separate similar facilities have been provided for staff houses. At several health posts and schools in Dondo District, dry/ecological latrines were provided. These separate urine and excreta, with the latter being deposited in a compartment that is covered, and has no contact with groundwater.

In the rural communities, laundry and bathing is practised in watercourses or in the vicinity of other sources of water.

In the urban areas, most households have waterborne toilet systems connected to the sewage system. However, flushing mechanisms often do not function, thus requiring water to be poured manually into the system. In most homes and buildings with internal toilet and bathroom fixtures, people often use external facilities because the systems are often broken down. In many cases, the entire system does not function, resulting in wastewater overflows

into backyards and streets. Whole sections of the sewage system are blocked and pumps broken down.

In urban areas there is an artificial low demand for water due to operational problems with the sanitation systems. Once these problems are corrected, water demand will increase dramatically.

In the peri-urban areas, some households have either water borne or improved latrine sanitation systems. However the majority use traditional pit latrines within the household or a neighbour's facility. Others relieve themselves in the open on unused land. The latter has serious implications for environmental health and the contamination of groundwater.

In a recent study on 960 households in the cities of Beira and Dondo, the following statistics were established:

Internal/external bathroom	-	13%
Improved latrine	-	22%
Traditional pit latrine	-	33%
None	-	31%

Despite the above scenario, some experience has been gained in the construction of dry pit latrines in Beira, under a Rotary Club initiative. Generally, it is evident that the objective for the provision of adequate sanitation facilities in the rural, urban and peri-urban areas has not been met. This reflects on general hygiene practices of basin communities, as well as their appreciation of the importance of adequate sanitation for improving the well-being and health of households.

In view of the poor sanitation conditions in all sectors of the basin community, the following strategy is recommended:

- Health education campaigns should be launched to encourage the construction of improved or dry latrines for rural household, with special attention on hygienic practices such as the use of soap to wash hands after using the toilet.
- The installation of dry latrines in the high density peri-urban areas of the district capitals and in large cities of Beira and Dondo.
- The provision of small production plants to fabricate cement slabs for the construction of improved latrines or low-cost dry pit latrines using local small-scale private producers in the district capitals and peri-urban areas.

6.4.2 Pungwe River basin in Zimbabwe

Table 20 below shows the distribution of sanitation facilities in the communal area of the Pungwe River basin in Zimbabwe. It is evident that concerted efforts have been made to improve sanitation. Most of the facilities are based on the pit latrine, which does not use water. Water borne facilities are limited in distribution. Current coverage is 46%, with a short-term target of 54%.

Most of the villages in the valley have Blair ventilated latrines, while villages in isolated areas or in the mountains use simple latrines or the bush. One of the most common reasons why sanitation systems are not installed is the lack of resources. In general people bath in the latrines.

The Ministry of Health and Child Welfare provides technical support in the provision of sanitation infrastructure. Many schools in the Pungwe River basin have adequate sanitary facilities, which include single, double or multi-compartment facilities.

Hauna Growth Point has a water-borne sanitation system, with households connected to septic tanks. Hauna Hospital discharges into sewage ponds. Other households still developing their properties use Blair toilets.

Although cases of water-borne disease, such as diarrhoea and cholera, have been reported because of poor sanitation in Mutasa District, these have not been reported at Hauna. The areas that have been seriously affected by water-borne disease are Chikuso on the border with Mozambique and the new resettlement areas including, Tara, Odzi and Grange Farms. Due to social and cultural habits, many people still prefer to bath and wash clothes at water points and watercourses. Consequently, even in areas with sufficient water supplies such as the Pungwe River basin, water-borne disease and diseases linked to sanitation will continue to exist.

Annex XII: Socio-economy

Table 20 Distribution of Communal Area Sanitation Facilities in Zimbabwe (2002)

Ward	No. Of Households	Type of Sanitation Facilities												Collapsed/Filled		Coverage	
		Single BVIP			Double BVIP			Flush		Other			SBL	DBL			
		h/w	No h/w	h/w	No h/w	h/w	No h.w	h/w	No h/w	h/w	No h/w						
Sahumani	1 349	229	0	210	0	0	0	0	0	0	0	0	0	0	0	0	32%
Samaringa	1 476	204	0	569	0	0	0	0	0	0	0	0	0	0	0	0	77%
Samanga 'B'	2 013	1 288	80	166	55	1	0	535	0	44	32	4	4	4	0	0	78%
Samanga 'A'	1 364	1 101	456	6	10	0	0	15	0	4	4	0	0	0	0	0	97%
Nyamaende	938	0	10	0	10	0	0	91	0	0	0	0	0	0	0	0	2%
Mandeya II	2 016	1 268	0	130	0	0	0	0	0	0	0	0	0	0	0	0	69
Muparutsa	1 364	378	0	70	0	0	0	0	0	0	0	0	0	0	0	0	33%
Zindi	1 827	960	0	72	0	0	0	0	0	0	0	0	0	0	0	0	32%
Chikomba	3 238	661	337	5	33	4	0	1 831	11	53	0	0	0	0	0	0	69%
Sanyamandwe	2 427	140	28	66	220	0	0	0	0	0	0	0	0	0	0	0	52%
Chidzembe																	
Stapleford	314	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77%

BVIP: Blair Ventilated Improved Pit Latrine **h/w:** Hand Wash Facilities **SBL:** Single Blair Latrine **DBL:** Double Blair Latrine

Source: Ministry of Health and Child Welfare

7 EDUCATION

7.1 The significance of education to basin development

The population's formal education level has a significant influence on the perceptions and behaviour of the population with respect to use, management and conservation of water. There is a relationship between formal education, health and disease. A certain level of education creates an understanding for ideas such as the gravity concept in water diversion, ventilated pit latrines, the protection of water sources and an awareness of the importance of water and sanitation. Formal education creates an awareness of the need to allocate sufficient resources to meet basic family needs, especially food, water, housing and clothing. Education is necessary but is not necessarily a sufficient pre-condition for development.

The general state of education in the Pungwe River basin is outlined in the following subsections.

7.2 Education facilities in Mocambique

The area under study is vast and has a formal education network, which is still developing. However, there are problems that necessitate a more active and influential role by the education sector in improving the well-being of the rural communities and the use of natural resources such as the land, water, flora and fauna.

Table 21 shows the number of schools under the National Education System in Sofala and Manica Provinces. The objective of the Ministry of Education is to convert all Level 1 primary schools into complete schools, Level 2, where all seven classes at primary school level are offered, and defined as compulsory. Regrettably, this continues to be an objective since the number of Level 1 school is still much higher. As a consequence, a large number of pupils complete Level 1 of primary school without progressing to Level 2 to complete the primary school level.

A similar situation exists for Level 2 graduates, where entry into Lower Secondary level is restricted by an inadequate number and sparse distribution of schools. The few secondary schools are normally located in the district capitals. Consequently, students from outlying areas are at a disadvantage, since they are usually unable to secure resources to cover the expenses of attending school away from their homes.

Although the Ministry of Education has teacher training institutions, it has not managed to maintain the impetus of building new schools that began in 1992, after the end of the devastating armed conflict. Consequently, most primary schools in the rural areas are staffed by young 12th grade graduates who have not received training in primary school education. To address the

Annex XII: Socio-economy

teaching staff shortage, the Ministry of Education is implementing short training courses for these teachers, with the assistance of partners such as UNICEF, GTZ and others, or using funds from the State budget.

Table 21 School Network in Sofala and Manica Provinces

Location	Education Level					
	Level 1	Level 2	EPC	ESG 1	ESG 2	EAO
Sofala Province						
City of Beira	35	5	18	3	1	
City and District of Dondo	25	1	6	2	1	
Cheringoma District	16	1				1
Muanza District	5	1				
Nhamatanda District	14	1	5	1	1	1
Sofala total	95	9	29	6	3	2
Manica Province						
Barué District	41	2	6	1		
Gondola District	66	2	11	1		
Macossa District	15		1			
Manica District	68	5	10	2	1	
Manica total	190	9	28	4	1	0

Source: Sofala and Manica Province Departments of Education

Level 1 – Level 1 Primary School (1st to 5th Grade)

Level 2 – Level 2 Primary School (6th and 7th Grade)

EPC – Full Primary School (1st to 7th Grade)

ESG 1 – Secondary School: 8th to 10th Grade

ESG2 – Pre-University School (11th and 12th Grade)

EAO – Arts and Crafts School

The failure rate in Level 1 and Level 2 varies between 60% and 70%. The dropout rate, particularly among girls, is of major concern to the government and its partners who have designed specific programmes to reduce it, with special attention on female students. The primary school curricula have little relevance to practical agricultural training. This is because primary school is not considered to have any influence on the subsistence farming in relation to new sustainable practices aimed at increasing productivity and crop diversification. The importance of Practical Agricultural Schools, craft trade training centres in the rural areas, where theoretical and practical subjects could be taught in crop farming, livestock rearing, metalwork, carpentry and other trades should seriously be taken into account for the future. This could facilitate the acquisition of skills for self-employment by school leavers.

The education programmes transfer knowledge that contributes towards behaviour change concerning health, hygiene and water usage. Multi-sector initiatives have also been undertaken to ensure that schools are equipped as centres that disseminate modern knowledge and practices in the communities in which they are located.

7.3 Education facilities in Zimbabwe

The Pungwe River basin in Zimbabwe has 41 primary schools and 14 secondary schools. Of the 14 secondary schools, four offer 'A' level. Each ward in the basin has a primary school. At present there are no plans to build additional schools.

About 90% of the children attend primary school. The rest do not attend school for religious reasons or due to poverty. Members of the Apostolic Church discourage their children from attending school, with girls being the most affected. In most cases the school attendance rate is 100% in the first term, while dropouts occur during the course of the year. To boost household incomes, some children are required to carry out farming activities such as tea picking on the plantations to the detriment of their education.

Through the Basic Education Assistance Module (BEAM) the government is assisting disadvantaged children and orphans with paying school fees. However, the programme is unable to support some of the disadvantaged children.

Some schools are not electrified. Practical subjects focus on agriculture, fashion and fabrics at the expense of other areas such as basket-making and carpentry. The inclusion of agriculture in practical training will have a positive influence on farming for basin communities.

The Ministry of Education has qualified teaching personnel, although in recent years it is becoming increasingly difficult to retain experienced staff. Despite staffing problems, the pass rate is very high. Many students reach secondary school, and a reasonable number progresses to 'A' level. Some pursue their studies in higher education institutions such as universities and colleges. Most of the youths in the basin are well educated. Manicaland Province has one of the highest educated population in the country. According to the 1992 Census, 83.37% of the male population and 74.24% of the female population above the age of 15 in Mutasa Rural District was considered educated. Those classified as "educated" reached a minimum level of grade 3.

The older generation in Zimbabwe is not as well educated as the younger one because it was prejudiced by the war of liberation, the discriminatory policies of the Colonial regime, limited finances and inadequate training institutions.

APRIL 2004 FINAL REPORT

However, traditional ancestral cultural practices relating to water use and management must not be under-estimated. Furthermore, awareness-building campaigns on water and sanitation, targeting men as well as women, have altered perceptions. More people are now aware of basic hygiene requirements. Habits concerning water and sanitation are gradually changing through education. Although many people understand the importance of food hygiene they are unable to apply this knowledge due to financial constraints that limit the ability to acquire adequate containers to store water or build ventilated pit latrines with facilities to wash hands (see **Table 20**).

8 GENDER AND POVERTY

APRIL 2004 FINAL REPORT

**SWECO, ICWS, OPTO, SMHI, NCG,
CONSULTEC, IMPACTO, UCM,
Interconsult Zimbabwe**

Page 76 (94)



8.1 Gender dynamics in basin development

Previous sections have shown that there are more women than men in the Pungwe River basin, and that women generally remain at home to fend for families while men migrate to urban areas in search of work. However, natural resources such as land and water are not equitably distributed with respect to gender. In the Pungwe River basin in general, access to water depends on access to land, control of resources, and development of capacity, all of which are more severely restricted for women than men. Because of the historic social construct of gender, women are the principal family providers in rural areas. They produce food, fetch water, and manage the sanitation needs of the family unit, yet they have a disadvantage with respect to access to water. In rural settings in particular, it is common knowledge that most human labour for agriculture, especially in irrigation farming, is supplied by women, few of whom have land rights that entitle them to a say in policy-making decisions which relate to land and water.

Development strategies and poverty alleviation programmes invariably falter in their initial stages because of their failure to explicitly refer to gender. The success of these strategies lies in managing conflicting gender interests in the face of limited resources and varied entitlements. Thus mainstreaming gender, through affirmative action, will be needed to ensure the sustainable success of the Pungwe River Basin Integrated Water Resources Management Strategy.

In Zimbabwe, although representation in the decision-making bodies such as the Save Basin Committee and the Pungwe River basin sub-committee favour men, the few women who are on those committees continue to play a key role in water management issues.

In its inaugural meeting, having noted the importance of including women in the decision-making process, the Basin's sub-committee voted in favour of including two women representatives. These women regularly attend the meetings alongside their male counterparts, contributing effectively to the discussions, and being actively involved in implementing the resolutions of the committee.

Notwithstanding the above inroads in the promotion of gender involvement in water management, cultural and other factors inhibit women's mobility, and regrettably militate against the participation of more women in the Basin committee and sub-committee. Through gender programmes, efforts are being made to avoid projects in which women only fulfil unpaid roles while doing physical work, such as cleaning around public taps and collecting fees, while only the men hold positions in organisations where management and financial decisions are made and the service is controlled.

In Mozambique the Pungwe Basin committee has not yet been established and it is not yet known exactly what form it will take. Given that the structures created include representatives of the local authorities, producer associations, and users of isolated water sources, it will be important to ensure that women are represented.

While gender concerns men and women, this study focuses specifically on the role played by women as managers of natural resources, domestic and income generating activities. This is not only because, on the one hand, they are victims of environmental degradation but because, on the other hand, they are active agents in the protection of the environment and its regeneration. The water resources that they use are susceptible to environmental degradation and contamination as is the case with the pollution of water by fertilisers, dynamite, detergents and faecal matter.

Considering that these environmental effects are occurring as a result of the search for better living conditions, women are extensively involved in managing water resources at a domestic and community level. Because they manage the environment surrounding them on a daily basis, the integrated water resource management strategy should take their concerns into consideration.

The collection of water is mainly a female activity. 95% of the people involved in transporting water are women and girls. On average, the female members of a household do four trips per day for seven days of the week, to carry 20 to 25 litres of water (a 20 to 25 litre bucket/tin is the most commonly used container for carrying water).

The maintenance and financing of water supplies and sanitation systems and the improvement of hygiene conditions require the participation of men and women in the planning, implementation, monitoring and evaluation of those projects. The participation of women when effected in the right way, has benefited the projects, women and their families. It was also observed that when the woman is literate and educated to at least primary school education, her family's health and well-being was better, partly due to better management, conservation and domestic use of water resources.

In Mozambique, the water sector recommends that women be included on the water committees chosen by the communities to ensure the correct management and maintenance of the water sources. In many places it has been noted that when they are first formed, the water committees are made up of men and women but with time some women cease to participate. It will be necessary to ensure the ongoing participation of women in the water committees, along with men, through monitoring and supervision by the water

sector and local organisations of the work carried out by community structures.

In Zimbabwe, in the Pungwe River basin, women promote the establishment of water and sanitation schemes. They continue to work with their male counterparts in setting up water supply schemes such as those funded by STABEX. They contribute towards the protection of the spring by supplying sand and stone, and in the construction of open community wells. The government promotes the involvement of women by stipulating that each community water source committee should be made up of three men and one woman.

In Zimbabwe, most of the community health workers in the towns originally trained in the early '80s by the Ministry of Health were men. Their role is to promote domestic hygiene, childcare, nutrition, water and sanitation programmes, activities for which women are undoubtedly more suited for.

8.2 Poverty

8.2.1 Pungwe River basin in Mozambique

A household survey conducted during the period 1996 to 1997 has defined poverty with reference to a poverty threshold based on the minimum monthly food consumption needs per capita. Households below 60% of the poverty datum are ultra-poor³. For Sofala Province, the minimum monthly consumption needs per capita were calculated to be 147 629 MT in the rural areas and 231 168 MT in the urban areas. For Manica Province, the minimum monthly consumption per capita was estimated to be 143 365 MT in the rural areas and 225 520 MT in urban areas.⁴

The 1996-97 IAF survey presents the general poverty and ultra-poverty findings by province, while the determining factors for poverty are only analysed for three zones in the country (the North, the Centre and the South) and the rural and urban areas. There is no data at district level. The 1996-97 IAF findings served as a basis for drafting the Action Plan for the Reduction of Absolute Poverty (PARPA) adopted by the government for the 2001-2005 planning period, and recognised by the donor community as an instrument for fighting poverty in Mozambique.

³ Poverty and Well-being in Mozambique, First National Evaluation (1996-1997), Ministry of Planning and Finance/Eduardo Mondlane University/International Food Policy Research Institute, Maputo, December 1998.

⁴ Sofala Provincial Poverty and Human Development Profile, Ministry of Planning and Finance, National Department of Planning and the Budget, Macroeconomic Planning Department, Sectoral Policy and Study Department, Maputo, June 2000.
APRIL 2004 FINAL REPORT

Based on the definition of the poverty line, the 1996-97 IAF findings indicate that Sofala Province has the highest rate of poverty at 87.9%, and ultra-poverty at 66.2%, in Mozambique. The national poverty and ultra-poverty average is 69.4% and 37.8% respectively.

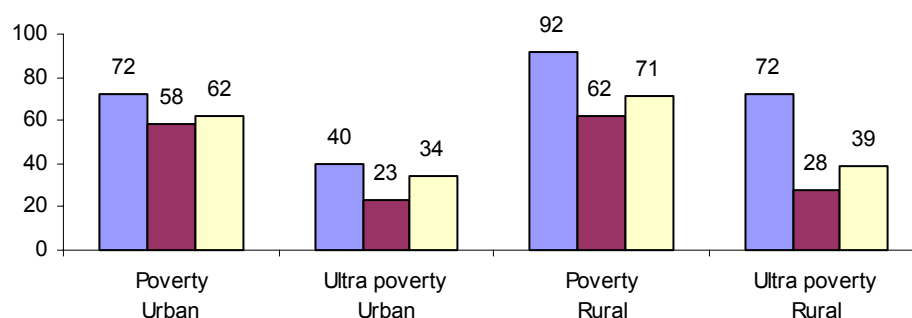


Figure 5 Urban and Rural Poverty in Sofala, Manica Provinces and Nationally

Figure 5 above illustrates the poverty and ultra-poverty indices in Sofala and Manica provinces, in comparison with national indices.

In the rural areas of Sofala Province, the rates of poverty and ultra-poverty are the highest in the country, with 92% poor and 72% ultra-poor. In the urban areas of Beira and Dondo there is a lower rate of poverty and ultra-poverty: 72% and 40% respectively. In urban areas throughout the country (including Maputo City) the rates of poverty are 62% and ultra-poverty, 34%. Poverty and ultra-poverty in Beira and Dondo are the third highest in the country's urban areas, after the urban areas in Nampula and Tete Provinces.

The high levels of rural poverty and ultra-poverty in Sofala could be attributed to the effects of the war and the continued isolation of some districts such as Chemba, Caia, Marromeu, Cheringoma, Muanza and Machanga since the Peace Agreements. This is the case despite existence of extensive forestry and hunting resources. Another reason is that local agricultural production has not been integrated into the market system, and in addition, local communities are not benefiting from natural resources.

Annex XII: Socio-economy

The poverty and ultra-poverty levels in urban and rural areas in Manica Province are much lower compared to national levels. This is most likely due to the prevailing climate and fertile soils that are suitable for agricultural production coupled with opportunities for vibrant trade with neighbouring Zimbabwe. In addition, several districts straddle the Beira Corridor and are close to Tete. There are also better rural road networks. In Manica province 63% of the rural population is considered poor, while 28% is ultra-poor. In the urban areas, 58% of the population is considered poor and 23% ultra-poor.

Table 22 below lists factors that cause poverty as determined by the 1996-1997 IAF survey and the Provincial Poverty Profiles of Sofala and Manica Provinces. Factors such as type and size of households, literacy and general education levels, employment, ownership of land and fruit trees, area under cultivation, agriculture inputs, marketing of crops, and access to safe water and adequate sanitation are associated with poverty.

Table 22 Factors Linked to Poverty in Mozambique

Poverty Factors	Cases in which there is a relation with poverty level
Household size	In rural areas of Sofala and Manica , the number of households members is greater in poorer households
Households headed by women	In Sofala province female headed households are poorer in urban areas, specially those headed by widows. In Manica province households headed by men are poorer in rural areas.
Level of literacy	In Sofala and Manica provinces, women and men have a high level of literacy in less poor households in both urban and rural areas. In rural areas the women literacy rate is very low both in poor and less poor families, not exceeding 10% in Sofala and 25% in Manica.
Education levels	In Sofala and Manica provinces more men and women have completed Level 1 of primary school education in less poor households in urban areas. This tendency is much lower in rural areas, specially for women. In Sofala province more boys and girls finish <i>Level 1 of primary school</i> education in less poor households in urban areas. In rural areas this tendency is only observed in boys. In Manica province more boys and girls finish Level 1 of primary school education in less poor households in urban and rural areas. In rural areas of Sofala and Manica the proportion that finish Level 1 of primary school is much lower than in urban areas, specially for girls. In Sofala province more boys and girls finish <i>Level 2 of primary school</i> in less poor households in urban and rural areas. In Manica province this tendency is not observed.

Annex XII: Socio-economy

Employment	<p>In Sofala and Manica provinces more children from 7-18 years attend school in less poor households, while more poor children do domestic job or work.</p> <p>In Sofala province about 90% of people employed in agriculture and fisheries and in the construction sectors are poor, while only about 70% employed in mining, commerce and services, transport and communication are poor.</p> <p>In Manica about 60% of people employed in agriculture and fisheries, or in mining are poor, while only about 40% of people employed in transport and communication and public services are poor.</p>
Consume patterns	<p>In rural areas of Sofala province poor households spend more money in housing. In urban areas less poor households spend more money in house items.</p> <p>In rural areas of Manica province poor households spend more money in energy and transport, while less poor spend more money in housing and house items. In urban areas a higher proportion of less poor households spend their money in durable goods.</p>
Ownership of land	In urban areas of Sofala and Manica Provinces a higher proportion of poor households owns land for agriculture.
Area under cultivation	In Sofala and Manica provinces less poor households has a higher average per capita agriculture land area in urban and rural areas.
Use of agriculture inputs	<p>In Sofala province a higher proportion of less poor households hire contracted labour in urban and rural areas. In Manica province, a higher proportion of less poor urban households use tractor power in their fields and a higher proportion of less poor rural households use animal traction power.</p> <p>The use of agriculture inputs in Sofala is much lower than the national average. In Manica is greater than the national average.</p>
Marketing of agriculture	<p>In urban areas of Sofala and Manica provinces all households use their crops for eating.</p> <p>In rural areas of Sofala and Manica provinces, less poor households market more maize.</p>
Ownership of fruit tress	In rural areas of Sofala and Manica provinces less poor households own more cashew nut and fruit trees.
Access to sanitation	<p>In urban areas of Sofala and Manica provinces a higher proportion of less poor households have a latrine or flush toilet.</p> <p>In rural areas of Manica a higher proportion of less poor households have a latrine or flush toilet.</p>
Access do safe water	<p>In urban areas of Sofala and Manica provinces, a higher proportion of less poor households consumes piped water or from the standpipes.</p> <p>In rural areas of Sofala and Manica provinces a higher proportion of less poor households consumes water from standpipes.</p>

The significance of gender in the above table with respect to poverty is self-evident.

Figure 6 below shows poverty levels with respect to access to water in rural areas of Sofala and Manica Provinces. Note that, in rural areas, the level of poverty has influence on the ability by households to access water. Poor households face difficulties in accessing water using more river and lakes in

Sofala and wells in Manica. On the other hand a greater proportion of less poor households in Sofala and Manica rural areas consume water from safe sources, such as piped water and standpipes.

In the urban areas, two main factors distinguish the poor from the less poor households. A greater proportion of the less poor households have access to piped water, while only a small part of the poor and ultra-poor have such access. Furthermore, a large proportion of poor households use unsafe sources such as wells and rivers for water.

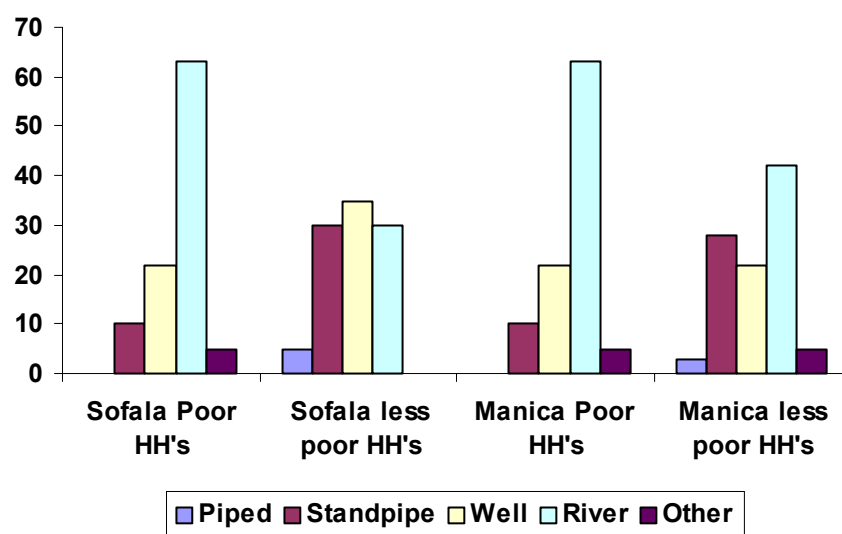


Figure 6 Access to Water with respect to Poverty Level in Rural and Urban Areas of Sofala and Manica provinces

8.2.2 Pungwe River basin In Zimbabwe

In Zimbabwe poverty is widespread and increasing. About 61% of households have a per capita income below a level that sufficiently satisfies basic needs. High poverty levels are more accentuated in the rural areas, with 75% of rural households categorised as poor, compared to 39% of urban households.

According to the Poverty Study (1997) conducted at provincial level, Manicaland Province was considered the poorest, with 89% of the people graded as totally poor. However, applying the poverty identifiers listed in **Table 23** below, used at provincial level, it could not be established whether the basin communities have the same conditions as those in the rest of the province.

The number and type of assets owned by a household determines its ability to transport bulk goods, including water, over long distances or difficult terrain.

Annex XII: Socio-economy

Most of the residents of the basin cannot afford to have water pipes connected to their houses. It costs Z\$107 910 to have a water connection installed. This is clearly unaffordable for most households.

Table 23 Poverty Identifiers – Manicaland Province, Zimbabwe

Poverty Identifiers	Observations
1. Lack of Food	Insignificant. Abundant food resources. Households that have lost breadwinners are affected.
2. Lack of land for farming	Significant due to the terrain. They are forced to cultivate on narrow ledges on mountain slopes and riverbanks.
3. No draught animals	Very few. Ownership of livestock, particularly cattle, is very important in rural communities, because they provide traction, as well as meat, milk, money and lobola. Cattle are also a symbol of the status of the owner, and are also used in ceremonies.
4. Lack of grazing land	Very significant, and as a result there are few animals.
5. Poor housing	Most of the buildings are made of unburnt brick (used frequently because of the shortage of firewood), asbestos or metal sheets indicating that the households have a high capacity to afford these materials.
6. Tendencies towards begging	Not observed, as in other districts. A few cases at Hauna Growth Point.
7. Shortage of clothing	Not observed. Orphans (due to the spread of HIV/AIDS) are the most affected
8. Problems with sending children to school	Most children have completed primary school. Some are not moving onto secondary school because of financial problems.
9. Malnutrition among children	Very few cases, particularly among orphans
10. Shortage of assets	They include scotch carts, ploughs, water pipes, bowsers and water tanks.

Using the amount of grazing land required as an indicator, **Table 24** below shows that most communities in the two Manicaland districts under study are very poor:

Table 24 Poverty and Grazing Land Requirements

District	Adequacy of land	Very poor %	Poor %	Non poor %
Mutasa	Inadequate	61	13	26
Nyanga	Inadequate	85	8	6

Some community members in the basin have invested in individual or community water projects in the basin, mainly to increase agricultural production. However, this may not be a useful guideline in view of the

intensive nature of crop agriculture in the basin, which has a strong bias on cash crops.

Studies on poverty identify the relationship between poverty and households headed by widows. Among the poorest households, most are headed by women. Access to resources is clearly responsible for this disparity.

Honde Valley has a mixture of rich and poor households. It was noted that those considered rich have been living in the area for a long time and are well established in terms of health and education. Some of the recent arrivals have not managed to establish themselves mainly because they have failed to adapt to the terrain and that their land is likely to be located in areas less conducive to irrigation agriculture.

Compared to other parts of Zimbabwe, Honde Valley has an abundance of water resources and fertile land which provide numerous sources of income through agriculture.

8.3 Strategy for poverty alleviation

The following strategy is recommended to alleviate poverty among basin communities:

- Poverty alleviation strategies and programmes should focus on the rural areas, with particular attention to gender, through the decentralisation of government functions, and the allocation of human and financial resources to the districts, while encouraging community participation in development initiatives.
- Increased production and productivity in subsistence farming should be promoted, so that the food security and earnings of rural families are improved through the introduction of crop diversification, sustainable production, the development of small-scale irrigation schemes and appropriate food storage facilities, as well as effective marketing techniques.
- The production of cash crops, livestock rearing, and fruit tree planting should be promoted in order to improve the diet and income of communal farmers and their families.
- The rehabilitation/construction of rural roads should be implemented to link areas with agricultural potential with local and regional markets.

Annex XII: Socio-economy

- Awareness programmes should be created on the full use of crops grown by communal families so as to improve their diet, through nutritional programmes targeting women.
- Adult literacy programmes should be implemented, taking into account gender disparities and their negative influence of poverty.
- Gender mainstreaming should be promoted as an effective mean to alleviate poverty, through sustainable development.
- Access to land for settlement and agriculture both in the urban and rural areas, access to water for irrigation, and access to education, health and sanitation facilities must be promoted.
- Women must be involved in water management at local and national level as part of the overall empowerment strategy and ongoing efforts to decentralise water management.
- Supervision, facilitation and monitoring programmes must be implemented at local levels for community structures involved in managing water resources, to maintain high standards of performance, while guaranteeing the participation of women represented by them.
- Women must be trained as stakeholders in the management and development of water resources and conditions created for them to be able to initiate and manage rural water projects.
- Programmes to reduce population growth should be promoted to foster sustainable development.

9 CONCLUSIONS AND RECOMMENDATIONS

APRIL 2004 FINAL REPORT

**SWECO, ICWS, OPTO, SMHI, NCG,
CONSULTEC, IMPACTO, UCM,
Interconsult Zimbabwe**

Page 87 (94)



9.1 Conclusions

The distribution of settlements in the Pungwe River basin in Mozambique is a function of climate, the availability of arable land and other natural resources such as water, and forests, as well as infrastructure. Because of its urban nature, the Beira/Dondo metropolitan area has the highest population density. Other high density settlements are found around administrative centres and along main roads. Settlement densities in the hinterland areas decrease with increasing distance from the centres. The Beira/Dondo metropolitan area is the only truly urban setting in the Pungwe River basin in Mozambique.

In the Pungwe River basin in Zimbabwe relief has had a profound influence on the settlement distribution. Consequently, these are concentrated in the valleys, along streams and near roads infrastructure. Hauna Growth Point, a thriving commercial and administration centre, has the potential to develop into a major town in the basin.

Land use in the basin is largely semi-subsistence farming, with a few large-scale commercial farming concerns, as well as national parks. There is a potential for the Gorongosa National Park in Mozambique, once rehabilitated.

As at year 2003, the Pungwe River basin has an estimated total of population of **1 199 567**, which is still considered to be sparse for the available land area. However, in Zimbabwe, arable land is limited by relief, consequently, there will be a need for the resettlement of communities to relieve land pressure and protect natural resources.

The local economy is predominantly agricultural, at the subsistence level. As such, given the available ample water and sparse populations, particularly in Mozambique, there is a huge potential for agricultural expansion. In Zimbabwe, the existence of mountain streams that are amenable to gravity irrigation provide a good basis for more intensive agriculture. There are opportunities to build on ongoing agricultural based activities through investments in more efficient irrigation systems and value enhancing food-processing and related industries.

The Beira metropolitan area and Hauna Growth Point are strategically located to exploit increased agricultural production in the basin. Rural town centres in Mozambique located in potentially productive areas are also well poised for commercial and industrial growth.

The status of health and health facilities in the basin is generally poor, particularly in Mozambique. In Zimbabwe, which is better covered by health facilities, these are deteriorating due to diminishing resources. This situation has the potential to derail future development initiatives, and prolong the

endemic poverty in most of the basin. The HIV/AIDS pandemic continues to be a major threat.

There is inequity in favour of men in the distribution of natural resources such as land and water. Since women are the principal parties in the production of food, the fetching of water, and management of the sanitation needs of the rural family unit; since they supply the most human labour for agriculture, the continued denial of their rights to land and water will compromise future development scenarios.

Poverty continues to be a major set back to sustainable development in the basin. It is the reason communities have occupied the Gorongosa National Park in Mozambique, practised stream bank cultivation in Zimbabwe and cleared trees from the indigenous forests. The threat from poverty on the basin's water resources and associated ecosystems is therefore real.

9.2 Recommendations

Development in the basin should be decentralised to facilitate the redistribution of settlements from densely populated areas and sensitive environments to the more sparsely populated areas that lack readily exploitable resources.

The potential for economic development through agriculture in the basin should be exploited by the introduction of community irrigation schemes in suitable areas, while taking cognisance of the need to conserve sensitive and potentially valuable ecosystems. Agricultural development as a vehicle for poverty alleviation must be accompanied by small-scale initiatives to add value to the raw products, particularly in the Pungwe River basin in Zimbabwe, where options for expansion are limited by insufficient arable land.

Marketing conditions for agricultural produce will require improvement through upgraded communications, progressive policy instruments and other strategies, to ensure the sustainability of higher agricultural output. Communities that are currently settled in sensitive and potentially valuable ecosystems must be encouraged through deliberate programmes to diversify from subsistence agriculture to eco-tourism.

Adequate resources should be channelled towards the improvement of health facilities and health education in the basin, without which investment initiatives cannot realise the intended benefits. Although education continues to be a national priority in the basin countries, more resources should be channelled towards the sector to extend services to poorly covered areas in the basin, in the case of Mozambique, and to maintain or improve standards in areas currently covered, in the case of Zimbabwe.

Annex XII: Socio-economy

Gender mainstreaming should be adopted as an important sub-strategy of future basin development through literacy programmes, training, the involvement of women in community structures, and the formulation and implementation of gender sensitive policy.

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APRIL 2004 FINAL REPORT

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Page 91 (94)



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Annex XII: Socio-economy

Appendix 1: Distribution of Population in the Pungwe River basin in Zimbabwe

Sub-basin Area	Ward No	Population Distribution		
		Enumeration Area (EA)	EA Population	Total Population
Ruera River	1	300	464	4 751
		290	341	
		270	389	
		280	403	
		260	271	
		210	709	
		240	421	
		010	983	
		020 – 040	770	
Nyamkombe R	1	230	306	7 894
		220	289	
		200	366	
		190	575	
		180	649	
		170	552	
		120	1 222	
		110	681	
		050	700	
		250	367	
		060	735	
	2	010	161	
		020	230	
		050	447	
		040	339	
		030	37	
	070	238		
Lower Pungwe	1	130	513	3 283
		310	445	
		080	517	
		090	574	
		100	572	
		070	662	
Nyawamba R	1	160	494	4 290
		150	855	
		140	693	
	2	210	224	
		060	106	
		120	166	
		080 – 100	503	
		110	331	
		130	262	
	3	140	160	
	080	496		

Annex XII: Socio-economy

Sub-basin Area	Ward No	Population Distribution		
		Enumeration Area (EA)	EA Population	Total Population
Nyamingura	2	200	103	4 184
		190	330	
		180	288	
		170	186	
		160	126	
		150	257	
	3	030	340	
		060	531	
		070	561	
		050	657	
	040	358		
	090	447		
Chitema River	3	010	305	2 245
		020	452	
		120	459	
		110	743	
		100	286	
Nyamawanga	3	180	303	3 083
		170	296	
		150	1 344	
		140	554	
		130	586	
Middle Pungwe	3	160	685	2 217
	5	020	433	
		030	572	
		010	527	
Muzinga	4	040	335	4 109
		050	577	
		060	475	
		070	772	
		160	621	
		170	710	
		150	619	
Nyamanyoka	4	200	279	4 289
		190	528	
		180	671	
	5	040	480	
		050	743	
		060	784	
		070	804	
Nyakujindura	4	080	549	4 289
		090	508	
		100	388	
		110	539	

Annex XII: Socio-economy

Sub-basin Area	Ward No	Population Distribution		
		Enumeration Area (EA)	EA Population	Total Population
		130	431	2 415
Marirangwe	4	120	554	3 633
		140	786	
	5	100	684	
		110	591	
		080	656	
		090	362	
Ruda River	5	120	941	7 573
	6	010	620	
		020 –070	3 835	
		080	354	
		090	436	
		100	568	
		160	572	
		170	247	
Boyoyo	6	150	454	4 215
		140	525	
		130	458	
		120	741	
	7	110	575	
		020	771	
		010	691	
Nyamakanga	7	120	1 015	2 232
		110	1 217	
Duru	7	030	170	8 290
		040	1 160	
		050	601	
		060	627	
		070	693	
		080	478	
		090	749	
		100	375	
		010	370	
		020	448	
		030	290	
		040	293	
		050	320	
		060	622	
		100	440	
		110	260	
120	394			

Annex XII: Socio-economy

Sub-basin Area	Ward No	Population Distribution		
		Enumeration Area (EA)	EA Population	Total Population
Nyagura	8	040	478	5 201
		030	525	
	9	080	502	
		090	411	
		070	626	
	9	040	846	
		100	628	
		010	421	
		020	381	
			030	
Mupenga River	10	040	497	7 995
		50	364	
		030	509	
		020	468	
		010	498	
		090	437	
	8	050	453	
		070	366	
		010	484	
		020	615	
		080	503	
		120	443	
		110	893	
		100	620	
		090	444	
		060	401	
Honde	4	210	911	7 995
		220	465	
		010	558	
		020	525	
		030	290	
	10	080	348	
		070	415	
		060	460	
	11	080	317	
		70	596	
		090	392	
	19	110	346	
		100	507	
		120	434	
		130	507	
		090	400	
		060	423	
		050	309	
040	579			

Annex XII: Socio-economy

Sub-basin Area	Ward No	Population Distribution		
		Enumeration Area (EA)	EA Population	Total Population
		030	345	
		010	807	
		020	656	
		070	296	
		080	324	
		140	621	
				11 831
Nyamakwarara	27	010	226	
		020	209	
	9	050	767	
		060	937	
				2 139