ジンバブエ国ニャコンバ地方かんがい計画
事前調査報告書

平成元年４月

国際協力事業団
農林水産計画調査部

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平成元年4月

国際協力事業団
農林水産計画調査部

序　　文

ジンバブエ共和国は，現在，第１次国家開発５ケ年計画（１９８６～１９９０）を策定し，社会主義路線から現実路線への転換を明確に打ちだしている。

この目標のひとつに「土地所有関係の変革と土地の有効活用」があり，国営農場の開発等を通じて，貧農・土地無し農民に土地を与える再定住計画を推進しているところである。

この再定住計画を推進しているのが，土地農業農村再定住省であり，同計画の一環として，同省は，マニカランド州東北部に位置するニャコンバ地方のかんがい計画を選定し，１９８５年６月，ジンバブエ国政府を通じて，我が国に対し，Ｆ／Ｓ調査の実施を要請してきた。

この要請を受けて，日本国政府は国際協力事業団を通じ，１９８９年２月２４日から３月１２日の間，ジンバブエ国に，農林水産省関東農政局建設部次長・古賀英祐氏を団長とする事前調査団（予備協議）を派遣し，要請内容とその背景の確認，関連情報の収集及び現地踏査を行うとともに，本格調査の内容に関して土地農業農村再定住省及び農業技術普及局との協議を実施し，３月８日に，農業技術普及局長との間でＳ／Ｗに署名した。

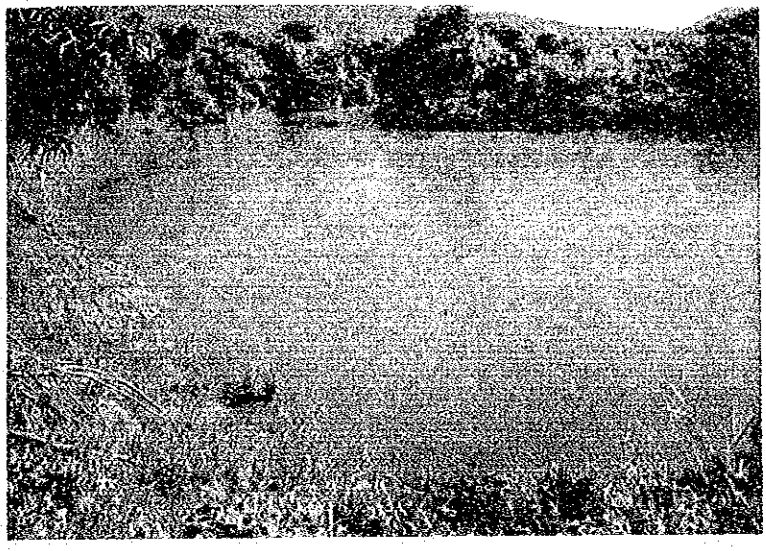
本報告書は，上記事前調査団による調査結果を取りまとめたものである。本報告書が今後予定される調査のための基礎資料として関係者に活用されることを願うものである。

最後に本調査の実施に際し，多大の御支援と御協力を賜った外務省，農林水産省，在ジンバブエ日本国大使館関係者，専門家及びジンバブエ国政府関係者各位に対し，深甚なる謝意を表する次第である。

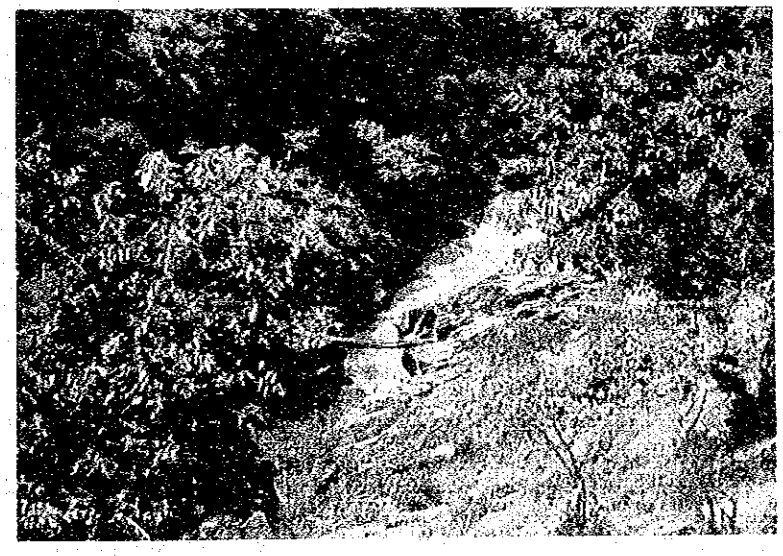
平成元年４月

国際協力事業団

理事　山極　栄司



Gairezi川（乾期の水源となる）の流況（Study Area内）

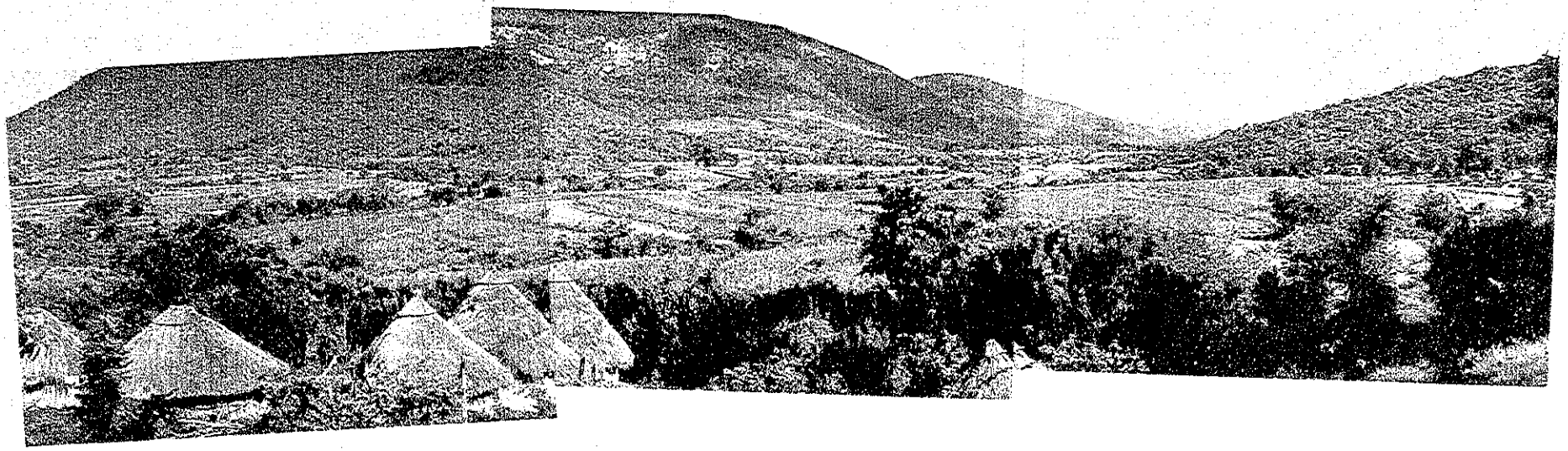


Nyamaropa地区（Study Areaの上流）のGairezi川。丸木橋を通してモザンビーク側(左側)と住民が行き来している。両側には、それぞれの国のArmyがいた。

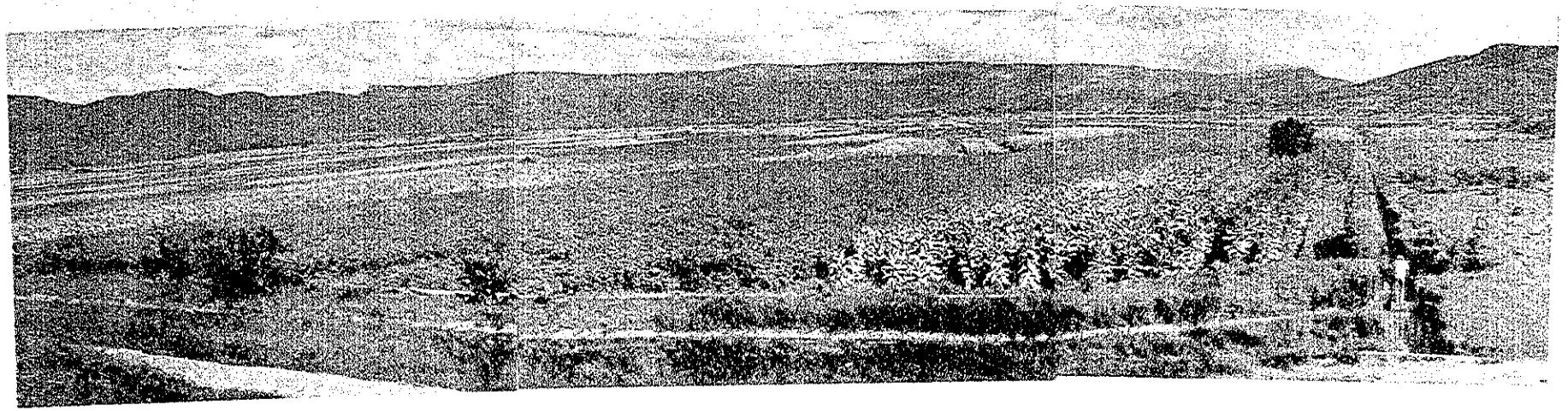
Gairezi川近辺の畑地に作付されたとうもろこし

Nyamaropaにて、粉すりの順番を待つ住民、エンジンの機械がある。

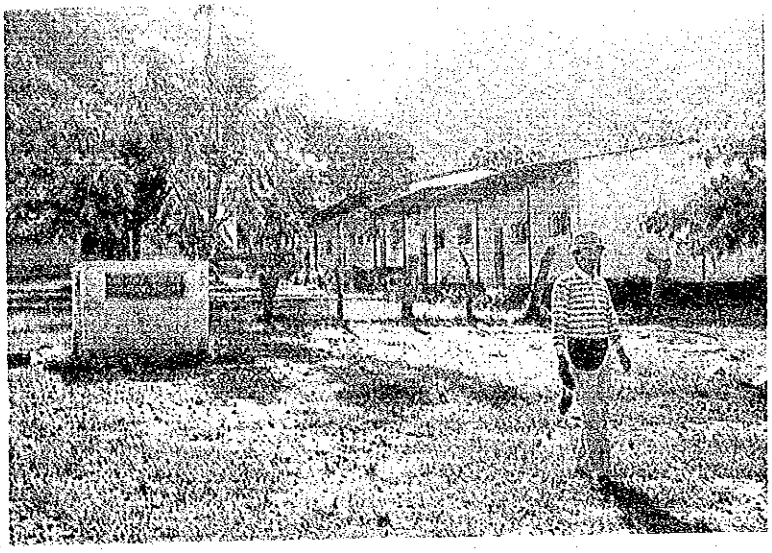
NyangaにあるCommercial Farm
数百人の労働者を使い、種イモ等を栽培している。



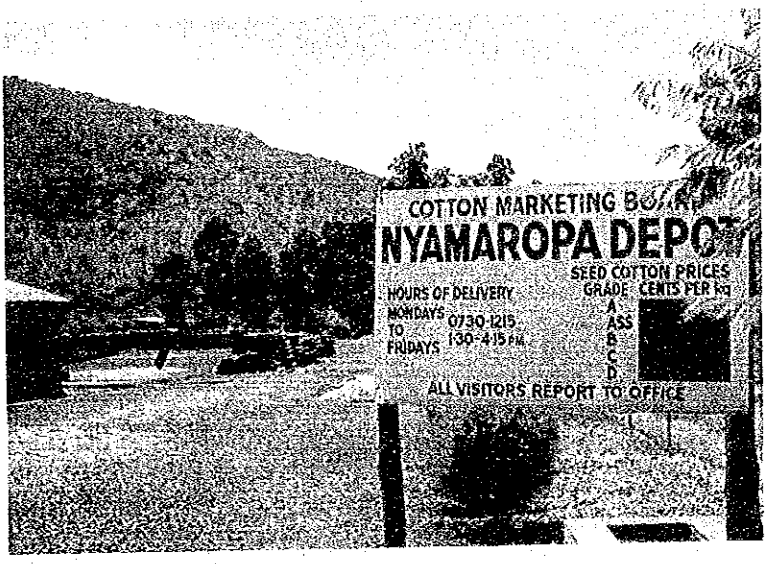
丘よりNyakomba地方を望む。山の麓に沿って民家が並ぶ。（乾期には、殆んど農地の緑がなくなる）



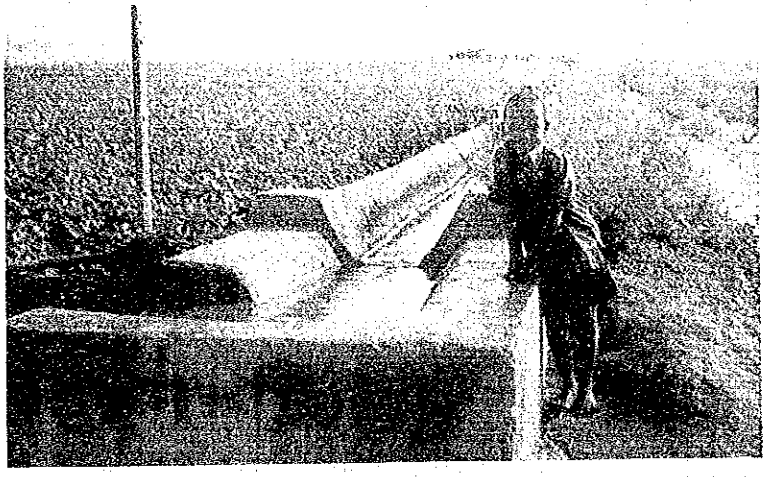
Nyamaropa Irrigation Project地区内にある水路。
全て重力かんがいである。



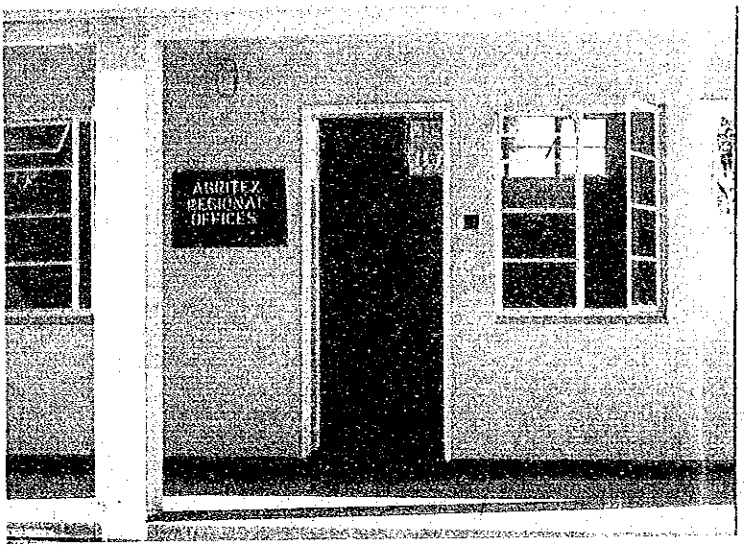
Nyakomba Areaに存在する
School



Nyamaropa地区にあるCotton
Marketing Board
Nyakomba地区で生産された綿花
もここに集積される。



Nyamaropa Irrigation
Project地区の現況。
みごとに綿花、煙草、とうもろこし
等が作付されている。

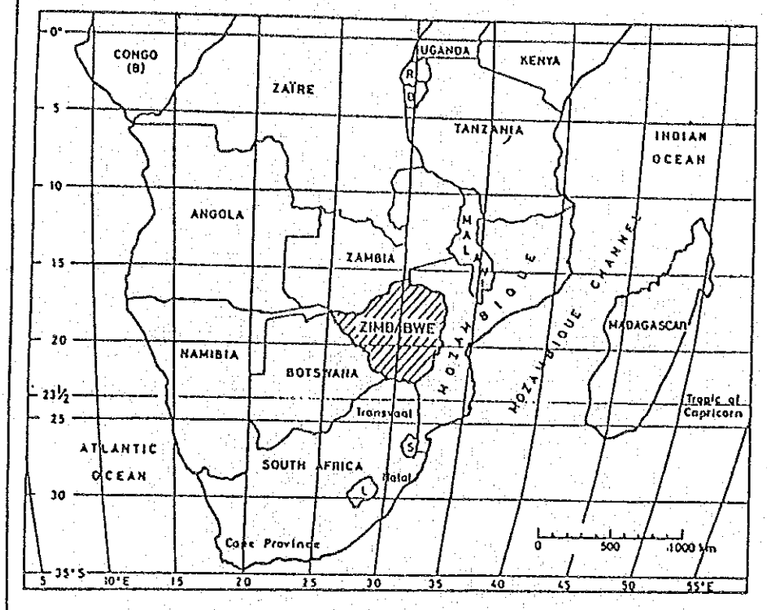


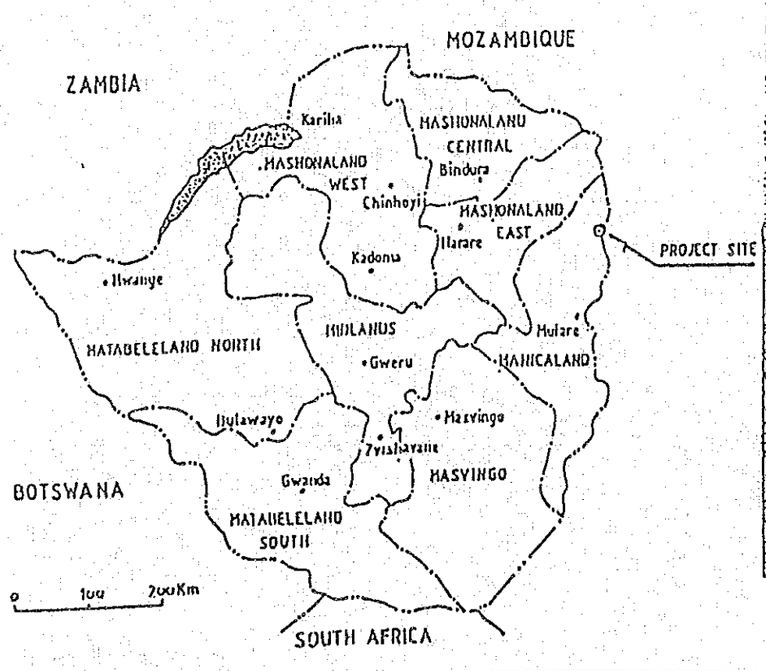
NyangaにあるAGRITEX REGIONAL OFFICES.
当OfficeのStaffは、かなり協力的である。

Regional officeでの資料収集状況

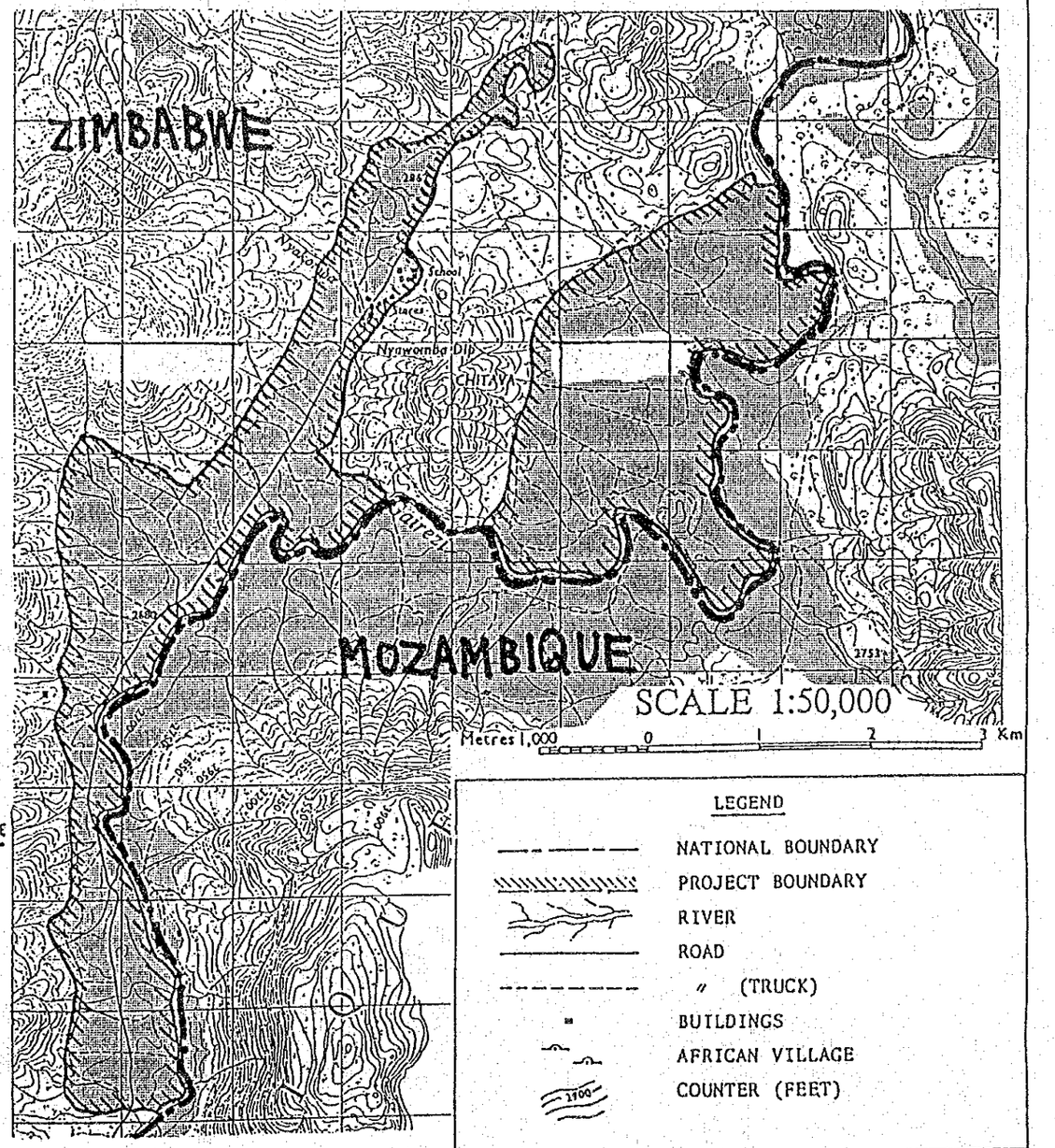
MLARRでのSigning Ceremony

調査対象プロジェクト位置図





STUDY AREA (3,000 ha) = ARABLE AREA (1,700 ha) + GRAZING AREA (1,300 ha)



目　　次

I　序　　章

1　調査団派遣の経緯

ジンバブエ国においては，現在第1次国家開発5カ年計画が実施されており，前暫定3カ年計画に比べ，社会主義路線から，現実路線への転換を明確に打ちだしている。新5カ年計計の目標は次の5本の柱におかれている。

(1)　経済の体制変革，管理強化と成長。

(2)　土地所有関係の変革と土地の有効活用。

(3)　国民の生活水準の向上。

(4)　雇用機会の増大と人材開発。

(5)　環境と開発のバランス維持。

「土地所有関係の変革と土地の有効活用」は，遊休地などの政府買上げを法的に容易にし，貧農・土地なし農民に土地を与え，再定住計画を推進すること，新規国営農場の開発などがその内容である。

この計画の一貫として，土地農業農村再定住省は，地域住民共有地のニャコンバ地方を選定した。ニャコンバ地方は，乾期（冬期）のかんがい水が無いことから夏作だけの営農となっている。「ジ」国の資金にて完成した近接するニャマロバかんがいプロジェクトにおいては，優良な農産物（綿花，煙草，とうもろこし，メイズ等）が生産されており，当地方においても同様の開発計画が熱望されている。かかる背景を受け，「ジ」政府より，1985年6月我が国政府に対し，ニャコンバ地方かんがい計画の協力要請がなされた。これは，農村総合開発計画のF／Sを内容としている。これを受けて，1989年2月に要請内容確認の為，事前調査団を派遣することを決定した。

本事前調査団は，次の理由により予備（コンタクト）調査ということで臨んだ。

1）「実施調査団のコンサル選定に際し，「ジ」側も参加したい，つまり，日本政府より無償にて得たお金を用いコンサル選定を自ら行ないたい」といった情報がある。

2）スタディーの為に，カウンターパートは提供しない。情報を提供する発注者としてのみ機能する。

予備協議とはいえ，上記の問題が解決され可能ならばS／W締結を行なう為，S／W（案）を作成し，協議に望むこととし，'89年2月24日から17日間,古賀英祐氏を団長として,「ジ」国を訪れた。

2　調査目的

本プロジェクトに係る調査の範囲と内容等，要請背景及び要請内容の確認を行なうとともに，現地踏査及び資料収集，調査方針の協議，先方受入体制の確認等を行ない実施調査方針の検討に資することを目的とする。可能ならば実施調査のS／Wの署名を行なう。

3　調査団構成

氏　　名	担当業務	所　　属
古賀英祐	総　　括	農水省関東農政局建設部次長
源　　秀夫	かんがい排水	農水省構改局建設部設計課施工企画調整室係長
小栗邦夫	農　　業	農水省農産園芸局畑作振興課農産園芸専門官
志野尚司	調査企画	国際協力事業団農林水産計画調査部農林水産技術課

4　調査期間・日程

月／日	時　　刻	内　　容
2／24	12：30	成田発
2／27	20：00	ハラレ着（予定では2／26午前着予定であったが，Technical Problemの為，一日遅れる）
	21：00	大使館職員と打合せ
2／28	8：30	M.L.A.R.R. 表敬，S／W（案）提示
	9：00	Agritex　〃，　〃
	14：30	M.F.E.P.D（大蔵・経済・企画・開発省）表敬
	15：40	日本大使館表敬
3／1	9：00	MLARR及びAgritexに，Questionnaireの提示及び打合せ
3／2	8：30	ハラレ発，現地踏査に出発
	14：00	NyangaのDEAO（District Extension Agriculture Office）表敬及び打合せ
3／3	8：00	NyangaのDEA.O.で，情報聴取
	8：30	Trout beckの白人農業経営者から，資料収集
	11：50	Nyakomba着
	15：00	Nyamaropa Irrigation SchemeのProjectを踏査
3／4 〜 3／5	8：15	現地ホテル発，市場状況等聴取の後，Acting Directorと，情報聴取ハラレへ資料整理，団内打合せ
3／6	8：30	団内打合せ
	9：30	資料収集，MEWRD（エネルギー水資源開発省）にて，水位データ収集
	12：00	Agritexにて，S／W協議
3／7	9：00	大使館にて打合せ
	10：30	MFEPDにて，修正S／W及びM／M（案）の説明

月／日	時　　刻	内　　容
3／7	14：00	MLARRで，修正S／W及びM／M（案）の最終協議
	18：00	JICA主催Reception party
3／8	7：00	MLARR，Dep.of Agritex及びMFEPDへサイン用S／W配布
	14：00	Signing Ceremony
	15：00	Dep. of Agritexにて資料収集
	16：00	ZESA（Zimbabwean Electricity Supply Authority）にて，情報聴取
3／9	16：00	大使館報告
	22：15	ハラレ発
3／12	10：55	成田着

5　面会者リスト

(1) Ministry of Lands, Agriculture, Rural and Resettlement

Mr. Chidawanika	Under Secretary
Mrs. Mudiwa	Assistant Secretary
Mr. M.M.Manbo	Senior Admin. officer

(2) Department of Agricultural Technical Extension

Mr. S. Pazvakavambwa	Director.
Mr. J.M. Makadho	Assistant Director Irrigation
Mr. Chitsiko	Assistant Chief Irrigation
Mr. A.F.Mtetwa	Acting DEAO, Nyanga
Mr. A.D.Sondo	Extension worker, Cartographic DEAO, Nyanga
Mr. Pauh Samsobza	Extension Worker, Nyakomba

(3) Ministry of Finance, Economic Planning and Development

Mr. O. Matsaalaga	Under Secretary
Mr. W.S. Chirimuuta	Japanese Desk
Mr. A.S. Nyamadore	Deputy Director
Mrs. M.A. Bamu	Assistant Secretary
Mr. C.P. Chemhuru	Administrative Officer

(4) Ministry of Energy, Water Resources and Development

Mr. B.T.W. Mavunga	Data Translation Supervisor Hydrological Branch.
Mrs. Barbro Johansson	Area Hydrological, Manicaland

(5) Commercial Farmer

Mr. Robin Waddacor

(6) 大使館

池　部　　健	特命全権大使
川　尻　幸　雄	一等書記官
森　野　よし郎	〃

Ⅱ　総　　括

1　調査結果要約

昭和60年のジンバブエ政府からの要請を受けて平成元年２月24日から，古賀英祐氏を団長として，予備協議事前調査団が派遣された。

可能ならば，Ｓ／Ｗ締結を行なうこととしており，諸問題が解決された為，'89年３月８日に，Ｓ／Ｗの締結がなされた。相手国実施機関は，土地農業農村再定住省であり，実際のカウンターパートエージェンシィは，下部組織の農業普及局が担当した。Ｓ／Ｗ（案）の提示説明を上述の２機関は勿論のこと，大蔵経済企画開発省においても行なった。現地踏査の結果，乾期においては，全くといって良い程農作物が育たないこと等情報を入手した。従って二毛作に対する農民の期待は，並々ならぬ強いものがあった。これは近隣で大成功しているニャマロバかんがいプロジェクト（自国により財源手当）の例を知っているということにも起因する。カウンターパートの協力体制等に問題があると予想されたが，農業技術普及局の現地スタッフを初め非常に本調査の間も協力的であり，実施調査団が派遣された際の協力も約束してくれた。

サイニングセレモニー時の挨拶として相手側より，実施調査団の早期派遣について要望があった。

a）本事業の可能性について

ⅰ）乾期農業の実施可能性は，市場性のある作目の導入により効果は大きい。（用水補給，条件整備等でなく非労働期間の活用である）

ⅱ）近傍地（ニャマロバ）の同種事業の成功から期待が大きい。

ⅲ）地区内の湧水池を所有する農家の乾期の用水利用の事例がある。

ⅳ）現状の栽培状況から判断すれば，農業に対する熱意は期待できる。

ⅴ）二毛作による所得の拡大は，農業規模の拡大と子弟教育に投資する旨の意向から，その意欲は信頼できる。

ⅵ）現地の行政実施機関の担当者の熱意，知識，技術力は，ニャマロバの事例からして，信頼ができ，現地の指導・実施は期待できる。

ⅶ）国内での位置付けとして，本地域は期待されている。

援助事業としての効果の評価として，受益者の意欲，期待感が大であり，行政機関も整備されていることから，積極的な取組が必要である。

b）畑地かんがいを核とした事業実施について

ⅰ）水源計画

国際河川ガイレジ川のポンプ取水と雨期の水を貯留する地区内溜池，調整池の設置について検討すべきである。

山麓沿いの細長い地域であることから，複数の調整溜池を連絡する幹線水路を設置し，水の有効利用を図ることが望ましい。

ii) 管理経費の軽減と管理内容の簡素化について

最小限の機場として，調整溜池利用を検討すべきである。

iii) 機場等の動力源について

地区内の小水力発電，風力発電等は需要時期と水量，設置ヶ所等からして非効率的である。ガリバ発電による国内の余剰電力利用が望ましいため，受電（送電）時期並びに経費について検討する。又，効果の早期発生の点から，最終動力目標は電力とするとしても，自家用発電とエンジンがかりの相方について検討すべきである。

iv) 効率的な“ポーダーかんがい”の実施について

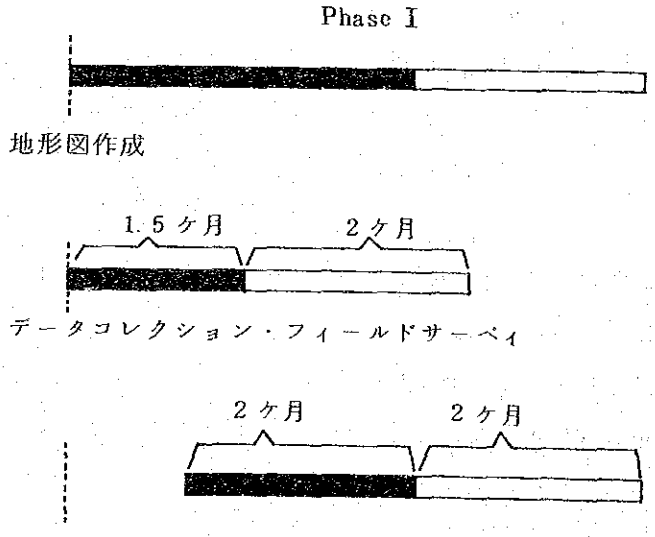
支線水路は圃場区画及び傾斜修正を考慮して効率的な配水整備方式の検討が必要である。

v) 生産物搬出及び農業機械進入のための圃場内道路を用水路と併せて検討する。

vi) 乾期営農の未経験と炎熱下の作業の労働意欲が心配である。

2 計画の基本構想

スタディエリアが，3,000haと比較的小さく，しかも相手側においてある程度の計画（技術的に十分でないが）を有している本プロジェクトは，非常に計画構想が立て易いと判断する。先ずPhase Iにおいては，地形図作成と，データコレクション及びフィールドサーベイを行なう。これらの工程は，概略次のように考える。



これらの結果を踏まえ，Phase Iでは，事前解析を行なう。特に，かんがい水源としては，ガイレジ川に乾期の水源を求めるべきなのか，雨期の表流水を貯留し，乾期に使用すべきなのかを判断する必要がある。

Phase Ⅱにおいては，S／Wに記した通り，各種計画を策定し，事業評価を行ない提案を記述する。

協議を行なった相手政府の感触では，水源の確保を，乾期においても豊富な流量のあるガイレジ川に求めることとして，決めてかかっている。その理由を問うたところ，雨期の水を貯留し，乾期に使うには，大容量の貯水池が必要であり，流域の小さい当地方はそれだけの集水が不可能であり，更に地質が非常に岩系統のため，大貯水池掘削が困難であることをあげていた。しかしこのことについては，実施調査団においても調査する必要があると判断し，Phase Ⅰの中で行なうこととした。

この調査が終わった後，相手国においては，無償援助を希望していた。これは，ジンバブエ国において，マシンゴ州中規模かんがいプロジェクトが無償案件として実施されようとしていることと無関係ではなさそうである。

3　合意の内容

a）当初懸念された2つの大きな問題については次の通り合意された。

ア）「コンサル選定に「ジ」側が参加したい』という問題

これに関しては，サイナーであるAgritexのDirector，Mr．SPAZYAKAVAMBWAを表敬した際，彼から，出された。彼は，ジンバブエに初めて来るコンサルではなく，アフリカに詳しくとりわけ，ジンバブエに経験の深いコンサルを選びたいと言った。その為に，ショート・リストを渡してもらい，コンサルの業務経験等を勘案した上で，何らかの形で選定に参加したい意向を述べた。これに対し，調査団は，日本の現在のシステムでは，そういうことはできないこと及び，経験豊かなコンサルを選び，調査にあたっては，ジンバブエ側と十分協議を行ない進めていくこと，又，仮に何か問題があった場合，在ジンバブエ日本大使館を通じてＪＩＣＡに連絡して頂ければ，それに対する対処を考慮すること等を説明した。その結果，日本のシステムを理解して頂いた。…M／M (8)参照。

イ）「スタディーの為のカウンターパートは提供しない。情報提供のクライアントとしてのみ行動する』という問題

最近，ＪＩＣＡで行なった農業関係の開発調査に，マシンゴ州中規模かんがい計画がある。この時の相手国実施機関は，Ministry of Energy，Water Resovrces Development Ministry（MEWRD）である。当時の，相手側のカウンターパートとしての活動状況を，日本大使館及び当時の実施調査団に聴取したところ，MEWRDは勿論，農業関係に関しては，Agritexもカウンターパートとして，かなり協力してくれたようである。

今回，Mr．Makado Assistant Director of Agritey と協議したところ，余剰なスタ

ッフは，いないので調査に参加できないが，情報提供等は十分協力するとのことであった。そういった意味もあって，S／W中の相手側Undertakingの中にあるカウンターパートの提供の文言をPartisipateからassistに変更した。Hararеにあるagritexにて資料収集を行なったが非常に協力的であった。又，Nyangaの Agritexの職員は,全面的に協力してくれ，将来，土壌調査等で，ピット掘りが必要になったら手伝うとまでいってくれた。従って実施調査にあたっては何ら問題はないと思う。……S／W　P9参照

b) 相手政府のundertakingについて

土地農業農村再定住省と，最初協議した時は，これは，同省の権々外のことなので，Technicalの部分とUndertakingの部分を分割し，Technicalの部分については,同省でサインすると述べた。これに対し，その後日本側は，大蔵省に対しても説明を行ない，問題はないということになったので，サイニング・セレモニー時に，大蔵省からUnder Secretaryと Japanese Deskの方に立会いを求め確認した。それぞれ変更力所は次の通り，

ア) データを持ち出す条項につき，all dataをnecessary dataに

イ) 車をarrargeするに

ウ) Officeの提供につき，with necessary equipmentをFurnitureに …… M／M (6)参照

c) Study Areaについて

Nyangaの Agritexで進めているデータによる可耕地(Arable Area)だけで，1,700 ha存在することが判面した。又，現在牧草地であるGrazing Area (1,300 ha)についても，貯水地を造ったり，水文計算に含まれる可能性があるので，Study Areaに含むべきとの判断に基づき，Study Areaを合計3,000 haとした。尚，Phase Ⅰで作成する地形図については，分水嶺等この近辺を少し膨らませる必要があると判断する。…… M／M (2)参照

d) 調査の内容について

ア) 農村インフラをしなくなったこと

要請のT／R(S60)には，農村総合整備的な内容であったが，現在他省庁の管轄となった為，省いてくれと要請がありこれに応じた。

イ) Mini－hydro powerの削除

将来，もしポンプ等が計画された場合動力源として次の3つが考えられる。

- Mini－hydro Power generation
- ZESA(Zimbabwean Electricity Supply Authority)からの供給
- Wind－millによる風力発電

これについて，Assistant Director of Agriteyと協議した結果，ZESAからのみで良いということになった。日本側としても，他の2動力源は，Study Area外である

と及び現地踏査の結果，Mini-HydroとWind-Mill についてはさほど有望でないことが判明した等の理由により，相手側要求を受け入れた。……M／M　(4)参照

e）その他

ア）地形図

地形図については，F／Sに必要な1／5,000，1mContourのものは，Nyakomba 地方についてはないことが判明した。従って約3,000 haについて，1／5,000（主曲線1mコンター）を作成する。その為に，1／25,000の航空写真及び1／12,500のモザイク版を使用し，現地調査を実施する。……S／W参照

イ）工期の短縮

協議の結果，農村インフラのStudyがなくなったこと，データが比較的揃っており，Phase Ⅱ，2)－1のSupplementary Surveyにさ程業務量を要しないことが判断されたこと等から，PhaseⅡの現地調査期間を1ケ月短縮した。……S／W参照。

ウ）水利権の問題

水源であるGairezi川は，モザンビークとの国境を流れる川であり，水利権の問題が予想された。一応外交ベースで，1987年8月2日モザンビーク側より，Nyakomba 地方の開発に際し，Gairezi川を開発することについては異存ないとの公電を得ている。次ページ別紙参照。

再度，関係省でこの点につき確認したところ問題なしとの解答を得た。現在，Gairezi川には，橋を含め構造物は何ひとつ存在していないこと，水が逼迫していないこと等により水利権の問題が生じるような状況に過去ならなかったのだと思う。因みに，北側でザンビアとの国境を流れるザンベジ川では，イギリスの援助で，橋と鉄橋が造られており，問題なく国境間の問題が解決されているようである。……M／M　11）参照

エ）圃場整備について

かんがい手法の決定時に，かんがい効率を向上させる為にのみ，レベリングとかシェイピングを考慮する。コスト高にならないように注意する必要がある。…M／M (3)参照

オ）入植計画について

入植の可能性については，経済的・技術的観点からのみ，このスタディーで行なうものとする。入植に関連する権利（一農家当たりの最大所有面積の決定等）及び施設（家屋，集会施設，水道等）については，ジンバブエ政府の問題であるのでこのスタディーには含まない。……M／M　(5)参照

カ）NyangeのAgritexで現在作成中のドキュメントについては，6月初めまでに現地大使館を通じてＪＩＣＡへ送付して頂く。現地で聴取したドキュメントの内容は次のとおり。

Nyakomba 地方の土壌調査と，かんがい方法に関する概略調査等。

聴取した限りにおいては，相手側の技術レベル及び経済的理由により成果品はF／S

レベルに達するものとは考えられないが，本計画を策定する上で参考になると思われる。
…… M／M (9)参照

4 提言及び留意事項

a) 地形図作成エリアは，3,000ha で十分と判断する。現地調査にあたっては，日本側技術者を数人派遣し，現地人夫を傭上し作業する。

b) 機材（測量機器 etc ）の輸送にあたっては，特に内陸国の為，現地大使館と綿密に連絡をとること。

c) 相手側が実施している農業開発に関するDocumentについては，6月初旬までに入手することとしているが，未完成の場合でも，乾期調査等を考え，8月には，実施調査団を派遣するのが望ましいと考える。その場合，現地大使館に，document の内容，進渉状況等を確かめるのが望ましい。

d) 実施調査団は，ニャマロバかんがいプロジェクトを十分参考にし，低コスト（維持管理費）のものを考えていくこと。

REPÚBLICA POPULAR DE MOÇAMBIQUE
MINISTÉRIO DAS OBRAS PÚBLICAS E HABITAÇÃO
DIRECÇÃO NACIONAL DE ÁGUAS

TO
ZIMBABWE EMBASSY

M A P U T O

Maputo, 02/08/987

Referência: ZHP/POL/7H/5 | Sua comunicação de | Nosso referência 845/DNA/150/AT-DEP-F

ASSUNTO:

Concerning the CHISUMBANJE Project we sent a letter to our Ministry of Foreign Affairs. We enclose a copy of that letter.

Also we don't have objections to the NYAKOMBE-Project. The Zimbabwen Government can continue with the progress of that project.

Yours sincerely

fr. Arnaldo Gomes Pereira
National Directorate of Water

PM/ams

RECEIVED
03 SEP 1987
EMBASSY OF ZIMBABWE
MAPUTO

SCOPE OF WORK

FOR

THE FEASIBILITY STUDY

ON

THE NYAKOMBA IRRIGATION DEVELOPMENT PROJECT

IN

THE REPUBLIC OF ZIMBABWE

AGREED UPON

BETWEEN

THE MINISTRY OF LANDS, RESETTLEMENT AND RURAL ~~DEVELOPMENT~~ AGRICULTURE

REPUBLIC OF ZIMBABWE

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

HARARE, ~~7~~ 8 March, 1989

THE MINISTRY OF LANDS, RESETTLEMENT AND RURAL ~~DEVELOPMENT~~ AGRICULTURE

REPUBLIC OF ZIMBABWE

LEADER OF

THE PRELIMINARY SURVEY TEAM,

THE JAPAN INTERNATIONAL

COOPERATION AGENCY, JAPAN

I . INTRODUCTION

In response to the request of the Government of the Republic of Zimbabwe(hereinafter referred to as "the Government of Zimbabwe"), the Government of Japan has decided to conduct the Feasibility Study on Nyakomba Irrigation Development Project (hereinafter referredto as "the Study"), in accordance with the relevant laws and regulationsin force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Zimbabwe.

The present document sets forth the scope of work with regard to the the Study.

II . OBJECTIVE OF THE STUDY

The objective of the Study is to conduct the Feasibility Study on Nyakomba Irrigation Development Project in Manicaland Province.

III . OUTLINE OF THE STUDY

1. Study Area

The Study Area shall cover the Nyakomba Irrigation Development Project area of ~~1,200~~ 3,000 ha which is located in the ~~Nyamaropa and~~ Sawunyama Communal Lands in Manicaland Province.

2. Scope of The Study

The Study will be divided into the following two phases.

1) Phase I . Topographical mapping, data collection and field survey

1)－1. Topographical mapping of the Study Area on a scale of 1:5,000 with 1m contour intervals.

1)－2. Data collection and necessary field survey relevant to the Study on the following items:

A. Natural condition

a) Topography

b) Meteorology and Hydrology

C) Geology and soil

B. Agriculture

a) Farm management

b) Land use and land classification

C) Agricultural inputs

d) Agricultural production

e) Farmers' organization

f) Marketing system

g) Farmers' income and productivity

h) Supporting services

i) Agro-economy and institution

C. Agricultural infrastructure

a) Irrigation and drainage system

b) Farm road

D. Social condition

a) Population

b) Socio-economy and social institution

C) Related development plan

E. Rural infrastructure

a) Rural electrification

b) Rural road networks

C) Domestic water

d) Social welfare

X. Others

1) – 3. Preliminary Study and Analysis

Based on the result of the above-mentioned survey, the preliminary study and analysis will be conducted.

2) Phase II. Formulation of the Nyakomba Irrigation Development Project

2) – 1. Supplementary field survey and additional data collection on the items mentioned in Phase I 1) – 2.

2) – 2. Formulation of the Irrigation Development Project concerning the following items:

A. Formulation of the following plans

a) Land use and classification

~~b) Cottage and agro-industries.~~

b) Cropping pattern and crop diversification

c) Supporting services

d) Agricultural infrastructure

.Irrigation and drainage facilities

.Farm road

~~.Land consolidtion~~

.Marketing facilities

e) Water management

f) Farmers' organization

~~h) Rural infrastructure~~

g) Farm settlement

f) Others

B. Preliminary designs on the recommended projects.

a) Intake works

b) Pump station

c) Canal networks

d) Storage reservoir

e) Others

C. Operation and maintenance

D. Estimation of the project cost and benefits

2) – 3. Project evaluation

2) – 4. Recommendation

IV. STUDY SCHEDULE

The study will be executed in accordance with the attached tentative work schedule.

V. REPORTS

JICA will prepare and submit the following reports in English to the Government of Zimbabwe.

(1) Inception Report

Twenty (20) copies at the commencement of the field work in the Phase I.

(2) Progress Report (I)

Twenty (20) copies at the end of the field work in the Phase I.

(3) Interim Report

Twenty (20) copies at the commencement of the field work in the Phase II.

(4) Progress Report (II)

Twenty (20) copies at the end of the field work in the Phase II.

(5) Draft Final Report

Twenty (20) copies at the end of the Phase II.

The Government of Zimbabwe provides JICA with its comments on the Draft Final Report through the Embassy of Japan within one (1) month after the receipt of the Draft Final Report.

(6) Final Report

Fifty (50) copies within two (2) months after receiving the comments on the Draft Final Report.

VI. UNDERTAKING OF THE GOVERNMENT OF ZIMBABWE

1. To facilitate smooth conduct of the Study, The Government of Zimbabwe will take necessary measures:

(1) to secure the safety of the Japanese study team.

(2) to permit the members of the Japanese study team to enter, leave and sojourn in Zimbabwe for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees.

(3) to exempt the members of the Japanese study team from taxes, duties, and any other charges on equipment, machinery and other materials brought into Zimbabwe for the conduct of the Study.

(4) to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emolument or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study.

(5) to provide necessary facilities to the Japanese study team for remittance as well as utilization of funds introduced into Zimbabwe from Japan in connection with the implementation of the Study.

(6) to secure permission for entry into private properties or restricted areas for the conduct of the Study.

(7) to secure permission for the Japanese study team to take ~~all~~ necessary data documents related to the Study including photographs out of Zimbabwe to Japan.

(8) to provide medical services as needed.

Its expenses will be chargeable on members of the Japanese study team.

2. The Government of Zimbabwe shall bear claims, if any arises against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or wilful misconduct on the part of the members of the Japanese study team.

3. The Ministry of Lands, Resettlement and Rural ~~Development~~ (hereinafter referred to as "~~MLRRD~~") shall act as counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organization concerned for the smooth implementation of the Study.

4. ~~MLRRD~~ shall, at its own expense, provide the Japanese study team with the following in cooperation with other agencies concerned;

1) available data and information related to the Study,
2) additional survey related to the Study, if necessary,
3) counterpart personnel to ~~participate~~ in the various activities for the Study,
4) suitable office with necessary ~~equipment~~ in Harare and the Study Area, and
5) ~~appropriate number of vehicles with drivers, and~~ arrangements for the Study Team to hire vehicles with drivers, and
6) credentials or identification cards to the members of the study team.

VII. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures;

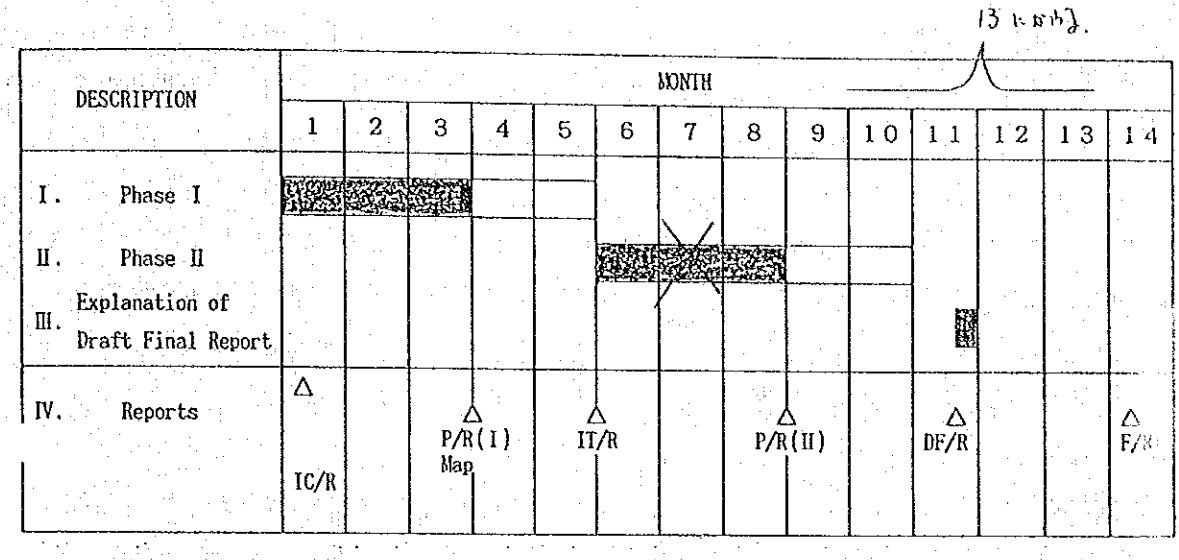
1. to dispatch, at its own expenses, study team to Zimbabwe,
2. to pursue technology transfer to the Zimbabwean counterpart personnel in the course of the Study,

VIII. CONSULTATION

JICA and MLRRD will consult with each other in respect of any matter that may arise from or in connection with the Study.

APPENDIX

TENTATIVE WORK SCHEDULE



IC/R: Inception Report

Map: Topographic Map

DF/R : Draft Final Report

P/R : Progress Report

IT/R : Interim Report

F/R : Final Report

Work in Zimbabwe

Work in Japan

Ⅲ　調　査　結　果

1　農村開発

ニヤコンバ地域における現在の営農状況をみると，かんがい排水事業の実施されている隣接したニヤマロバ地域との比較において，同じ栽培作物についても，雨期のみの状況で播種時期，かんがいによる栽培管理などの差から作物の成育に大きな差が生じている。またかんがい事業の実施地区においては，乾期についても取り引き価格が有利な換金作物が作付け出来るのに対し，かんがい施設のないニヤコンバ地方においては休農となり，また他の就労機会にも恵まれない純農山村であることから苦しい生活状態となっており，就労者の都市への流出は余儀ない環境となっている。かんがい排水事業による農村開発は，純農山村にあるニヤコンバ地域発展のための有効な手段と思われる。

（Marketing Systemについて）

C．M．B（Cotton Marketing Board）がNyamaropaにある。又，G．M．B（Grain Marketing Board）もあり，Nyakombaの農民はここを通じ，農産物を出荷している。

（Social Infraの現況及び協議結果）

Clinic	→ Grade up　の必要性あり
School	→ 十分
Church	
Country Club	Water Supplyについては，極端に悪い。
Business Center	

上記Social Infraが不十分ながらも存在している。当スタディ要請当時と違って役所の機構が変わった為，Social Infraについては，今回のスタディーから除外していいとの了解を得た。尚，当業務の所轄官庁は，地方行政，都市計画省とのことである。

尚，農村開発に関する組織は次の通りである。

Communal Land	—	Chief
Ward	—	Counsellor
		Ward Development Committee
Village	—	Chairman
		Village Development Committee

Commercial areaに定住させるのは，Resettlementと呼び，Communal Landに定住させるのは，Land use Planningと呼ぶ。

2　かんがい排水

(1)　かんがい技術

ニヤコンバ地区のかんがい排水事業の実施計画にあたり，100％自国技術で実施されたと聞く，隣接したニヤマロバかんがいプロジェクトにおける実施内容を参考に当地区の計画及び実施を進めることが，かんがい施設の用地確保・生活環境への同化などの観点から重要と思われる。

(2) ニヤマロバかんがい地区実施内容の要旨

ア) ニヤマロバダム

当ダムはニヤマロバかんがい地区を流れる，ニヤルワカ川支流の最上流に設置されているためダムの直接流域はなく，ガイレージ川の別支流マロジ川からの流域変更により取水され貯水しているもので，これはニヤルワカ川に良好な計画処所がないのではなく，ニヤルワカ川流域が，上流まで耕地化され農地となっているため，大きい規模のダム建設による農地の減少，農家の移住を少なくする等を考慮しているためと思われる。

イ) 幹線用水路

ニヤマロバダムの用水は，現況ニヤルワカ川を流下しニヤマロバ地区の上流約3 km地点にて取水され用水路により，地区に隣接した小流域の排水路上流に設置されたファームポンドなどに送水され地区に至っている。

ウ) 支線(小)用水路

ファームポンドなどから，流量の多い区間はU字トラフ用水路により各圃場小用水路に送水されている。用水路の勾配・流速調整は，多数の小段設置で調整され分水がスムーズに出来ており，又圃場への給水は2重の用水路構造により，畑面への均一な給水を可能としている。

エ) 区画整理(圃場整備)

かんがい地域は現況勾配も緩く広いため恵まれた地形条件ではあるが，全面にわたり勾配調整及び区画整理がなされており，耕作道路，用水路，排水路が等間隔で整備された優良な耕地となっている。一圃場の区画は約30a程度となっており機械化体系による耕作が可能となっているが，暗渠排水は行なわれていないため地区の比較的低い圃場の一部で排水不良による弊害が見受けられた。

(3) ニヤコンバ地区かんがい計画

ア) 水源計画

当地区の取水には，以下の方法が考えられ，取水方法によりそれぞれの検討課題が上げられる。

① 揚水機場方法

ガイレージ川本流から数箇所(2～4箇所)により揚水機場を設置し揚水する方法で，ガイレージ川本流については乾期においても相当の流水があり，また地形上送水管も短くて済み，一般的な揚水機場としては経済的な設置となるため有効な取水方法

と考えられるが，動力源について現在電力の供給はなく，送電線の建設計画は立てられているものの着手目途はないため，ディーゼルなどのエンジンによる動力源になるものと思われるため，運転に相当の経費が必要なことと，当国の国全体に輸入規制などもあるため，故障時に短期間の部品調達がむずかしいことが考えられ保守管理について不安があると思われる。

② ダム貯水方法

地区内において用水を確保出来る支流はニヤコンバ川の一河川と思われ，それ以外の川は流域が小さく雨期以外はほとんど流水がないため地区全体にかんがいする用水量は取水出来ないと出われる。ニヤコンバ川は上流が他集落となっており，ダム設置ケ所については他集落に大きな影響を与えない様考慮が必要で，またニヤコンバ川の流水はニヤコンバ集落の生活水源としても取水されており，関係者との協議が必要になるが，他集落からニヤコンバへの間には大きな高低差があるため，ダムの設置可能地点も考えられ，自然流下取水方法のダム貯水方法は，現地調査を行い実施の可能性について検討するメリットが十分あると思われる。

③ 頭首工方法

ガイレージ川が当地区に入る上流約1kmに急流部があり，その上下でかなりの高低差（10m程度）があるため，その上流において頭首工等により取水し当地区へのかんがいが考えられるが，現況耕地の全域を対象としたかんがい計画地域の全域にはかんがいできないこと，またモザンビークとの国境河川なので，現在ガイレージ川には，両国間を結ぶ1ケ所の橋梁も設置されていないと聞いており，頭首工がスムーズに設置出来るか疑問があるが，取水施設の設置方法を工夫し完全な頭首工ではない，対岸に影響しない取水を検討する方法も考えられる。

イ) 用水路計画

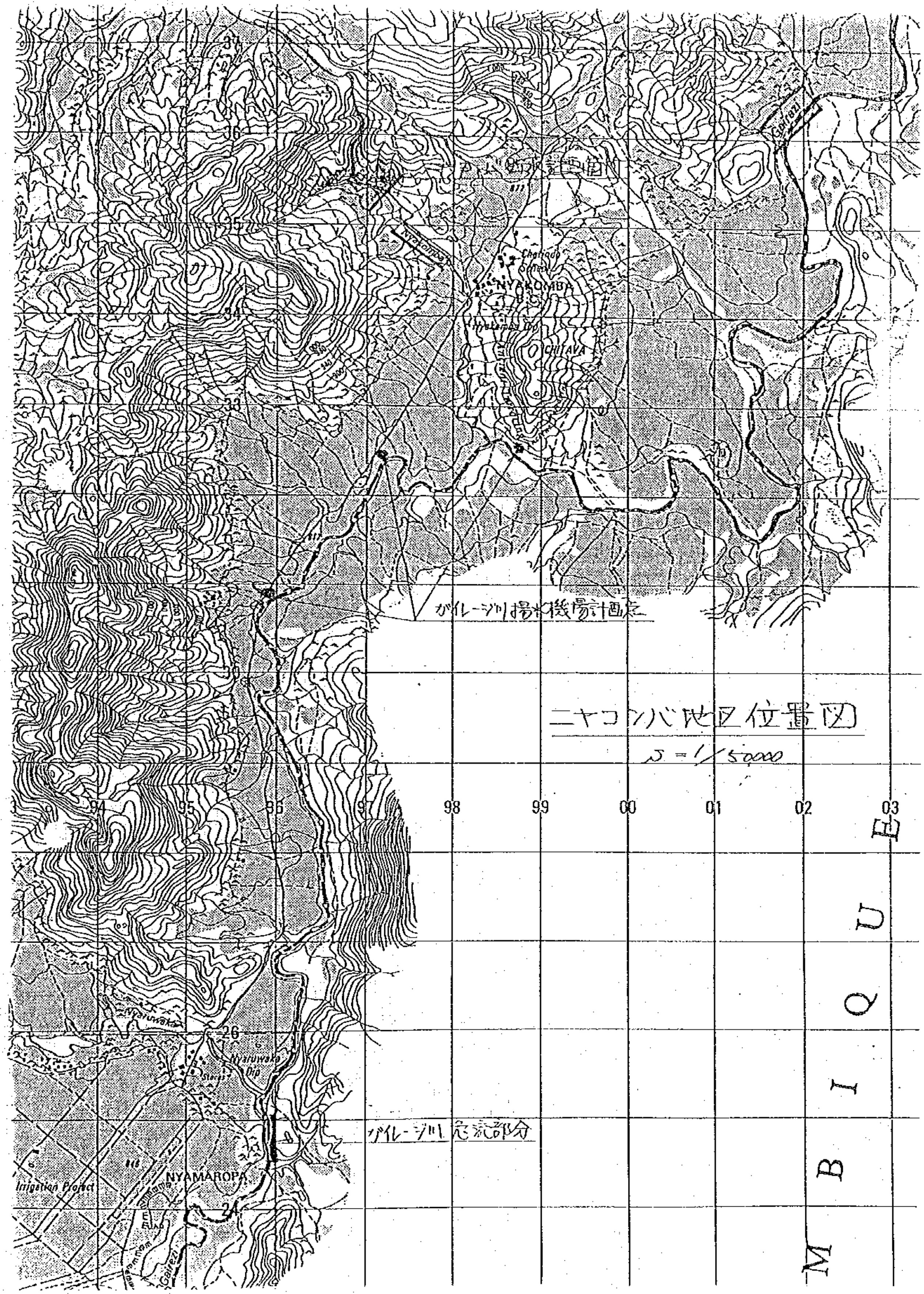
用水路は先進ニヤマロバ地区と同様な開水路による方法が，水路の維持管理上良いと考えられ，前地区に比較し地形勾配がやや急なことから，2重構造の末端用水路方法が圃場給水に生かされるものと思われる。

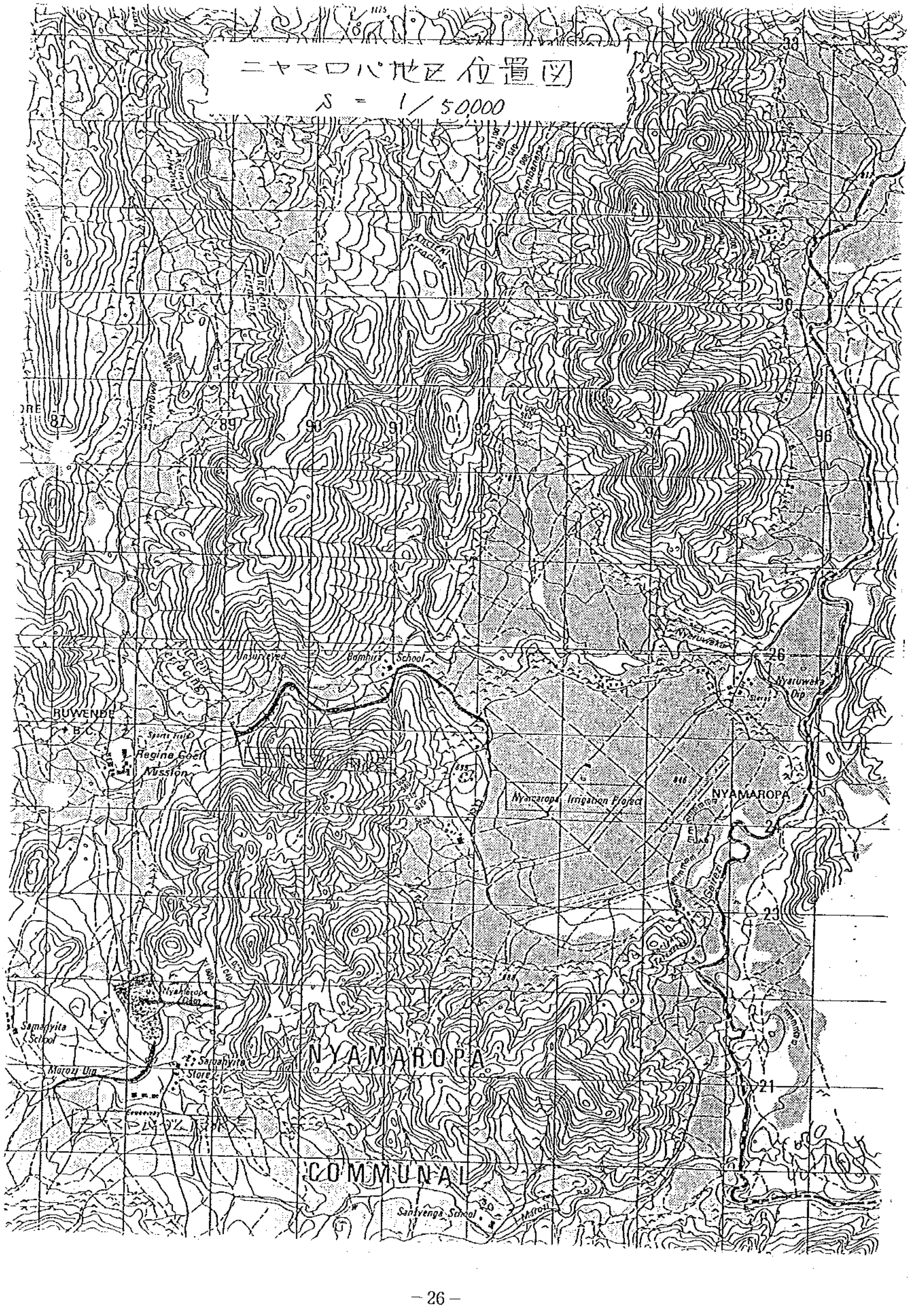
ウ) 道路計画

地区中央を縦断する既設の主要道路は，道路整備計画として現在地区に入る手前約10kmまで改修され舗装化が進んでいるため，3～4年程で当地区までの改修が行なわれるものと思われる。当地区での道路整備は，区画整理計画に沿った非舗装の農道及び耕作道を考える。

エ) 排水計画

雨期については毎日降雨が続くものの1日の間では短時間の降雨と思われ，現況は小さな排水路で流下しており，当地区についてはニヤコンバ川以外は，圃場整備の排水路


NYAKOMBA
CHITAVA
Nyakomba
ガイレージ川揚水機場計画点
ニヤコンバ地区位置図
S=1/50000
98
99
00
01
02
03
94
95
96
M B I Q U E
Nyaruwaka
Nyaruwaka Dip
ガイレージ川急流部分
NYAMAROPA
Irrigation Project


ニヤマロパ地区位置図
S = 1/50,000
RUWENDE
B.C.
Regina Coeli Mission
Sports field
Bomhiri School
Ancient Terracing
Nyaruwaka
Nyaruwaka Dip
NYAMAROPA
Nyamaropa Irrigation Project
Samanyita School
Samanyita Store
NYAMAROPA
COMMUNAL
Sanyenga School
87
89
90
91
92
93
94
95
96
26
23
21

としての，改修で済むものと思われる。

また当地区は全域にある程度の勾配があるため暗渠排水の計画は不要と思われる。

オ）区画整備（圃場整備）

区画整理の実施は，用水・排水・耕作道路等の効率的な設置及びかんがい効果の向上，農作業の機械化，効率化等の関係からぜひ必要と思われる。またニヤコンバ地区との比較において当地区はより勾配が急な地形にあるため，圃場への給水の実施に勾配補正は必要であると考えられる。区画整理水準については，一区画の大小及び補正勾配限度によりかなり土量の差があるため十分な検討が必要と思われる。

カ）全体計画

ニヤコンバ地区のかんがい計画については地区中央附近に小山があるなど地形状況複雑でありまた飛び地的な耕地も点在しているため，計画区域全域の既耕地について00％かんがいを計画すると無利な用水網も考えられることから用水路等の効率の良・否を勘案しより効果的な計画を立てることが必要と思われる。

（水位データの存在状況）

ガイレジ川に沿っては，構造物は，現在何も存在していない。又，水位観測ステーションは，近傍の支流には，５ケ所存在しているが，本川にはなく将来設置するという計画もない。従って，最高，最低水位を地方事務所で把握している程度である。今回の調査で水位計等を設置することについては，現地調査期間が短期間であること，ポンプの施設設計には最高，最低水位で十分であること及び相手側が一年限のデータ収集では，無意味であることを主張したこと等により考えない。

（Mini － hydro Power）

（Local）

Nyakomba 地方については，エネルギーとして次の３つが考えられる。

① ZESAからの電気供給

② ガイレジ川に mini － hydro power station 設置

③ 風力発電

①については，ZESA本社にて聴取した所，Nyakomba 地方は，Secondary Rural Electrification Project に組み込まれており，電力需要に応じて，Power Line を設置する可能性がある。

②については，Study Area 外のガイレジ川沿いに３ケ所あり，それぞれ次の状況である。

候補地 1. 豊富な水量と Head があるが，地形が複雑であり，工事困難が予想される。

（下流）

2. 水量は小さいが，Head が十分ある。

（上流）

3. 豊富な水量だがHeadがない。

（Area近辺）

従って，下流の候補地が一番有望だが，現地踏査結果及び協議の結果，ZESAからの電気供給のみを考えるものとなった。

3 調査地区の農業

(1) 地　形

調査地区は，ガイレジ川沿いの標高700～800 mの比較的平坦な地形であり，川沿いの低地に耕地が分布し，山沿いのやや高台に民家（小集落）が集まっている。耕地周辺の耕作に適さない土地は，かん木がまばらに茂る放牧地となっている。

後述する土壌区分では，大部分の耕地が平坦地又は緩傾斜地に分類されている。現地調査で緩傾斜地に分類されている耕地を調べたが，畑作営農上問題となるような傾斜ではなかった。

(2) 土壌条件

ジンバブエ国の土壌区分図によれば，モザンビークとの北部国境地帯一帯は，石英，雲母，片岩，正石英＆黄鉄鉱（花こう岩系か？）の土壌が分布しており，調査地区周辺の川沿いの低地は沖積層が分布している。

アグリテックス地方事務所では，地区内で22地点の土壌調査を実施し，土壌を区分している。それによれば，大部分の耕地は土壌区分のⅠ（耕土良，平坦）又はⅡ（耕土良，緩傾斜）に該当し，営農上問題なしとしている。

なお，現地調査時の観察では，耕地の土はいずれもかなりの赤色を呈し，ラテライト系の土壌と思われる。

耕地周辺の放牧地については，将来，耕地化の可能性についての検討も必要であろうが，アグリテックス担当者は，土壌が浅いために否定的な見解であった。

(注) 土壌区分分類基準は収集資料③　参照

(3) 気象条件

調査地区内の気象データはないものの，概ね次のように見込まれる。

ジンバブエ国の気象分類図によれば，調査地区はⅢランクの年降水量650～800 mmの地域に区分されている。ちなみに，約5 km南部に位置するニヤマロバかんがい地区は，Ⅱbランクの800～1,000 mmの地域に区分されている。ニヤマロバ地区の降水量データは次のとおりである。

土地区分分類基準（詳細は収集資料③参照）

DEFINITION OF LAND CLASSES

Agricultural land can obviously be classified in a number of different ways depending on the objectives of the classification. Specific classifications can be made for instance in respect of suitability for irrigation, or perhaps in regard to suitability for a specific crop, or for any other purpose.

In land-use planning, as practised in Rhodesia, the planner is concerned with the capability of the land to produce permanently, under specific uses and treatments. The objective of classification is therefore the systematic arrangement and grouping of different kinds of land to show their most intensive safe use and indicate their management requirements and to show the permanent hazards attached to the use of the land, in terms of increasing degree of limitation of use.

Eight land capability classes are recognised and these may be divided into three land capability divisions. The following chart illustrates how the land classes and divisions are arranged in order of decreased adaptability and freedom of choice of uses:

USE OF LAND ACCORDING TO CAPABILITIES

Land Capability Class		increased intensity of use									Land Capability Divisions
		Wildlife	Forestry	Limited Grazing	Moderate Grazing	Intensive Grazing	Limited Grazing	Moderate Cultivation	Intensive Cultivation	Very Intensive Cultivation	
Increased limitations and hazards Decreased adaptability and freedom of choice of uses	I	W	F	LG	MG	IG	LC	MC	IC	VIC	Arable Land
	II	W	F	LG	MG	IG	LC	MC	IC		
	III	W	F	LG	MG	IG	LC	MC			
	IV	W	F	LG	MG	IG	LC				
	V	W	F	LG	MG	IG					Grazing Land
	VI	W	F	LG	MG						
	VII	W	F	LG							
	VIII	W									No agricultural value.

ニヤマロバかんがい地区の月別降水量（mm）

1月	2月	3月	4月	5月	6月	7月	8月	9月	10月	11月	12月	計
218	263	131	38	19	−	6	1	15	24	89	163	967

調査地区も，ニヤマロバに比べ雨量がやや少ないものの，同様の季節変化と見込まれ，雨規と乾期にわかれ，降雨は雨期に集中する。

気温のデータは，ニヤマロバについてもないものの，ニヤマロバでは乾期に小麦作が可能なことから，乾期には気温が下がり，温帯的な気象条件と思われる。

(4) 農業の現状

ア 農家数，人口

調査地区には6つの村（Village）があり，1村当たり約100農家，合計約600農家が営農している。1農家当たりの家族数は8人程度（夫婦に子供6人程度）で総人口は約5,000人と見込まれる。

イ 土地利用

調査地区内の耕地面積は約1,700 haであり，これに1,300 ha程度と見込まれる放牧地を加え，約3,000 haを対象地区面積である。

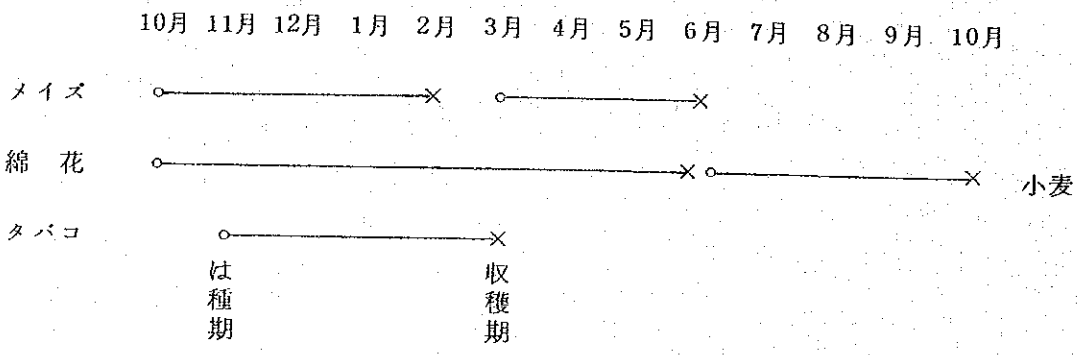
耕地面積を農家数で除せば，1戸当り耕地面積は約2.5 haと推定される。

ウ 作付体系，作型

調査地区はほとんどが天水依存農業であり，作物の栽培は雨期に限られる。雨期の初めに降雨を待って播種し，雨期の終わりに収穫する。主要な作物はメイズ，綿花，たばこ，ひまわり等である。

ニャマロバかんがい地区では，畑地かんがいにより，雨期作及び乾期作の二毛作を実施している。主要作物は雨期作（夏作）は調査地区と同様であり，乾期作（冬作）は小麦，シュガービーン（菜豆の一種か？）等である。

ニャマロバかんがい地区における作付体系



エ　営農形態

現地で2戸の農家から営農状況を聴取した。

(ア)　約5 haを経営する富農

地元でレストランを経営しつつ，親子で約5haを経営する富農である。（本人が約2ha，2人の息子が各々2ha，1haを耕作）。

綿花，メイズ各々約2ha，ひまわり約1haを作付け。他に約1haのコーヒー園も所有している。

農機具は，トラクター，トレーラー各2台等を所有。自力で少面積のかんがいも実施している。

トラクター等が故障した場合には，約150 km離れた都市（ムタレ）から修理を呼ぶが部品が入手しにくいのが難点としている。

農業労働者を4人雇用。賃金は月90ドル（約6,000円）と極めて低い。

このような富農はごく小数である。

(イ)　約1.6haを経営する小農

夫婦に子供13人。ただし6人は独立し，現在同居し，農作業を手伝うのは7人である。

メイズを約0.8 ha，綿花及びタバコを各々約0.4 haを作付け。メイズの約半分を自家消費し，残りと綿花，タバコを販売し，年に約1,000ドル（65,000円）の現金収入を得ている。

農機具は，荷車，すき，ハロー等を使用し，牛4頭（耕作用，乳用各2頭），鶏20羽を所有している。

地区内ではやや下位の農家と考えられる。

オ　栽培技術

購入種子利用，化学肥料施用，殺虫剤散布等の基本技術はかなり普及している。

富農では，例えば綿花に対しては，元肥及び追肥に化学肥料を施用し，8回の殺虫剤散布を行い，種子はマーケティングボード（MB）から購入している。

小農でも，化学肥料は施用し，人糞尿も利用している。メイズの残稈等は牛の飼料とる。

ニャマロバかんがい地区では，殺菌剤も一部では使用されている。

トラクター等の農業機械は少なく，畜力利用が一般的であるが，背負式噴霧機は現地調査時にも見かけられた。

カ　生産性

アグリテックス現地事務所のデータによれば，非かんがい地域とニャマロバかんがい地区とでは単収水準に2倍近い差がみられる。

これは，非かんがい地域では，雨期作であっても降雨量が不安定かつ不足傾向にあるためと考えられる。現地調査においても，調査地区内の作物の生育状況は圃場によりかなりの差がみられた。

主要作物のha当たりの収量（Kg）

＜ニャマロバかんがい地区＞

	86 年	87 年	88 年
メイズ	2，000	4，700	4，500
綿花	1，000	2，050	2，400
タバコ	1，500	1，500	2，500
小麦	1，600	3，000	3，000

＜調査地区を含むニャンガ東地域＞

	86 年	87 年	88 年
メイズ	1，700	900	2，700
ひまわり	1，100	500	500
落花生	1，200	600	1，200
綿花	1，000	800	900
タバコ	900	800	1，200
大豆	600	400	400

ニャマロバかんがい地区の実績にみられるようにかんがいによる増収効果は極めて大きい。乾期作が可能となることと雨期作の単収向上との二重の効果があるためである。

一方，かんがい必要水量については，乾期作用だけでなく，雨期作にもかんがい水が必要であること，全般的に雨量の少ない乾燥地域であり，土壌，作物からの蒸散量が多いこと等からみて，かなりの水量が必要になるものと思われる。

(5) 行政，農業支援制度

ア 行政組織

調査地区は，サウヤマ Commural Land 内のニャコンバWard にあり，さらにWard は6つのVillage で構成されているが，Commural Land，Ward，Village の各段階に，責

任者及び委員会が設置されており，委員会の決定により行政決定がなされるようになっている。

ニャマロパかんがい地区における入植者への土地配分はこのラインで決定されており，調査地区でかんがい事業実施後，土地の再配分等が行われる場合には，やはり，このラインで決定されることになるものと思われる。

イ　土地所有

ジンバブエ国は社会主義国であり，商業農業地域等では土地所有が認められているが，Commural Land（共同体農業地帯）では，農民は，土地の耕作権を持つだけであり，所有権は有しない。ただし，この耕作権は，親子間では継承される仕組となっている。

ウ　普及組織

ニャンガのアグリテックス地方事務所管内には，30数名の普及員がおり，そのうち名がサウヤマCommural Landに配置されており，そのうち1名が調査地区（ニャンガWard）を含む2つのWardを担当している。

ニャマロパかんがい地区においては，一般の普及員とは別に，かんがい専門の普及員が常駐しており，水管理に当たっている。

調査地区においても，かんがい事業が実施されれば，同様の配置が必要となろう。

エ　インフラストラクチャー

調査地区内では，学校，医療機関，ビジネスセンター（売店），生活用水等のインフラストラクチャーはある程度整備されている。

しかし，地元からはこれらの増設が要望されており，特に生活用水については，現状では不十分であるとしている。

オ　ニャマロパかんがい地区の状況

ニャマロパかんがい地区は，旧植民地政府時代の1962年に着手された事業であり，約400haの耕地が区画整理され，ガイレジ川支流に設けられたダムから重力かんがいされている。

農家数は約320戸であり，1戸当たり耕地面積は1ha強となっている。これは調査地区の平均2.5haに比べて著しく小さいが，前述したように単位面積当たりの生産性が極めて高いため，このような小面積でも周辺の非かんがい地域以上の所得を得られるとのことである。

ちなみに，調査地区においても，かんがい事業実施後は1戸当たりの必要耕地面積が小さくなるので，既存農家への割当面積を減らし，空いた面積に新たに入植者を入れることが検討されている。

カ　ヨーロッパ系住民の経営する農場の状況

ニャンガ地方の代表的な農場を訪れる機会があったので概要を紹介する。

イギリスの大学を卒業し，35年前に当地に入植し，現在，農地約50haと松林約1,000haを経営している。（農場としては農地面積は極く小さい方である。100ha以上の農家が多い。）

標高約2,100mの高冷地にあり，種いもを主体としたばれいしょ生産が経営の中心である。他に500頭の羊を飼育している。

ばれいしょ2年と牧草4年を組合わせた6年輪作により連作障害を回避している。

小規模なため池を持ち，約3haにかんがいし，9月に早植し（1月収穫），作期の分散を図っている。（非かんがい作は10～11月定植，3～6月収穫）。

種いもは，首都ハラレまで出荷し，その後ザンビア等の周辺諸国に輸出される。

約600人の農業労働者を雇っており，日当は3.85ドル（約250円）と，前述の調査地区の富農の雇用労賃とほぼ同じ水準である。

なお，ニャンガ地方は，山岳地帯が多く，冷涼な気候を生かして，りんご作等の集約農業がさかんである。

キ　農産物価格等

主要農産物については，MB（マーケティングボード）により一定価格で買い上げられている。

また，種子，肥料，農薬等の供給価格も定められている。

なお，かんがい地域の水使用料は，全国一律で，近年はCommural Landでは1年間で145ドル／haとなっている。（商業農場にあっては12ドル／1,000㎥）

農産物価格（1988年6月）

	大規模商業農場	（小規模商業農場 Commural Land）
メイズ	194.2 ドル/t	193.8 ドル/t
小麦	363.0	359.8
大豆	416.2	404.8
ひまわり	413.3	420.8
食用豆（菜豆？）	446.0	447.9
落花生（皮むき）	621.5	604.5
綿花	782.6	782.6

(注)○1ドル＝約65円（89年2月）

○タバコは入札により価格が決定されるが，概ね4,000ドル／t程度。

肥料価格（ 1988／89年 ）

化成肥料		417～547 ドル／t
窒素肥料	硝酸アンモニア	415
	硝酸ソーダ	821
	硫　安	389
りん酸肥料	singhe 過りん酸肥料	317
	double 〃	586

種子価格（ 1987 ）

メイズ	シングル ハイブリッド	74. 9 ドル／ 50 Kg
	3ウェイ 〃	37. 5 〃
ソルガム	ハイブリッド	65. 0 〃
	自家授粉	22. 0 〃
ひまわり		92. 5 ドル／ 25 Kg

(6) （参考）ジンバブエ農業生産の動向

87年度のジンバブエの農業生産は，天候に恵まれ，近年にない豊作となった。

ジンバブエは，平年作であれば食料の輸出国であるが，干ばつ等により作柄の変動が著しいこと。人口増加率が年率3％程度と高いことから，今後も食料の安定増産に努めていく必要があろう。

1986年に作成された新5ヶ年国家開発計画においても，1990年までに937万人に増える人口を養うために，農業部門で年5％の成長率が必要であるとしており，その実現のために，再入植計画による耕地面積の増加，作物の選択的拡大や技術向上，かんがい開発による収量増加等が不可欠であるとしている。

主要農作物の生産量の推移（千トン）

	83 年度	84 年度	85 年度	86 年度	87 年度
メイズ	616. 7	941. 6	1, 827. 8	1, 594. 3	2, 253. 1
ソルガム	5. 3	19. 9	82. 0	73. 6	175. 8
大豆	74. 4	89. 8	85. 3	83. 4	120. 4
コーヒー	9. 7	10. 7	11. 4	13. 5	–
小麦	124. 3	98. 5	205. 5	248. 3	–
綿花	167. 3	250. 1	297. 5	252. 7	339. 0
ひまわり	4. 7	8. 7	14. 1	19. 8	64. 7
葉たばこ	94. 3	119. 6	106. 0	114. 3	114. 0

(注) 年度は，4月～3月

主要農産物の87／88年の生産状況

	作付面積 ha	生産量 t	単収 Kg／ha	販売量 t	自家消費量 t
メイズ	1, 299, 500	2, 253, 100	1, 734	1, 162, 800	1, 090, 300
大豆	64, 470	120, 410	1, 868	119, 020	1, 390
落花生	224, 780	135, 270	602	31, 050	61, 370
ひまわり	101, 800	64, 700	636	54, 440	10, 260
ソルガム	220, 020	175, 805	799	78, 200	97, 605
ムフンガ	242, 860	187, 080	770	64, 900	122, 180
ミレット	131, 150	90, 775	690	30, 200	60, 575
綿花	271, 787	338, 953	3, 265	338, 953	–
葉たばこ	62, 527	114, 026	3, 555	114, 026	–

4 関連事業

（Nyamaropa Irrigation Schemeの現況）

「ジ」政府の予算にて，上流にダムを作り，堰を設計，重力にてかんがいを行なっている。綿花，煙葉等を栽培しており乾期にも作付できる為，かなりの成功を治めている。農民は水使用料（145 Z$／ha. year）を永久に払う。また，耕作権のみを有する。このプロジェクト

は，ニャコンバの近辺であり，同地域にも参考になるが，乾期のかんがい方法が，根本的に違う可能性がある（重力かんがいとポンプかんがい）。

rural infra 状況

上水道（ground water を使用）

school

wind mill station

business center

shop

clinic

Ⅳ　調査後の要望

無償援助にて，本かんがいプロジェクトの実現を希望している。又，順次こういった開発を他の地域住民共有地（Commural Land）へ適用していく考えを有している。

V　実施調査にあたっての勧告及び提言

1　かんがい排水

ニヤコンバ地区のかんがい計画における給水量等の諸数値は，前進のニヤマロバかんがい地区における数値を参考とし，また現在の営農状況・かんがい実施状況の把握により，当地区に必要な十分なデーターが得られるものと思われる。またダム・頭首工等の計画における降雨量，河川流出等の数値は，ガイレージ川支流のニヤルワカ川，マロジ川に複数の自動観測所が置かれてデータが得られており，当地区に運用出来ると思われる。

水源計画について現地の担当者等は，ポンプ取り扱い業者等からの助言により，揚水機による取水方法がベストを考えている様に思われたが，動力源，国の経済状況，後々の維持管理を考えると，自然流下による，ダム・頭首工等の取水方法が安全で最良と思われるので実施調査にあたり，その可能について検討する必要がある。

2　農業関係

(1)　温帯的気候で，雨期作作物と乾期作作物の組合せにより合理的輪作の実施が可能であること，基本技術が普及し農民の技術レベルも一定水準には達していることから，農業技術的観点からはかんがい事業実施後の生産性向上は十分可能と考えられる。

(2)　ただし，生産資材の供給面は，どの程度安定的に供給できるか今後の検討が必要があろう。トラクターのような高度なものは今後も安定供給は困難ではないか。（ジンバブエ国では自動車の供給も慢性的に不足している。）

(3)　ニャマロバかんがい事業を独力で実施しており，指導組織もしっかりしているものと考えられる。アグリテックスでは詳細な普及ハンドブックも作成しており，また，現場の生産データもかなり収集されており，これらの内容もチェックしておく必要がある。

(4)　Ⅲの4で述べたように，かんがい事業実施後，生産力が上がった分，新たに入植させる方針で検討されているが，既存農家の耕作面積の減少等難かしい問題がある。土地配分等は基本的にはジンバブエ側の問題であり，アグリテックス現地事務所の担当者は，既存農家にとっても，耕作面積が減少してもそれを上回る単収増があれば問題なしと単純に割り切っているが，疑問は残る。

事業の成否にも結びつく重要な問題であるので，ニャマロバかんがい地区の実施状況等について，農業経営面ないし組織面からくわしく調査分析しておく必要がある。

Ⅵ　付属資料

1. S／W
2. M／M
3. 要請文章
4. Questionnaire
5. 収集資料リスト
6. 参考資料リスト
7. 第1次5カ年国家開発計画（抜粋）
   1986 - 1990　VolumeⅡ

1. S／W

SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
THE NYAKOMBA IRRIGATION DEVELOPMENT PROJECT
IN
THE REPUBLIC OF ZIMBABWE

AGREED UPON

BETWEEN

THE MINISTRY OF LANDS, AGRICULTURE AND RURAL RESETTLEMENT

REPUBLIC OF ZIMBABWE

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

HARARE, 8 MARCH, 1989

S. PAZVAKAVAMBWA
DIRECTOR OF DEP. OF AGRITEX
FOR THE MINISTRY OF
LANDS, AGRICULTURE
AND RURAL RESETTLEMENT
REPUBLIC OF ZIMBABWE

古賀栄祐

EISUKE KOGA
LEADER OF
THE PRELIMINARY SURVEY TEAM,
THE JAPAN INTERNATIONAL
COOPERATION AGENCY, JAPAN

B.K

8/.

I. INTRODUCTION

In response to the request of the Government of the Republic of Zimbabwe (hereinafter referred to as "the Government of Zimbabwe"), the Government of Japan has decided to conduct the Feasibility Study on Nyakomba Irrigation Development Project (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Zimbabwe.

The present document sets forth the scope of work with regard to the the Study.

II. OBJECTIVE OF THE STUDY

The objective of the Study is to conduct the Feasibility Study on Nyakomba Irrigation Development Project in Manicaland Province.

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III. OUTLINE OF THE STUDY

1. Study Area

The Study Area shall cover the Nyakomba Irrigation Development Project area of 3,000ha which is located in the Sawunyama Communal Lands in Manicaland Province.

2. Scope of The Study

The Study will be divided into the following two phases.

1) Phase I. Topographical mapping, data collection and field survey

1)-1. Topographical mapping of the Study Area on a scale of 1:5,000 with 1m contour intervals.

1)-2. Data collection and necessary field survey relevant to the Study on the following items:

A. Natural condition

a) Topography

b) Meteorology and Hydrology

c) Geology and soil

B. Agriculture

a) Farm management

T-K.

b) Land use and land classification

c) Agricultural inputs

d) Agricultural production

e) Farmers' organization

f) Marketing system

g) Farmers' income and productivity

h) Supporting services

i) Agro-economy and institution

C. Agricultural infrastructure

a) Irrigation and drainage system

b) Farm road

D. Social condition

a) Population

b) Socio-economy and social institution

c) Related development plan

E. Others

1)-3. Preliminary Study and Analysis

Based on the result of the above-mentioned survey, the preliminary study and analysis will be conducted.

2) Phase II. Formulation of the Nyakomba Irrigation Development Project

2)-1. Supplementary field survey and additional data collection on the items mentioned in Phase I 1)-2.

EK.

2)-2. Formulation of the Irrigation Development Project concerning the following items:

A. Formulation of the following plans

a) Land use and classification

b) Cropping pattern and crop diversification

c) Supporting services

d) Agricultural infrastructure

.Irrigation and drainage facilities

.Farm road

.Marketing facilities

e) Water management

f) Farmers' organization

g) Farm settlement

h) Others

B. Preliminary designs on the recommended projects

C. Operation and maintenance

D. Estimation of the project cost and benefits

2)-3. Project evaluation

2)-4. Recommendation

IV. STUDY SCHEDULE

The study will be executed in accordance with the attached tentative work schedule.

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V. REPORTS

JICA will prepare and submit the following reports in English to the Government of Zimbabwe.

(1) Inception Report

Twenty (20) copies at the commencement of the field work in the Phase I.

(2) Progress Report (I)

Twenty (20) copies at the end of the field work in the Phase I.

(3) Interim Report

Twenty (20) copies at the commencement of the field work in the Phase II.

(4) Progress Report (II)

Twenty (20) copies at the end of the field work in the Phase II.

(5) Draft Final Report

Twenty (20) copies at the end of the Phase II. The Government of Zimbabwe provides JICA with its comments on the Draft Final Report through the Embassy of Japan within one (1) month after the receipt of the Draft Final Report.

(6) Final Report

Fifty (50) copies within two (2) months after receiving the comments on the Draft Final Report.

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VI. UNDERTAKING OF THE GOVERNMENT OF ZIMBABWE

1. To facilitate smooth conduct of the Study, the Government of Zimbabwe will take necessary measures:

(1) to secure the safety of the Japanese study team.

(2) to permit the members of the Japanese study team to enter, leave and sojourn in Zimbabwe for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees.

(3) to exempt the members of the Japanese study team from taxes, duties, and any other charges on equipment, machinery and other materials brought into Zimbabwe for the conduct of the Study.

(4) to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emolument or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study.

(5) to provide necessary facilities to the Japanese study team for remittance as well as utilization of funds introduced into Zimbabwe from Japan in connection with the implementation of the Study.

EK.

(6) to secure permission for entry into private properties or restricted areas for the conduct of the Study.

(7) to secure permission for the Japanese study team to take necessary data documents related to the Study including photographs out of Zimbabwe to Japan.

(8) to provide medical services as needed.
Its expenses will be chargeable on members of the Japanese study team.

2. The Government of Zimbabwe shall bear claims, if any arises against the members of the Japanese study team resulting from, occuring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or wilful misconduct on the part of the members of the Japanese study team.

3. The Ministry of Lands, Agriculture and Rural Resettlement (hereinafter referred to as "MLARR") shall act as counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organization concerned for the smooth implementation of the Study.

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4. MLARR shall, at its own expense, provide the Japanese study team with the following in cooperation with other agencies concerned;

1) available data and information related to the Study,
2) additional survey related to the Study, if necessary,
3) counterpart personnel to assist in the various activities for the Study,
4) suitable office with necessary furniture in Harare and the Study Area,
5) arrangements for the Study Team to hire vehicles with drivers, and
6) credentials or identification cards to the members of the study team.

VII. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. to dispatch, at its own expenses, study team to Zimbabwe.
2. to pursue technology transfer to the Zimbabwean counterpart personnel in the course of the Study,

VIII. CONSULTATION

JICA and MLARR will consult with each other in respect of any matter that may arise from or in connection with the Study.

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APPENDIX

TENTATIVE WORK SCHEDULE

DESCRIPTION	MONTH												
	1	2	3	4	5	6	7	8	9	10	11	12	13
I. Phase I	▒▒	▒▒	▒▒										
II. Phase II						▒▒	▒▒						
III. Explanation of Draft Final Report										▒			
IV. Reports	△ IC/R		△ P/R(I) Map		△ IT/R		△ P/R(II)			△ DF/R			△ F/R

IC/R: Inception Report

Map: Topographic Map

DF/R : Draft Final Report

P/R : Progress Report

IT/R : Interim Report

F/R : Final Report

▒ Work in Zimbabwe

□ Work in Japan

TK.

SP

2. M／M

MINUTES OF MEETING
OF
THE SCOPE OF WORK FOR THE STUDY
ON
THE NYAKOMBA IRRIGATION DEVELOPMENT PROJECT
IN
THE REPUBLIC OF ZIMBABWE.

HARARE, 8 MARCH, 1989

S. PAZVAKAVAMBWA
DIRECTOR OF DEP. OF AGRITEX
FOR THE MINISTRY OF LANDS,
AGRICULTURE AND RURAL
RESETTLEMENT
REPUBLIC OF ZIMBABWE

古賀英祐
EISUKE KOGA
LEADER OF THE
PRELIMINARY SURVEY TEAM,
THE JAPAN INTERNATIONAL
COOPERATION AGENCY, JAPAN

EK

1. In response to the request of the Government of the Republic of Zimbabwe, the Government of Japan has dispatched a contact survey team for this Study, from 27th February to 9th March, 1989 through JICA.

2. The Contact Survey Team and the Zimbabwean Officials concerned had a series of discussions and exchanged their views regarding the Study. As a result of discussion, both sides have agreed on the Scope of Work.

3. The salient results of the discussion are as follows:

(1) MLARR explained there would be no problems about the water right on Gairezi River (international river, border river) if it might be developed.

(2) The Study Area covers arable and grazing area in the Nyakomba Ward. Then topographic mapping (requested by MLARR) will be conducted including the vicinity of this Study Area.

(3) Land consolidation (leveling and shaping etc.) should be planned for the purpose of high irrigation efficiency at the time to decide the type of irrigation.

(4) Both sides agreed that the energy sources for pumping, if necessary, would be studied only from ZESA (Zimbabwean Electricity Supply Association) power line which will be constructed in Nyakomba and Nyamaropa in the near future.

(5) Both sides agreed that the capability for settlement (called land use planning in the communal land) from the view point of economical and technical aspects should be included in this Study.
However, the rights and facilities attached to settlement should not be included since they are the responsibility of the Government of Zimbabwe through the Regional Development Committee.

(6) On undertaking of the Government of Zimbabwe
a. Furniture mentioned in No.4, Item 3 means desks, chairs and telephones etc.
b. No.4, Item 5 was accepted, but MLARR requested for vehicles because of shortage especially in the Study Area.
c. Credentials or identification cards mentioned in No.4, Item 6 will be issued as letters of introduction by MLARR.

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(7) MLARR requested survey equipments (theodolite etc.)

(8) MLARR proposed that they participate in the pre-selection of full-scale survey team (ie. the Consultant).
The Japanese side turned down this request because of the present Japanese system under which JICA selects an experienced and professional Consultant and it is the responsibility of this Consultant to take advice from the Government of Zimbabwe.

MLARR accepted Japanese selection system.

(9) MLARR promised to send the Agricultural Development document, which is now under preparation by the District Agritex Extension Office, to JICA through the Embassy of Japan by the beginning of June, 1989.

4. List of participants in the discussions were as follows:

MLARR and Dep. of Agritex

(1)	Mr.	Chidawanyika	Under Secretary, MLARR
(2)	Mrs.	Mudiwa	Assistant Secretary, MLARR
(3)	Mr.	M.M. Mambo	Senior Admin. Officer MLARR
(4)	Mr.	S. Pazvakavambwa	Director of Agritex
(5)	Mr.	J. M. Makadho	Assistant Director, Irrigation, Agritex
(6)	Mr.	Chitsiko	Assistant Chief Irrigation, Agritex
(7)	Mr.	A. F. Mtetwa	Acting DEAO, Nyanga

MFEPD (Ministry of Finance, Economic Planning and Development)

(8)	Mr.	O. Matsaalaga	Under Secretary
(9)	Mr.	W. S. Chirimuuta	Japanese Desk

Embassy of Japan

(10)	Mr.	Yukio Kawajiri	1st Secretary

JICA Team

(11)	Mr.	Eisuke Koga	Leader
(12)	Mr.	Takashi Shino	Member
(13)	Mr.	Hideo Minamoto	Member
(14)	Mr.	Kunio Oguri	Member

E/C.

3. 要請文章

Re: A/26/41

RE: PROJECT TYPE TECHNICAL COOPERATION SCHEME

A 1. PROJECT: Integral Rural Development Project at Nyakomba Irrigation Scheme.

2. BACKGROUND AND PURPOSE: The existing Nyamaropa Irrigation Scheme (20km from Nyakomba) with 417ha has operated successfully producing some of the finest cotton and barley tobacco. Demand for irrigation in this area has always been great proved by the long waiting list on the existing scheme. Suitable irrigable land amounting to 700ha has been identified. However any irrigation development here must be studied to have a comprehensive plan for the region. The existing business centre might grow into a self-sustaining growth centre.

The purpose of the project is to initiate a study so as to define all the technical aspects of all components from the development of the irrigation infrastructure to the establishment of the growth point with fully developed agro - industries.

3. MINISTRY: Lands Resettlement and Rural Development.

4. RELATIONSHIP WITH THE NATIONAL DEVELOPMENT PLAN: The area in which the scheme is to be lies in one of the most neglected rural areas of the country. The development of the irrigation scheme will have large spin - off effects including;

2/....

-raising the incomes of the local people through intensive cash crop farming.
-generation of non-farm employment opportunities.
-raising the standard of living of the local people.

All these fall within the scope of the National Development Plan which aims at raising the standard of living for the rural poor who have been neglected in the past. Further the development of the necessary infrastructure would enable the people to market their produce.

5. PRIORITY RATING: Irrigation development is one of Government's top priorities with particular emphasis on rural development. This project ranks high on the priority list since it is aimed at raising the standard of living of rural people through the creation of non-farm employment opportunities.

6. RELATIONSHIP WITH OTHER DONORS/MULTINATIONAL ORGANIZATIONS: No other donors/multi-national organizations are involved in the proposed scheme.

7. FINANCIAL SCHEDULE: This has not yet been prepared since this will be prepared during the course of the study.

8. PROSPECTS AND FEASIBILITY: Irrigation development of the region accompanied by other infrastructural development would pave way for full development of the potential in this area with the existing business centre growing

3/....

into a self-sustaining growth centre. Further the scheme would help to increase agricultural production to meet the needs of a growing urban/rural population and industrial sector.

9. FACILITIES FORMING THE BASIS FOR THE PROJECT:

The existing 417ha Nyamaropa Irrigation Scheme has created a huge demand for a similar scheme at Nyakomba. The infrastructural development of the area is part of the development scheme, but there is already a business centre which has the potential to develop further.
With regards to road networks, the access road from Nyanga Heights via Troutbeck is being reconstructed and will be tarred as far as the existing Nyamaropa Scheme.

10. LIST OF MACHINERY AND EQUIPMENT:

-Pump Station, canals and pipes, electrical installations- $6 000 000 intake works, feader roads etc.
-Agricultural machinery and equipment (tractors- $600 000 trailers, ploughs, bulldozer, sprayerset).

11. JAPANESE EXPERTS:

a number of experts are needed to carry out detailed designs and plans for the whole project.

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REF : RD/I/41 NYAKOMBA

PROPOSAL FOR INTEGRAL RURAL DEVELOPMENT PROJECT AT NYAKOMBA IRRIGATION SCHEME

1. SUMMARY

This project proposal is for an identified integrated rural development project with a 700 hectare proposed irrigation scheme forming the central objective of the development.

The proposed Nyakomba irrigation scheme is in the Nyamaropa and Sawunyama Communal Lands about 84 km north of Nyanga district and 210 km from Mutare in Manicaland Province. It is to the north-east of the existing 417 hectare Nyamaropa Irrigation Scheme.

Development of this irrigation scheme will be supported by cottage - and agro-industries, roads and other service infrastructure which will create a self-contained growth centre and improve tremendously directly and indirectly the lives of more than 20 000 people.

A full feasibility study will need to be carried out before implementation can be carried out.

2. BACKGROUND

The existing Nyamaropa Irrigation Scheme about 20 km from the proposed Nyakomba scheme was established in 1956 and presently has 417 ha with 313 plotholders. The scheme has operated successfully over the years and is well known for producing some of the finest cotton and burley tobacco (among other crops) in the country.

Enthusiasm for irrigation has always been great in this area as has been proved by the long waiting list on this existing scheme. Suitable irrigable land was identified at Nyakomba amounting to 1 200 hectares of which only 700 ha is effectively suitable and excludes parts showing excessive slopes, irregular formations and risk of floods.

However any irrigation development in this region must be studied as a component of a more comprehensive plan for the whole of the Nyamaropa and Sawunyama Communal Lands. This will remove the present constraints in marketing transportation etc., and pave the way for the full development of the potential in this area.

There is an existing business centre which has the potential of growing into a self-sustaining growth centre.

3. OBJECTIVES

The project proposal is first and foremost to initiate a study by experts to define technical aspects of all the components of the project from the development of the irrigation infrastructure to the establishment of the growth point with fully developed agro-industries.

This study will prepare complete designs enabling immediate implementation of the project.

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The salient objectives of this project are :-

1. To increase agricultural production (food and industrial crops) to meet the needs of a growing urban/rural population and industrial sector.

2. To generate employment and raise the income levels of the rural poor through irrigation, agro-industries, cottage industries and ancillary services.

3. To save/earn foreign exchange through import substitution and exports.

4. To provide some relief of population pressures on the land.

4. LOCATION AND COMMUNICATIONS

The scheme lies approximately 84 km north of Nyanga district and about 210 km from the provincial capital, Mutare. There is a full tarmac main road through to Nyanga up to the border with the Nyamaropa rural lands. The road from there is gravel and is in some parts difficult to pass during the rain season.

The access road from Nyanga Heights via Troutbeck is being reconstructed and will be tarred as far as the existing Nyamaropa scheme.

There is presently no telephone link to this area.

Due to these poor road and communication infrastructure in this region no commercial transporters operate creating problems for the procurement on inputs and sale of produce.

5. PHYSIOGRAPHY AND CLIMATE

As the altitude decreases from above 1200 m on the Nyanga Escarpment to 900 m below along the Gaerezi at the north, the area is classified from Region 1 to Region IV. Variation in climate is sharp as only 10 km to the north of the project area crossing into Matizi Communal Area one reaches a very dry area classified as Region V.

A reconnaissance soil survey was carried in 1984 and an earlier one in 1950. The soil types in the area fall under the Kaolinitic order which are moderately shallow to moderately deep, reddish brown to greyish brown, relatively silty sandy clay loams and clay loams over reddish brown to yellowish brown similar clay loams and clays. The majority of soils are loamy sands to sandy loams overlaying sandy loams or sandy clay loams to clay. A few pockets fall in the heavier group of sandy clay loams to clay.

The shape of the land is generally undulating and flat stepped averaging 2 - 3%. This is probably the single most important factor limiting the irrigation area to 700 ha.

The vegetation is mainly of tree savannah of Piliostigma Thoningi with some Strychnos, Protea and Terminalia species.

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Surface water in the Nyamaropa area is abundant and can be harnessed from the system of perennial rivers running from the Nyanga Heights into the Gaerezi. In Sawunyama the streams become less reliable, the run-off decreases and only few spots with perennial flow can be found. The Gaerezi itself bordering the whole area in the lowest part flows an amount of water largely in excess of any possible requirement in the area, but its use is limited by pumping.

The existing Nyamaropa scheme receives water from both the Marozi and Nyaruwaka basins through a system of wiers, canals and storage reservoirs. The regulating dam was built in 1974 - 75 with a capacity of 1,625 x 10^6m. Water from the Marozi river, which has a stronger dry-weather flow, is stored there and used in the late months of each year when the natural flows are inadequate. A night storage reservoir of 30 x 10^3 m^3 exists.

For the Nyakomba area it is only along the Gaerezi river north of the Nyaruwa confluence that the largest place of land can be commended.

The limited shape of the Gaerezi river in the area does not provide any possibility for gravity abstraction for the irrigation. However, pumping sites can be located at convenient points where rock banks allow a better anchorage for the fixed equipment. Based on 1:50 000 scale cartography and field observations the lands lie between 15 to 40 metres above the low water level. There are a number of convenient locations for storage reservoirs where water could be pumped into and then gravitated on the fields.

Dividing the area into a lower and higher section in order to save on pumping head would be an economic consideration.

6. POWER SUPPLY

Power requirements for pumping purposes would have to be assessed accordingly, the order of magnitude being of 500 KVA. The additional demand for the settlements in the area would put the initial demand our roughly 1000 KVA.

The flow in the Gaerezi as already noted is far higher than the irrigation requirement. Conservative estimates of above 10^3m/S in the driest months have been made. The availability of such high excess flow suggests an investigation into the feasibility of a local hydro power generation. Such a possibility along the Gaerezi river has been considered. Ministry of Energy Water Resources and Development identified one site for large dam construction approximately 30 km north for power generation. Locally two different locations are 30 km north the other 20 km south where sufficient drop in the river bed would easily allow a power generation of the order of magnitude required to exist.

7. DEMOGRAPHY

The largest concentration of population in this region is around the existing Nyamaropa scheme. Densities are also very high in the south-east of Nyamaropa and along the Gaerezi in Sawunyama reducing drastically in the driest northern part.

The 1982 census puts the human population in Sawunyama Communal Land at 8 535 with about 20 people/km^2.

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8. DEVELOPMENT POTENTIAL

8.1 Irrigation

Potential irrigable area is estimated at 1 300 ha. Owing to the not-so-favourable physiography in some parts the effective area that can be irrigated is some 700 ha.

It is proposed to pump water from the Gaerezi river to some storage reservoirs from which it will gravitate to the fields for flood irrigation. Consideration may be given for sprinkler irrigation if the area to be irrigated has to be increased from the 700 ha to the full potential of 1 300 ha.

Construction work would include river-side pump station, primary, secondary and tertiary canal network, boundary fencing, A/C piping, flood protection works, roads, buildings and land preparation.

Machinery and equipment requirements will include tractors, lorries, trailers, ploughs, bulldozer, graders, dam scoops and land planes.

8.2 Power

Electric power must be made available for pumping water and for other uses such as domestic requirements, agro-industries etc. This will reduce the operation and maintenance costs considerably for the pumping units.

8.3 Crops

Agricultural activities under irrigation will be intensified to double cropping. The introduction of irrigation will enable cropping intensifies of up to 175%.

Cash crops like burley tobacco, soya beans and cotton are expected to feature prominently although maize, edible beans etc will be grown mainly for subsistence in this region.

8.4 Agro-Industries

Local processing of the main agricultural products is envisaged seriously more so that there is a strong likelihood of the availability of electricity on site.

Possibilities in this line include an oil mill to process the oil-bearing crops prodiced (e.g. cotton seed, soya, groundnuts) and the installation of a cotton ginnery.

Other sideline possibilities would include a unit for production of cattle feed using cake produced as a by-product of the oil mill, packaging or processing of produce etc.

8.5 Social Infrastructure

This area lacks some basic infrastructural facilities which slow down the increase in the production of food. Notable are the poor feeder roads, inadequate road networks, shortage of schools and clinics and piped domestic water supply

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In all these areas there is abundant potential for improvement of the lives of the people in this region.

9. COST ESTIMATES

The magnitude of the work needed to be carried out needs a full feasibility study to be done. However, some indications below could make a good start for detailed planning to proceed.

Irrigation Development	
Pump station, canals, pipes electrical installation, intake works, feeder roads etc.	$ 6 000 000
Agricultural Machinery & Equipment	
Tractors, trailers, ploughs, bulldozers, sprayerset	$ 3 000 000
Social Infrastructure Development	
(schools, clinics, water supplies, access roads)	$ 4 000 000
Agro-Industries	
(oil mill (size to be determined) cotton ginnery) etc	$ 3 800 000
Construction Machinery	$ 5 000 000
Mini Water Treatment Plant	$ 4 000 000
Mini Hydro-electric Plant	$ 5 000 000
Storage Plant	$ 1 000 000
Feasibility Study	$ 200 000
(Expatriate Personnel to carry out detailed design and plans	
TOTAL ESTIMATE COSTS	$ 32 000 000

10. JUSTIFICATION

The project lies in one of the most neglected rural areas of the country. However, it has vast and diversified potential for integrated rural development. The development of the irrigation project will have large spin-off benefits.

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Direct benefits include:

10.1 Assured food supply and intensified cash crops raising considerably the incomes of the local people.

10.2 Generation of other non-farm employment opportunities.

10.3 Raise the standard of living of more than 20 000 families.

REF : RO/ I/ 41 NYAKOMBA

TERMS OF REFERENCE FOR THE FEASIBILITY STUDY OF NYAKOMBA INTERGRATED RURAL DEVELOPMENT PROJECT

1. INTRODUCTION

Some Irrigation potential has been identified at Nyakomba approximately 20km North of the existing Nyamaropa Irrigation Scheme. It is believed that up to 1200 ha of suitable irrigable soils can be successfully irrigated thus bringing about rural development in this area. The area is poor on infrastructure and other basic facilities and there is therefore the need to view the Irrigation development within the context of an intergrated rural development project.

The Ministry of Lands, Resettlement and Rural Development (MLRRD) is responsible for Communal Area development and Irrigation development in the Communal Lands. This Ministry has decided that the tentatively identified potential should now be proved through a full feasibility study; on the basis of which a decision to implement the project will then be taken. It is for this purpose that the following Terms of Reference are being drawn up for submission to the Government of Japan through their Embassy in Harare and seek grant funds with which the study will be undertaken through the use of Japanese Consultants and if possible with the collaboration of local consultants.

2. BACKGROUND INFORMATION

2.1 Location of Project Area

The project area is located on the border with Mozambique as is shown on the Location map attached.

2.2 Project size

The 1200 hectares of irrigation development will form the nucleus for the intergrated rural development project which will cover approximately 50% of the Nyamaropa and Sawunyama and Matizi Communal areas.

2.3 Agro-climatic Data

While the project area encompasses Natural regions IIa, to V; the irrigation scheme which is the project nucleus is predominantly in natural regions IV. Therefore dryland cropping within the potential irrigation area is unrealiable despite the good soils.

The meteorological station with comprehensive data which is closest to the project area is Nyanga. Below is some of the pertinent climatic data:

2/.....

Climatic data for Nyanga Meteorological Station

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Mean Relative Humidity %	70	61	48	54	66	76	83	82	77	71	72	70
Rainfall mm	17,	11	23	48	131	254	226	295	177	68	21	16
Mean monthly Evaporation mm	90	122	166	181	137	112	114	98	114	99	92	79
Mean Temp. °C	16	18	21,1	22,6	21,5	21,2	21,1	21,1	20,7	19,8	18,2	16,

Climatic data for Nyamaropa

Rainfall mm	6	1	15	24	89	163	218	263	131	38	19	Nil

Climatic data for Regina Coeli Mission

Rainfall mm	1	0	3	29	79	177	187	236	124	27	6	Nil

Nyanga itself is in natural region I and the Ga[illegible]rezi river which is the main source of irrigation water has its source in this high rainfall area. Consequently the Gaerezi has a very strong perennial flow; at least 10 3/6 on the conservative side.

2.4 Soils

A reconnaissance soil survey was carried out in 1984 and an earlier one in 1950. The soil types in the area fall under the kaolinitic order which are moderately shallow to moderately deep, reddish brown to greyish brown, relatively silty sandy clay loams over reddish brown to yellowish brown similar clay loams and clays. The majority of the soils being loamy sands to sandy loams overlaying sandy loams or sandy clay loams to clay with few pockets of heavier soils.

2.5 Land Use

The current cropping patterns is geared towards self-sufficiency making cereal grains predominant.

Once the irrigation is developed cash crops particularly of an industrial nature to support the agro-industry will replace the cereal grains.

2.6 Demography

The largest population concentration in the region is on the existing Nyamaropa scheme and as one goes northwards to the project area the population density decreases.

The 1982 census came up with a population density of about 20 people/km^2 in the project area.

The scheme development should directly or indirectly benefit 20 000 people.

2.7 Project Objectives

- To increase agricultural production of food, cash and industrial crops.
- To generate employment and raise income levels of rural poor through irrigation cropping, agro-industry, social and physical infrastructural development.
- To earn foreign currency through exports and import substitution.
- To provide population relief in the region where the population pressure is already imposing an ecological stress on the natural potential.

The 1981/82 to 1983/84 droughts have clearly demonstrated the need for the Government of Zimbabwe to develop all irrigation potential in the area in order to attain and retain food self-sufficiency despite the normal variation in seasons in sub-tropical Africa where droughts are a common feature.

3. OBJECTIVES AND TASKS OF THE FEASIBILITY STUDY

The Ministry of Lands, Resettlement and Rural Development being responsible for Communal Land Development including irrigation development desires that the following investigations be carried out:-

a) An inventory of the rural development potential in the Sawunyama Communal Land of which Nyakomba is part.

b) A comprehensive study on the provision of basic infrastructure to include inter alia : access and main roads, electricity and water; rural service centres, marketing depots and agro-industry posts and telecommunication infrastructure; health; education and sanitary infrastructure and any other aspects incidental to and connected with proper perspectives of rural technology development.

c) A comprehensive analysis and study of the feasibility of irrigating approximately 1200 ha in the Nyakomba area to cover the following aspects.

(i) Availability of water; water rights and supply system.

(ii) Most suitable method of irrigation and other considered alternatives.

(iii) Investigation into international water rights as the Gaorezi is an International (border) river.

(iv) Irrigation and drainage infrastructure with emphasis on appropriate technology and force account work during implementation.

(v) A full soil survey of the irrigable area indicating

1. Soil classes
2. Land capability classes
3. Land suitability classes
4. Irrigability classifications and complete soils analysis.

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(vi) An economic and financial appraisal of the project indicating both the economic and financial analysis: Internal Rates of Return etc.

(vii) Opportunity costs attached to the intergrated development of this area; other development strategies.

(viii) Market analysis particularly for cash crops eg. cotton, burley tobacco and the full logistics of marketing. - Where export is contemplated - a full forecast of the export potential; costs and benefits.

(ix) A topographical survey of the proposed irrigable area upon which a tentative irrigation design will be superimposed.

(x) A proposed operation and maintenance manual for the irrigation scheme if and when constructed.

(xi) Canal cross sections; profiles and bills of quantities for earthworks and other necessities.

(xii) Domestic water supply for the irrigators and a settlement plan. - Rural Water supply scheme etc.

(xiii) An indicative design of the intake works, night storage dams; pumping stations and all proposed drainage works.

d) A comprehensive socio-economic survey to indicate

- acceptability - desirability of the scheme.
- anticipated level of people participation.
- anticipated level of patronisation etc.

All aspects to be accompanied by the relevant maps, drawings, plans etc in metric form.

e) An investigation into the erosion risks and erosion hazards incidental to irrigation development.

4. PERSONNEL FOR THE STUDY:

While the consultant is perhaps free to widen the scope of the investigation team, the following disciplines are deemed adequate for this study.

a) One Team Leader, preferably an Irrigation/Drainage or Civil Engineer with considerable experience in both the documentation aspects and the practical field application of similar projects in both scope and size.

b) One Socio/Economist and Rural Planner.

c) One Agricultural Economist or Farm Management Specialist.

d) One Irrigation and Drainage or Agricultural Engineer with extensive knowledge of design, layout and planning of irrigation systems with particular emphasis on force account work for implementation.

e) One Irrigation Agronomist familiar with the intended crops to be produced under irrigated conditions.

f) One Soil Surveyor/Chemist with extensive experience in Soil Surve methods, soil coding and soil analysis for irrigation.

The disciplines have been deliberately left wide open for a desired maximum effect. Once they become too narrowly specialised; the broad objectives will be lost.

5. MODE OF STUDY EXECUTION

It is proposed that for maximum effect, the following procedures of selecting the consultants should be jointly undertaken between COZ and the Japanese Government.

(1) Pre-qualification of consultants. - Here the consultants should state the following:

(a) Scope of Activity - Job Capacity.

(b) Level of experience in similar jobs world-wide.

(c) Experience of similar jobs in a regional context - ie. in either the SADCC countries; Kenya; Sudan etc.

(d) Experience on similar jobs in an environmental context.

(e) Qualifications of key personnel to be used on the assignment.

(2) A short list of between 5 - 8 Consultants will then be drawn up and these will then be asked to submit detailed proposals in two parts.

(a) A Technical proposal indicating the consultant's understanding of the Terms of Reference and how he proposes to undertake the study. He may at this stage even suggest an improvement in the Terms of Reference; Personnel etc.

b) A financial proposal indicating clearly what the work is likely to cost.

The contract will be awarded entirely on the quality of the technical proposal. Only when two technical proposals are too close to each other will the respective financial proposals be opened to arbitrate between them - otherwise the financial proposal will not be opened.

On acceptance of the technical proposal, the financial proposal will become part and parcel of the agreement.

*For easier execution it is Strongly proposed that Japanese Companies should go into partnership with Local consulting companies for the provision of local expertise; office back-up and other logistics. The Government Authorities concerned with the Feasibility Study cannot perform the functions, neither will they be in a position to provide counterparts.for the study. They will only act as the client for the purposes of providing background information only.

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6. REPORTS

The Reporting procedure will be discussed with the successful consultant. This will have to include an expected monthly or quarterly briefing session with the client team.

It is also anticipated that this study should take 4 - 6 months with a possible total input of between 28 - 36 man months.

S. PAZVAKAVAMBWA

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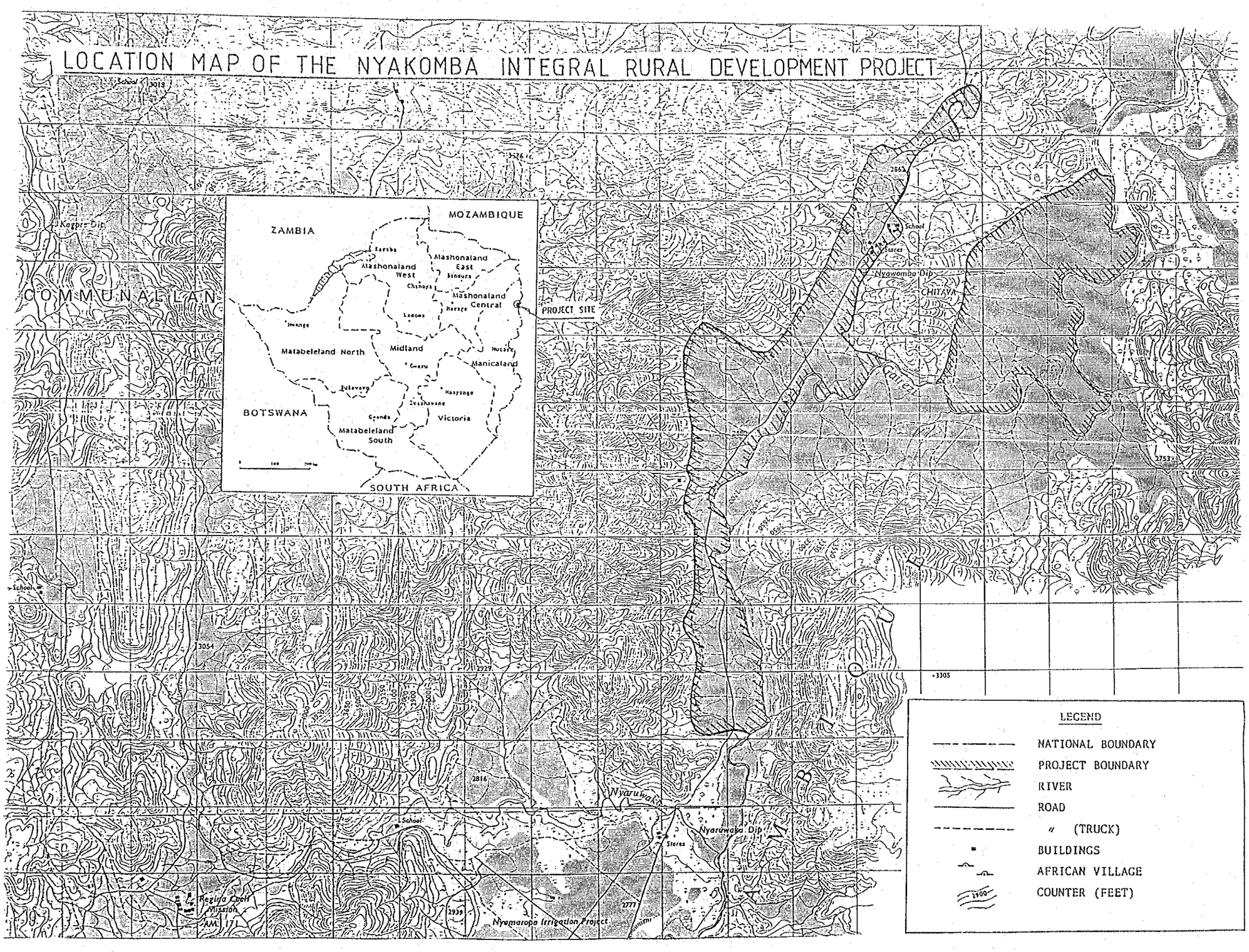
LOCATION MAP OF THE NYAKOMBA INTEGRAL RURAL DEVELOPMENT PROJECT



4 Questionnaire

General questionnaire

Re; Nyakomba irrigation development project

Made by; the contact mission , JICA

1. Water right related to Gairezi river that is interrational and border river. Ahy problem between the Government of Zimbabwe and the Government of Mozambique, if the Government of Zimbabwe shall muke irrigation facilities in Gairezi river in the future and use irrigation water for Zimbabwe side orly.
2. Prospective hydro Power generation dam Which is Planned in the upper strean of Gairezi river.
3. Any idea to use Power energy, for pumping Station and rural electrification Nyakomba, which will be generated by the hydro Power generation dam in the upper Stream of Gairezi river.
4. Location of two Prospective mini-hydro Power Station whose Possibility has beer Considered by the Ministry of Erergy Water Resources and Development.
5. Existence of private Company Cohich has the ability to condnct a ground Survey and make map.

Detail Questionnaire

(Agriculture)

1. About the Republic of Zimbabwe

① Present farm and cultivated land acreage of each land holding.

② Farm family number and the number of farmers of each land holding.

③ Acreage of main crops, its unit yield (fon/ha) , total yield (fon) and quantity for sales.

④ About main domestic animals.

a) the number of each animals.

b) the number for slaughter.

c) quantity of dairy productt.

⑤ Labour wages (average)

⑥ Producer and consumer Price of main agricultural products including livestck farming.

⑦ Cost of fertilizers, pesticide, Fuel etc. and its quantity of supply.

2. About the Nyamaropa Irrigation Project.

① Acreage of irrigated area and water requirement for irrigation.

② Project Cost.

③ The number of resettled farm family. acreage of cultivated land per one farm family and He number of person of each family.

④ Acreage of farm (Paddy field, wheat, upland. orchard and pasture etc.)
Unif yield (fon/ha) , yield (fon) and quantity for sales

⑤ Outline of each farm maragement.
(Cropping pattern, species, fertilizer,pesticide and agricultural machinery.)

⑥ Stock Facilities for post harvestings and transportation for agricultural products.

⑦ Jarmers' organization

⑧ Extension service and its present activity.

⑨ Social infrastructure
(drinking water, electricity. school and clinic etc.)

3. About the Nyakomba Irrigation Project.

① Meteorological condition (Temperature.Precipitation.)

② Soil.

③ Present land holding, population.

④ Present land use, main crops.

⑤ Trafic measures for going to main cities.

5. 収集資料リスト（ＪＩＣＡ保管）

① 最新の航空写真（1986年，4年毎に更新している） 1：12,500

② 1：50,000 地形図

③ A Guide to soil cpding and land capability classyfication for land vse planners.

④ Nyakomba ward land capubility map.

⑤ Jarm Manayement Handbook Pand one, two

⑥ Nyanga 在名白人が計画した，Nyakomba のポンプ及び風力発電計画報告書

⑦ Jirst Jive－Year National Development Plan.
1986－1990 Volume Ⅱ April, 1988

⑧ QUARTERLY DIGEST OF STATISTICS
CENTRAL STATISTTICAL OFFICE September : 1988

⑨ CLIMATE HANDBOOK OF ZIMBABWE
DEP. OF METEOROLOGICAL SERVICES APRIL 1981

⑩ AGRITEXで収集した農業関係資料
・Fertilizer and lime prices
・農薬価格一覧

⑪ NATURAL REGIONS and FARMING AREAS 1984

⑫ MEAN ANNUAL RAINFALL 1984
(Monthly)

⑬ LAND CLASSIFICATION 1：1,000,000 1979

6. 参考文献（ＪＩＣＡ保管）

① ＪETRO　ジンバブエ　S 57

② INTENSIVE RESETTLEMENT　pnlicies and procedures.
Min of Lands, Resettlement and Rural Development

③ PROPOSALS for a Jive - Year Programme of Developmeot in the PUBLIC SECTOR　January 1979.

④ 発展途上国直接借款推進基礎調査
— ジンバブエ —　　S 59·3　アジア経済研究所

⑤ ジンバブエ共和国マシンゴ州中規模かんがい計画
事前調査報告書　　S61. 4　　国際協力事業団

⑥ 経済技術協力国別資料シリーズ
ジンバブエ　　1985.8　　国際協力事業団企画部地域課

⑦ TRANSITIONAL NATIONAL DEVELOPMENT PLAN
1982／83 - 1984／85　Volume 1, 2

⑧ MONTHLY SUPPLEMENT TO THE DIGEST OF STATISTICS
FEBRUARY ; 1985

⑨ Provisional Soil Map　1 : 1, 000, 000

⑩ Hydrological Zore Map　1 : 1, 000, 000

⑪ プロジェクトファインディング調査報告書　　1985年10月

⑫ ジンバブエの農業　　AICAF　　1986年3月
— 現状と開発の課題 —

7. 第１次５カ年国家開発計画（抜粋）

REPUBLIC OF ZIMBABWE

FIRST FIVE-YEAR

NATIONAL DEVELOPMENT PLAN

1986-1990

VOLUME II

APRIL, 1988

C.P. & S. 41740-T.

CONTENTS

INTRODUCTION

This volume, which is the second part of the First Five-Year National Development Plan, contains programmes and projects which are formulated on the basis of the six major objectives of the Plan as outlined in Volume I. Each programme or project is, therefore, pursuant to one or more of these objectives.

Four basic economic indicators were used in determining the programmes and projects to be included in the Plan. These indicators are: investment, employment creation, output, and export potential. With respect to employment creation, the Plan requires use of labour-intensive techniques where feasible as a strategy for maximizing the economy's capacity to generate additional employment opportunities.

Most of the priority projects whose financial requirements are in excess of Government's capability have been spread over a period that extends into the next five-year plan in order to enable Government to match the total investment programme with available human and financial resources and the requisite foreign currency.

An additional aspect of this Volume which needs to be pointed out is that the programmes and projects are presented in summary form. Where applicable, the necessary details will be presented in the Investment Register. Exceptional cases apart, the programmes and projects to be implemented in each fiscal year, especially those in the public sector, will be drawn from Volume II and the Investment Register and presented as part of the Annual Plan. Implementation of the Annual Plan is largely a function of the Annual National Budget which is the key instrument for implementing National Development Plans.

Because of the nature and structure of the economy, Volume II contains mainly Public Sector investment programmes and projects, albeit with strong indications of projects in which private sector investment is expected and encouraged. Most of the projects in which the private sector is expected to make direct contribution are in manufacturing, mining and, to some extent, in the agricultural sector.

The main thrust of the investment programme is in keeping with Government policy of expanding the productive base of the economy as a strategy for generating additional employment opportunities as well as increase the wealth of the nation.

While the structure and level of public investment will be determined directly by the State, private investment will be influenced largely by the orientation of Public Sector Investment and by the projects contained in the Investment Register as well as by the short-term fiscal and monetary measures which will be implemented during the Plan period which are designed to influence change in the intended direction. It should be emphasized that the main preoccupation of each Annual Plan is not the level of investment but the restructuring of the key productive sectors and their contribution to overall development.

Efforts have been made to make this Volume conform to the planned distribution of resources as outlined in Volume I. This is revealed in the table overleaf.

PUBLIC SECTOR INVESTMENT PROGRAMME
(1986/87–1990/91 COMPARISON OF VOLUME I AND VOLUME II)
(Z$ million)

Sector	Volume I		Volume II		
	1986/87–1990/91 (at 1985 prices)	Structure in per cent. share	1986/87–1990/91 (at 1985 prices)		Structure in per cent. share
Agriculture and forestry	880	19,5	842	(1 214)	17,0
Mining and quarrying	257	5,7	179	(257)	3,6
Manufacturing	415	9,2	381	(550)	7,6
(1–3) Productive sectors	1 552	34,4	1 402	(2 021)	28,2
Electricity and water	541	12,0	950	(1 368)	19,1
Construction and housing,*	888	19,7	818	(1 178)	16,5
distribution, Hotels and Restaurants	165	3,7	38	(55)	0,8
Transport and communication	794	17,6	812	(1 169)	16,4
(1–7) Material production sectors	3 940	87,4	4 020	(5 791)	81,0
Education**	200	4,4	617	(888)	12,4
Health	175	3,9	188	(270)	3,8
Public administration and others	198	4,3	138	(199)	2,8
(1–10) Total	4 513	100,0	4 963	(7 148)	100,0

The figures in brackets in column 3 are at current prices.

* Includes general purpose investment by Government and urban development.
**Volume II figures includes Youth Training Centres, Health Centres, Public Services Training Centres and Agricultural Training Centres.

As will be apparent, this volume is organized according to social and economic sectors and where feasible, the programmes and projects are also presented according to provinces, especially in sectors such as agriculture, water development, education and health and, to some extent, in mining and manufacturing. Efforts will be made in the preparation of future plans to present most of the sectors according to provinces.

The average rate of inflation assumed in Volume I is still relevant to this Volume and it remains the objective of Government to contain inflation rates at a level lower than that assumed for the Plan period.

Provincial Plans for the period 1986/90 were submitted to Cabinet in November, 1986. Attempts have been made to integrate key elements of these plans into this Volume, taking into account the potential contribution of projects identified by provinces towards the attainment of the objectives of the First Five-Year National Development Plan. In addition, the projects were subjected to the same rigorous test which consists of the four basic indicators referred to earlier.

Although most of the programmes and projects contained in the eight Provincial Plans are relevant to the development requirements of the provinces, it was not possible to incorporate all of them into this Volume for two main reasons. First, the total investment requirements of Provincial Plans for the Plan period under consideration are much larger than available national resources as already determined globally and sectorally by Cabinet. Second, most of the self-reliant projects in Provincial Plans, including some projects to be implemented by Non-Governmental Organizations, are not included in the Plan because the mechanism for financing these projects currently falls outside the domain of the National budget. In this connection, integration of self-reliant projects into National Development Plans and the budgeting process will be one of the main tasks to be undertaken by the Regional Planning arm of the National Planning Agency during the current Plan period and beyond. This is because Government attaches great importance to self-help which, in addition to its contribution to overall development, demonstrates the initiative and efforts of the masses in the development process.

Accordingly, Government will make efforts to develop a methodology for incorporating these projects into National Plans.

The emphasis on provincial development to which Government has commited itself will be pursued with vigour in conjunction with efforts to attain regional balance. It is for this reason that attempts have been made in this Volume to proceed rapidly along this front. In view of the historical imbalances that have existed among regions in the development of the economy over an extended period of time, it will take time to attain the intended balance.

In assessing progress towards regional balance, one is cautioned against examining a given sector, project or programme in isolation of the rest of the activities in the economy. One needs to take into account the physical location of all programmes and projects and their priority ranking in the context of total investment, past investment developments and private sector investment in the regions. In this way, one will get a clearer view of Government's strategy for attaining regional balance and how much progress has been made in this important aspect of development. In subsequent plans, Government will strive to promote the changes that will further reduce disparities in incomes and economic opportunities that exist among regions.

One of the major weaknesses in the national planning machinery which the Plan seeks to address is the lack of an effective link between national plans and provincial plans. In the future, this link will be strengthened and harmonized as a result of the establishment of the National Planning Agency (NPA) which includes a section that will oversee all aspects of provincial planning. The Regional Planning Section of the National Planning Agency will guide Provinces in the preparation of Provincial Plans in line with national development plans. In addition, the Plan Implementation Section of the NPA will play an important role in the establishment and refinement of provincial planning in that it will monitor and review the implementation of provincial plans with a view to recommending corrective measures, where necessary.

In conclusion, it should be emphasized that since publication of Volume I of the Plan, disparity already exists between available resources and investment requirements of the Plan. This caution is essential in view of the fact that there are several projects which were still under consideration by Government at the time of publication of this Volume. These projects are shown in Annex I. If a decision is reached to implement one or more of the projects during the Plan period, it would be necessary to make major changes in the investment programme.

AGRICULTURE AND RURAL DEVELOPMENT

Agriculture, which is one of the three material production sectors, is placed at the centre of the development strategy, especially as it relates to rural development.

During the Plan period, therefore, Government will implement agricultural and rural development programmes and projects that are intended to increase agricultural productivity and output. The resettlement programme will remain central in the attainment of the rural development objective. In this regard, approximately 75 000 families will be resettled during the plan period.

In order to increase agricultural productivity and output and ensure continued expansion of the sector, Government will take measures which are designed to create a suitable environment for a high and sustainable growth rate in the sector. Some of these measures include provision of credit facilities to small-scale resettlement and communal farmers, annual review of the pricing policy for agricultural produce, promotion of research activities relevant to the sector and development of irrigation schemes. In addition agricultural production will be further diversified.

An important aspect of development to which Government will pay greater attention in the development of agriculture and the rest of the economy is the regional dimension. This is to ensure regional balance in the development process. It is for this reason that this chapter is organized according to provinces.

REGIONAL DIMENSION OF AGRICULTURAL DEVELOPMENT

The regional dimension of agricultural development considers the development of agriculture in each province with a view to promoting and diversifying agricultural production in accordance with the soil and climatic conditions of each province. It also helps to determine which agro-based industries that use locally produced agricultural raw materials should be established in a given province.

MANICALAND PROVINCE

Manicaland Province falls within Natural Regions I, II, III, IV, and V. Compared to the other provinces, Manicaland has the highest potential for agricultural development. The main agricultural activities in the Province are crop and cattle production. The crops produced include maize, sorghum, groundnuts, rice, sunflower, tea, coffee, cotton, tobacco, wheat, soyabeans, potatoes and a variety of horticultural products. There are well developed irrigation schemes in the Province which are made possible by perennial rivers. There is still potential for the development of additional irrigation schemes and this potential will be examined during the Plan period.

During the Plan period Government will implement several projects in the Province, the most important of which are outlined below.

Middle Sabi III B

The Middle Sabi III B project produces cotton and wheat. It will be extended by 960 irrigated hectares. The canal to bring water to the project area is already in place. Engineering works will be established to service this project.

Small-holder coffee and fruit project

The Small-holder Coffee and Fruit Development Project is designed to improve productivity in the small-scale farming of coffee and fruit starting with Ngorima Communal area. The project includes production of Arabica Coffee on at least 300 hectares with 600 participants in Honde Valley. It also includes cultivation of 100 hectares of pineapples by 300 farmers in Ngorima and 270 hectares of other fruit in Ngorima Valley and Ngarura in Honde Valley.

Rusitu Small-Scale Dairy Scheme

The Rusitu Small-Scale Dairy Scheme is designed to resettle 647 families with adequate facilities for dairy and fodder production, acquisition of crossbred heifers and the development of zero-grazing units.

Pungwe Valley Outgrowers

The Pungwe Valley Outgrowers' Tea Project will develop 1 000 hectares for tea cultivation, with 657 outgrowers. Total green leaf production is set at 6 600 tonnes per annum. It is envisaged that total output of made tea will average 1 400 tonnes per annum.

Buhera District Rural Development Project

The Buhera Rural Development Project is located in the poor, dry and degraded area of the upper catchment area of the Sabi Valley. The project is intended to rehabilitate and reclaim the area through implementation of sound land-use, soil conservation measures, grazing schemes, water supply and other infrastructure, credit and marketing facilities. The project is expected to stabilize physical and ecological conditions and promote higher standards of living through improved livestock production.

Honde/Pungwe Valley Development Project

This project aims at the following:

(i) encourage correct cropping patterns including replacement of cereal crops by three crops, introduction of demonstration farms, increase production of rice, barley, tea and coffee;
(ii) improve livestock management and the draught power situation;
(iii) provide support infrastructure, especially roads, marketing and transport;
(iv) encourage and assist in the development of cooperatives for production and services;
(v) provide credit facilities for productive activities;
(vi) introduce small-scale irrigation schemes using perennial streams; and
(vii) introduce correct land-use patterns.

Musikavanhu Irrigation Development Project

About 1 500 hectares of irrigable land has been identified in the Mahusekwa communal area. About 750 hectares will be irrigated using underground water. The necessary infrastructure, including settlement will be introduced. The rest of the area will have a land-use re-organization programme which will include:

(i) reinforced grazing land management;
(ii) improved crop husbandry; and
(iii) provision of support infrastructure such as roads and marketing facilities.

Nyanyadzi/Nenhowe Irrigation Project

This irrigation project has 424 families supporting a direct population of about 5 000 people and indirectly up to 10 000 people. Increased demand for irrigation in the area has been evidenced by a long waiting list, illegal extension of the irrigated area and illegal abstraction of water upstream of the Nyanyadzi Weir. The project thus seeks to alleviate these problems by putting an additional 150 hectares under irrigation near the Nyanyadzi scheme. The water will be pumped from Odzi River to a night storage dam from which it will be gravitated. 150 new plot holders will be placed on this project (one hectare per family).

Bonde Irrigation Scheme

This project involves the development of 600 hectares for irrigation. The development includes a take-off weir canal and in-field canals, night storage dams, staff housing, access roads and perimeter fencing. The scheme is intended to meet the increased demand for irrigation.

Deure Block "C" Scheme

The project aims at redesigning blocks B and C of the Deure Irrigation Scheme in order to increase agricultural output. It includes the rehabilitation of lined canals, construction of three fish ponds to be integrated with intensive vegatables, poultry and pig production.

Musikavanhu Irrigation

The project which is in Natural Regional V is intended to increase food self-sufficiency and raise the incomes of the people in the Sabi Valley through expansion of irrigation facilities in the Valley. In addition, several bore-holes will be drilled for irrigating 400 hectares.

Nyamaropa Development

The project involves redeveloping Block "A" which consists of 197,3 hectares. The objective is to construct 21 113 metres of lined canals to service the 197,3 hectares.

Chisumbanje Stage I

The Chisumbanje expansion Stage I envisages expansion of the existing Estate and settler area of about 4 000 hectares of flood irrigated land. The project comprises the construction of a pump station on the Save River and main canal to serve 4 000 hectares of flood irrigated land. The irrigation will be implemented in four stages of 1 000 hectares each. Infrastructure will include housing for labour and management, settler housing offices, workshops and sheds.

Tawona Extension

Great demand for land by people in the area has been felt for some time and planned extension is essential to prevent illegal expansion. The project will extend the present irrigated area by 71,64 hectares for settlement of 71 farmers who have no irrigation holdings at present.

New local sales distribution centre in Mutare

The existing complex is no longer viable due to structural degradation and the age of the equipment. The new project will consist of a local sales and distribution complex which will serve the city of Mutare and its hinterlands.

Table 1 below gives details of the capital expenditure for the projects discussed above.

TABLE 1

MANICALAND PROVINCE: CAPITAL EXPENDITURE, 1986-1990 (Z$'000)

Projects	Implementing agency	1986/87	1987/88	1988/89	1989/90	1990/91	Cumulative 1986/87–1990/91
Middle Sabi IIB	ARDA	7 800	1 750	—	—	—	9 550
Smallholder coffee and fruit project	ARDA	900	2 397	1 373	—	—	4 670
Rusitu small-scale	ARDA	2 950	3 170	—	—	—	6 120
Pungwe Valley Outgrowers	ARDA	—	—	2 532	2 148	1 831	6 511
Buhera District	ARDA	—	5 227	5 184	1 907	1 007	13 325
Honde Pungwe	ARDA	—	2 420	2 324	1 700	2 324	8 768
Musikavanhu Irrigation	ARDA/ AGRITEX	—	1 690	2 001	2 048	2 725	8 464
Nyanyadzi/Nenhowe	AGRITEX	1 650	1 205	805	1 000	1 340	6 000
Bonde Irrigation	AGRITEX	—	3 722	2 400	1 800	1 500	9 422
Deure Block "C"	AGRITEX	—	260	350	510	500	1 620
Musikavanhu Irrigation	AGRITEX	—	—	1 920	2 000	1 900	5 820
Naymaropa Development	AGRITEX	200	400	—	—	—	600
Chisumbanje Stage I	ARDA	—	18 505	23 516	12 909	12 742	67 672
Tawona Extension	AGRITEX	81	279	—	—	—	360
New local Sales Distribution Centre in Mutare	C.S.C.	1 038	—	—	—	—	1 038
Mutare Abattoir	C.S.C.	—	50	1 607	1 701	—	3 358
Vumba Coffee Farm	Y.S.C.	81	279	—	—	—	360
Chisumbanje Youth Project	Y.S.C.	10	10	11	10	10	51
Sanyanga Garden	Y.S.C.	11	10	10	10	18	59
TOTAL		14 721	41 374	44 033	27 743	25 897	153 768

New Mutare abbatoir

The project seeks to provide a 100 head per day abbatoir in Mutare to service producers in the Province.

In addition there are three projects for Youth (Vumba, Chisumbanje and Sanyanga Gardens) for production of crops and vegetables.

MASVINGO PROVINCE

Most of Masvingo Province lies in Natural Regions IV and V. Only a small part of the province is in Region III. In other words most of the Province lies in poor rainfall regions in which intensive farming can only be carried out under irrigation.

Mixed farming is dominant in the Province and the main crops include finger millet, bush millet, sugar cane, cotton, maize and groundnuts. Cattle rearing dominates livestock production.

The Province has potential for increasing the production of goats, sheep and pigs. The Province is experiencing population pressure, both human and livestock. As a result marginal areas are increasingly being brought under cultivation and this has led to soil erosion and siltation of rivers and dams.

There are three large scale irrigation estates in the Province namely Triangle Limited, Hippo Valley and Mkwasine. A fourth newly opened irrigation estate is the ARDA Tshovani Scheme. The crops produced under irrigation are sugar cane, cotton, wheat, maize and citrus fruit.

An additional big dam, the Manyuchi dam, will be completed in 1988. The water will be used to irrigate 12 000 hectares of oil palm plantations. In addition to these large-scale irrigation schemes, there are a number of small-scale irrigation schemes which are currently operating efficiently.

Inspite of the arid conditions that prevail in the Province, there is potential for crop diversification through irrigation which would lead to higher levels of output. To this end, schemes such as the Lundi-Tende, Tokwe-Mukosi will be investigated.

Some of the major projects to be implemented during the Plan period are outlined below.

Coordinated Agricultural and Rural Development

The Coordinated Agricultural and Rural Development (CARD) project is intended to improve the agricultural performance of small-scale farmers in Gutu. Various measures which are intended to improve the performance of small-scale farmers have been designed and these include land-use planning, crop development, livestock development, farm technology, horticultural development and provision of agro-services. The key implementing agencies are the District Development Fund, the Department of Water Resources, the Department of Veterinary Services and the Ministry of Health. Coordination will be done by ARDA. It is envisaged that the CARD programme will be extended to the other districts in the Province with the various components of the programmes varied in accordance with prevailing local agro-ecological conditions.

Mkwasine Ranch Irrigation Scheme

The planned Mkwasine Dam is intended to develop the lowveld of Masvingo Province. The area will produce irrigated stockfeed. This project will be a finishing ranch.

Sengwe Cattle Development Project

This project is located in the Chiredzi District. Studies that have been undertaken in this area indicate that the best way of raising the standards of living of people in this dry region is to improve methods of cattle management especially in view of the prevalent overgrazing practices in the area. In this connection, Government will develop ground water systems to open up under-utilized grazing areas. Other programmes will include reclamation of major catchment areas which require a time period beyond the Five-Year Plan period.

Masvingo Province Irrigation Programme for Rehabilitation and Expansion

and output in the region. The basic infrastructure is already in place. For this reason, fifteen low cost irrigation schemes have been identified for rehabilitation and expansion. These include schemes such as Manjinji and many others.

Partial Replacement of Existing Complex

The project provides a partial rebuild of an existing factory complex. The new works will include a slaughter facility with capacity to handle 400 cattle and 200 small animals per day. It will also include a by-product process area, a cold store and hide curing and storage area.

Replacement of Steam Raising Facilities

Boiler House and Steam Raising facilities will be provided at the Masvingo factory in order not to joepardize the preferred layout for the replacement abbatoir.

State Farm development—Sikato

The project consists of Sikato and Ivyland Farms (1 746 hectares). So far, 409 hectares are under irrigation.

Nemamwe Youth Project

The youth project is situated at the Nemamwe Growth Point with a membership of 29 persons. The main agricultural activity is poultry.

Table 2 below gives the capital expenditure for Masvingo Province.

TABLE 2
MASVINGO PROVINCE: CAPITAL EXPENDITURE, 1986–1990 (Z$'000)

Project	Implementing agency	1986/87	1987/88	1988/89	1989/90	1990/91	Cumulative 1986/87–1990/91
Carl (Gutu)	ARDA	1 245	2 144	724	1 904	1 062	7 079
Mkwasine Ranch	ARDA	—	170	603	0	0	773
Sengwe Cattle	ARDA	—	121	307	304	630	1 362
Masvingo Irrigation	ARDA	100	2 816	2 600	2 500	450	8 466
Replacement of Steam Raising-facilities at Masvingo		150	388	—	—	—	538
Masvingo partial replacement of existing complex	C.S.C.	—	2 108	6 006	20 000	39 394	67 508
State Farm Development—Sikato	ARDA	1 560	470	450	544	571	3 595
Chikombedzi Youth Project	Y.S.C.	5	10	3	4	—	22
Nemanwe Youth Project	Y.S.C.	15	10	5	10	17	57
Reppling waters	(L.W.F.)	20	20	20	20	20	100
TOTAL		3 095	8 257	10 718	25 286	42 144	89 500

TABLE 16
PUBLIC SECTOR CAPITAL EXPENDITURE PROGRAMME FOR THE MINING SECTOR
1986/87–1990/91 ($'000)

Project	1986/87	1987/88	1988/89	1989/90	1990/91	Cumulative 1986/87–1990/91
Ky Mine	400	5 000	—	—	—	5 400
Elvington Gadzema Mine	1 000	5 000	—	—	—	6 000
Mutandahwe Tungsten Mine	1 600	1 000	1 000	1 000	—	4 600
Buona Fortuna Mberengwa Gold Belt	1 000	1 000	7 000	8 400	1 000	18 400
Airborne Magnetic follow up	1 500	1 000	600	—	—	3 100
Study on increasing ferrochrome production	1 000	1 000	—	—	—	2 000
Refractory bricks production	50	0	25 000	15 000	—	40 050
Sanyati Copper Queen	1 000	500	5 000	3 000	1 144	10 644
Shamrock	750	500	—	—	—	1 250
Chemutsi	100	500	3 750	700	250	5 300
Industrial minerals follow up	—	1 000	500	500	—	2 000
Plasma smelting	—	25	25	25	—	75
Mimosa platinum	—	—	100 000	50 000	—	150 000
Lab extension	80	126	—	—	—	206
RHA tungsten	—	—	5 000	2 000	2 000	9 000
TOTAL	8 480	16 651	147 875	80 625	4 394	258 025

ENERGY

DEVELOPMENT OBJECTIVES

The development objectives for the energy sector are as follows—

(i) to achieve, as far as possible, self-sufficiency and security in certain types of energy supplies;
(ii) to increase the amount of electricity produced from coal and hydro-power;
(iii) to increase the use of coal, biogas and solar energy so as to reduce the rate of deforestation; and
(iv) to ensure conservation of oil through research and other measures to enable the country to reduce the amount of imported oil fuel.

Progress towards attainment of these objectives is vital to development. The country uses six types of energy which include hydro-power, coal, oil fuel, fulewood, solar power and biogas. Hydropower and coal are available locally and are the main sources of electricity which is widely used in urban areas as the key source of energy in production and lighting. A small amount of electricity is imported to supplement domestic output. Oil fuel is all imported and is largely used by the transport sector. Fuel wood is used primarily in rural areas for domestic purposes. Biogas and solar energy are still in the early stages of development.

Employment is expected to reach 7 000 by 1990. Approximately $1 197 million will be invested in the sector during the same period.

PROGRAMMES AND PROJECTS

The programmes and projects outlined below will be implemented during the Plan period.

Power generation

The development of the energy sector is an on going process. In order to meet the rising demand for electricity, Government has embarked on an expansion programme which includes construction of a thermal power station at Hwange with an installed capcity of 920 MW. This station will cost $850 million most of which will be foreign loans. Further development to meet the country's demand in electricity will include the extension of Kariba South Power Station which will include two additional generators of 150 MW each.

In addition to the Kariba South extension, the generators at Kariba will be refurbished and rewound to provide long term reliability. The rehabilitation of the power station will also allow an increase in rating of the two generators from 111 MW to 125 MW each. The programme will commence in the last years of the Plan period and will be completed during the next Plan period. There will be an on-going programme to rehabilitate, where necessary, the transmission and distribution network country-wide.

Transmission

The transmission programme will continue in both urban and rural areas. Nearly all provinces will be covered, including the Harare and Chitungwiza areas. The projects to be undertaken in the provinces will differ in nature. Some will involve construction of new transmission lines mostly in rural areas while others will require an increase in the number and capacity of lines for higher voltage. About 18 rural areas will be covered during the Plan period.

Four additional lines will be constructed in the eastern provinces of Manicaland and Masvingo to provide adequate supplies to expanded projects such as the Chisumbanje sugar cane ethanol plant.

The Zimbabwe Electricity Supply Authority plans to spend about $198,0 million on transmission projects during the Plan period.

Rural Energization Programme

The rural energization programme which is a combination of different types of energy such as electricity, solar energy, biogas, fuelwood and coal is intended to provide energy for rural development. The programme will promote the development of cheaper types of energy. In addition a study called Rural Electrification for Low Income Groups (Relig) is underway. The purpose of the study is to identify cheaper types of energy. The study will cost about $1,2 million. In order to concretise the rural energization programme, rural energy centres will be established for demonstration purposes as well as for training local people in the installation and maintenance of rural energy systems.

Liquid Fuels

Although there are no known oil and gas deposits in Zimbabwe, exploration for possible occurrence of natural gas and other hydro-carbons is being carried out by Government in the Zambezi and Sabi-Limpopo Valleys. Government is also carrying out a feasibility study for the construction of a new Oil Refinery. The former oil refinery at Feruka near Mutare, closed since 1966, has been converted into a large oil depot for storing refined products transported via the Beira–Mutare pipeline. Government was initially keen to reopen this refinery to reduce dependence on South Africa for refined oil imports. A technical study on the feasibility of reopening the refinery showed that it would be too costly to reopen the refinery.

It is Government policy to ensure that the country has adequate petroleum products or substitutes. In this connection the necessary measures are being taken to increase internal storage and transportation facilities. However, in order to reduce fuel imports, Government has initiated research into the manufacture of diesel extenders.

Energy Database

During the Plan period, a national energy database will be established for purposes of centralizing energy data in order to assist in the planning of the energy sector as well as in supplying energy statistics when required. The proposed database project will be implemented in two phases. Phase I will cover a period of two years and will include activities such as data collection, data processing and programming. This phase will also cover preparation of energy audits for those sectors that show high energy consumption. Ultimately, the audits will indicate areas in which energy can and should be conserved.

Phase II will cover mathematical treatment of data to produce various planning options for the national energy sector.

Zimbabwe and Botswana Interconnector

Plans are underway to construct an interconnector between Zimbabwe and Botswana. This project will be undertaken within the framework of SADCC and will be completed within the Plan period at an estimated cost of US$38,0 million. Zambia already has similar connections with Zimbabwe.

The following Tables 17 and 18 give details of programmes and projects to be implemented during the Plan period.

TABLE 17
($'000)
PUBLIC SECTOR EXPENDITURE: ENERGY SECTOR, 1986/87–1990/91

Item	1986/87	1987/88	1988/89	1989/90	1990/91	Cumulative 1986/87–1990/91
Kariba South Extension	—	50 000	75 000	100 000	25 000	250 000
Rehabilitations	3 772	19 400	31 900	18 120	2 315	75 507
Hwange 7 and 8	—	—	10 000	70 000	301 000	381 000
Normal transmission consumer services	7 493	106 057	32 548	26 516	25 771	198 385
Distribution	7 350	11 754	11 044	8 330	536	39 014
Rural energization	23 429	31 565	3 328	34 080	—	92 402
Other projects	52 910	6 000	1 550	1 000	—	61 460
Transport	20 819	20 171	1 800	2 277	500	45 567
Tools and equipment	—	525	310	280	—	1 115
Buildings	9 300	4 462	2 284	3 016	3 346	22 408
Training and technical assistance	205	14 053	9 190	6 402	268	30 118
TOTAL	125 278	263 987	178 954	270 021	358 736	1 196 976*

* Refers to ZESA's own resources of about $355,751 million and $841,245 million foreign loans.

TABLE 18
GOVERNMENT EXPENDITURE ON ENERGY PROJECTS FOR 1987/88–1990/91 ($'000)

	1987/88	1988/89	1989/90	1990/91	Cumulative 1987/88–1990/91
Rural					
Afforestation, Rural and National	70	50	80	—	200
Woodstoves, Rural and National	100	80	40	—	220
Coal					
Utilization, Rural	225	140	135	—	500
Biogas energy, Rural and National	125	105	75	—	305
Solar energy, Rural	2 137	2 057	1 048	—	5 242
Relic study, Rural and Urban	55	3	15	15	88
Establishment of National Database,	40	242	120	—	402
Development of Rural Areas Service Centres	141	111	111	111	474
TOTAL	2 893	2 788	1 624	126	7 431

NATURAL RESOURCES

Natural resources are the backbone of all material production activities in the economy. Non-renewable resources exist in finite quantities and as such, their time-usefulness to society can only be extended through optimum exploitation and economical usage. Renewable resources, on the other hand, depend for their continued existence on careful nurturing and usage by society. In this respect, the future of productive activity in the country rests on planned optimum utilization and management of both renewable and non-renewable resources. Whilst planners and scientists have the principal task of defining the correct balance between development and environment, the ultimate responsibility for the maintenance of this balance rests on all citizens, urban and rural alike.

The objectives of the sector include the following—

(i) ensuring selfsufficiency in all timber products including building timber, furniture, pulp and paper and fuelwood;

(ii) curbing soil erosion and soil loss and the resultant siltation of dams and rivers and general environmental degradation so as to maintain soil and watershed protection;

(iii) instilling popular awareness of the need for soil, flora and fauna conservation for the benefit of the present and future generations;

(iv) bringing benefits of wild game parks and other natural resources to the people living in and around game parks in an organized way, which will help control poaching of protected wild life whilst increasing the standard of living of the people;

(v) promoting the planting of fast growing indigenous and foreign tree species in rural afforestation and re-afforestation projects; and promoting cooperation with SADCC countries in the development of forestry, manpower and all environmental issues.

DEVELOPMENT STRATEGY

In order to fulfil the above objectives, active mass participation in conservation awareness projects falling under the national conservation strategy shall be encouraged in all provinces. For the projects to continue to have popular appeal and support, the projects should produce direct benefits to the relevant community. In this respect, the Communal Area Management Programme for Indigenous Resources project (Project CAMPFIRE) is most appropriate as it seeks to ensure that communities conserve natural resources in their area since the revenue from their harvest will be distributed among them, thus giving them a stake in the utilization and management of the resources. If successful, this project will raise the standards of living of the communal people as well as the contribution of the sector to gross domestic product. Communal game ranching and the gully reclamation programme will form vital components of the CAMPFIRE project.

The National Tree Planting Day which places emphasis on the communal woodlot approach will continue to be observed nationwide and people will be encouraged to increase the time they allocate to tree planting as a strategy for increasing the rate of afforestation and, therefore, availability of timber and fuelwood for domestic use. For the latter case, woodlots are particularly important since cheap alternative sources of energy have not yet been fully developed.

Indigenous tree species should also be made available for woodlot projects during the Plan period especially that research in this area is an ongoing process. To complement this programme, agroforestry will be encouraged for individual tillers of communal plots as a way of increasing greater peasant interest in rural afforestation.

The regional effort at attaining optimum use of commonly shared natural resources in the Zambezi River system has now reached an advanced stage with the adoption by the SADCC of the "Action Plan on the Management of the Zambezi River Basin". Implementation of this project will contribute towards the policy of availing the benefits of natural resources to the people living in the areas in which the resources exist which is also the objective of Project CAMPFIRE referred to above.

As a matter of policy, there will be greater cooperation between the Forestry Commission which deals mainly with forestry and the Department of National Parks and Wild Life Management which looks mainly after the nation's wild game heritage. Playing acomplementary role to both is the Department of Natural Resources which deals with environmental protection.

Successful implementation of the plans of these agencies will depend on the extent to which they educate the people.

INVESTMENT PROGRAMME

The 1986/87–1990/91 total investment programme for the natural resources sector which is detailed below amounts to $129,8 million and is almost equally divided between the Forestry Commission and the Department of National Parks and Wild Life Management.

Forestry Commission

The Forestry Commission will implement a number of projects. Some of the projects are on-going, implying that there will be no limited life span to the projects.

The projects which will be implemented by the Commission will include the following: conservation and maintenance of indigenous forests, mainly on state land in Matebeleland; the urban forest nurseries project in Harare and Gweru; forestry research activities, including research in multiple purpose trees (refer to the forestry section in the Science and Technology chapter); provision of additional facilities to promote skilled manpower development through training at the Zimbabwe College of Forestry. A Forest Industry Centre will be established for this purpose (refer to Human Resource Development Chapter); purchase of land for plantation development; rural afforestation projects; establishment of a Regional Seed Centre; dry zone afforestation; establishment of a timber testing and utilization Laboratory in Mutare; research into the use of hardwoods for fuelwoods; equipment for various facilities including timber harvesting; and saw milling and earthmoving.

Trading activities will include plantation development and timber harvesting in plantations under the Commission's management as well as wild honey harvesting. Plantation development in Manicaland and near Mvuma in the Midlands will include planting of 10 000 hectares of softwood and hardwood

plantations to help meet the country's requirements for both types of wood and the requirements of the proposed pulp and paper mill. The purchase of additional softwood plantations is expected to complement construction of the pulp and paper mill.

The investment plan for the Forestry Commission is shown in the table below.

TABLE 19

TRADING ACTIVITIES: CAPITAL EXPENDITURE 1986/87–1990/91 ($'000)

Projects	1986/87	1987/88	1988/89–1990/91	Cumulative 1986/87–1990/91
Plantation development	3 000	1 163	12 211	16 374
Fixed assets for plantation development	800	2 423	5 290	8 513
Fixed assets for trading activities	600	2 301	8 697	11 598
Saw milling and other machinery	—	1 500	3 250	4 750
Earthmoving equipment	—	300	—	300
Purchase of softwood plantations	—	500	—	500
Purchasing logging skidders	—	130	290	420
Purchasing logging trucks	—	346	798	1 144
Communication system	—	—	405	405
Chimanimani sawmill	—	—	14 100	14 100
Access road	—	—	180	180
Agricultural development	—	353	1 162	1 515
Wild honey harvesting	—	72	68	140
TOTAL	4 400	9 088	46 451	59 939

Department of Natural Resources

The Department of Natural Resources will increase its activities in environmental protection awareness through mass meetings and workshops in communal areas and through community based gully reclamation projects. This will be done in close collaboration with Agritex.

Table 20 below shows details of the department's five-year investment programme.

TABLE 20

DEPARTMENT OF NATURAL RESOURCES: CAPITAL EXPENDITURE 1986/87–1990/91 ($'000)

Projects	1986/87	1987/88	1988/89–1990/91	Cumulative 1986/87–1990/91
Gully reclamation	—	90	180	270
Environmental monitoring	—	120	—	120
Control of exotic water weeds	—	45	—	45
TOTAL	—	255	180	435

The Department of National Parks and Wild Life Management

The Department will implement programmes and projects designed to protect and preserve the country's wild life heritage which is also an important tourist attraction; commercial exploitation of the wild life; and promotion of commercial game ranching by peasants which will help curb poaching in National Parks. Table 21 below shows the capital expenditure programme for the Department for the Plan period.

TABLE 21

NATIONAL PARKS AND WILD LIFE MANAGEMENT, CAPITAL EXPENDITURE 1986/87–1990/91 ($'000)

Project	1986/87	1987/88	1988/89–1990/91	Cumulative 1986/87–1990/91
Head Office complex	750	850	24 400	26 000
Zambezi Rhino rescue	577	1 303	—	1 880
Housing	50	200	8 150	8 400
Modification house	100	55	595	750
Aquaculture	—	—	1 790	1 790
Various facilities	500	700	3 083	4 283
Chizarira Camp reconstruction	80	285	675	1 040
Communication system	186	364	1 450	2 000
National Parks electrification	136	264	600	1 000
Laboratory equipment	—	216	166	382
Sebakwe Camp reconstruction	10	700	270	980
LKFRI vessel*	—	125	0	125
Field labs, workshop and coldroom	84	—	517	601
Patterns and demands of outdoor recreation	13	10	83	106
Glen Eagle Estate	—	1 758	5 189	6 947
Zambezi Valley development	—	3 340	5 445	8 785
CAMPFIRE**	—	1 130	2 120	3 250
Aircraft for control of problem birds	—	500	—	500
Aquadozer (weed control)	—	330	—	330
Hwange game water supply equipment	—	200	100	300
TOTAL	2 486	12 340	54 623	69 449

** Communal Area Management Programme for Indigenous Resources.
* Lake Kariba Fisheries Research Institute.

WATER RESOURCES

DEVELOPMENT OBJECTIVES

The primary objective of Government in the water resources sector is to develop adequate water supplies for agricultural, industrial and domestic purposes, with special emphasis on communal areas requirements.

Table 22 below shows the annual average rainfall for seven consecutive seasons, 1980/81 to 1986/87.

TABLE 22

Year	Rainfall
1980–1981	870 mm
1981–1982	440 mm
1982–1983	403 mm
1983–1984	464 mm
1984–1985	746 mm
1985–1986	703 mm
1986–1987	421 mm

Apart from low annual average rainfall and considerable year-to-year variation, the country experiences uneven rainfall distribution. Some northern parts of the country and most of the eastern areas receive more rainfall than the western and south western parts of the country. In the south-west rainfall varies between 350 mm and 700 mm, with some low lying areas receiving less than 250 mm. The country also experiences frequent drought periods. As shown in the table, four of the seven seasons were drought years.

The north eastern mountain areas receive 700 mm to 1 000 mm, with some eastern highlands experiencing rainfall in the range of 1 000 mm to 2 000 mm.

DEVELOPMENT PROGRAMME

In order to fulfil the development objective of the sector, Government is engaged in the construction of water conservation works, major water supply schemes and rural water supply schemes. Studies for the development of surface and underground water are also underway.

Construction of water conservation works

Government is engaged in the construction of dams to supply water for industrial, agricultural and consumption purposes. Table 23 below gives the planned capital expenditure for the conservation works.

TABLE 23
CAPITAL EXPENDITURE: CONSERVATION WORKS
1986/87 — 1989/90 ($'000)

Expenditure during year: 1986/87	1987/88	1988/89	1989/90	Cumulative expenditure 1986/87–1989/90
18 275	20 060	25 075	28 344	91 754

The above allocations include expenditure for on-going dam construction, the raising and betterment of dams as well as construction of new ones.

Dams for Urban, Industrial and Mining purposes

The following projects will be implemented during 1986/87. The Sebakwe Dam will be raised at an estimated cost of $20,08 million to augment water supply for the Kwekwe/Redcliff area; the Clifton Off River Storage Dam will be completed to provide water to Chegutu town; the Rufaro Dam will be built to augment water supply for Marondera; and the Bangaza Dam will be completed to augment water supply for Chipinge town. Other dams which will be completed include Mangwe Dam at Plumtree and Chimanda Dam at Chimanda Growth Point in Mashonaland Central Province.

During 1987/88 a number of dams will be built to provide water for agricultural and drinking purposes. The dams to be constructed are shown in the table below.

Dam	Cost ($m)
Ngezi Dam, Mashonaland West	22,4
Shashani Dam, Matebeleland South	13,0
Siwaze Dam, Matebeleland South	5,9
Murambinda Dam, Manicaland	2,0
Mondi Mataga Dam, Midlands	8,0
Mahusekwa Dam, Mashonaland East	2,6
Hollins Block Dam, Matebeleland South	2,4
Lungwala Dam, Matebeleland North	5,0

Irrigation Development

Irrigation plays a crucial role in the development of agriculture in the country, especially in the production of winter crops and in overall farming in drier parts of the country.

In this connection, several dams will be built whose primary function will be provision of water for irrigation. The most important of these dams are listed below.

Dam	Cost ($m)
Mazikadei, Mashonaland West	38,6
Mwenje, Mashonaland Central	5,6
Osborne, Manicaland	47,0
Dande, Mashonaland Central	19,3
Manyuchi, Masvingo Province	2,8

Other Dams

The Manyame and Shamva Balancing Dams will be completed during the Plan period and will help increase irrigation capacity in the areas in which they will be built.

Other dams such as the Moza, Biri, Insukamini and Hama will also be completed during the Plan period.

These dams will enhance irrigation in the communal areas in which they are situated.

Some dams will be raised to increase their water storage capacity. This programme includes the Kalope, Roswa, Neshuro, Sivole Sadza and Madabe.

Future dam construction projects being contemplated include Mkwasine in Masvingo. Gates for Claw and Mayfair Dams, Bindura Dam, Lions Head Dam, Tok wane Dam, Jumbo Dam, Munyati Dam and Silverstroom Dam.

Construction of Water Supply

A number of major water supply schemes will be completed during the first half of the Plan period. These include: Karoi, Murombedzi, Hwange, Shamva, Marondera Prison, Ngezi-Mamina, Mashumbi Pools, Mlezu Silobela Administration, Mabasa, Mataga, Mutimurefu, Ngundu, Nyanga, Birchenough Bridge, Nyanyadzi, Muzukomba, Tongwe and Silobela Extensions. Major water supply schemes such as Banket, Sadza Uprating, Trelawney Chizou R.S.C., Goromonzi School, Ndanga, Nyika, Dunga uprating Cross Roads, Murambinda, Mabasa uprating, Kariba Airport, Ntabazinduna, Inyati, Mangwe Police, Tsholotsho and Hauna will be constructed during 1988/89.

Rural Water Supply

The main objective of the rural water supply programme is to provide the rural masses with adequate, safe and accessible water. In assessing the demand, however, close attention will be paid to the potential for livestock watering and small irrigation schemes in order to stimulate food production and raise incomes of rural people. The National Water Master Plan for Rural Water Supply and Sanitation was prepared as part of the strategy for attaining the objective stated above. The Plan envisages a long term strategy for providing portable water within walking distance of thepopula tion in communal and resettlement areas.

In line with Government's policy, Community participation, particularly participation by women, will be crucial in the planning, implementation and maintenance of rural primary water supply programmes.

In view of recurrent droughts, Government will provide more resources for the development of techniques for forecasting droughts. It is necessary to provide a network of boreholes and deep wells to complement each other in order to make adequate water available to communities during drought periods. Wherever it is considered expedient, piped water supplies will be provided. Government has observed in many cases that rural water schemes become non-operational because of inadequate maintenance. There is, therefore, need to give maintenance and operation the highest consideration in planning and implementing rural water supply schemes.

Table 24 below shows the expenditure for the water supply schemes for the years 1986/87-1989/90.

TABLE 24

INVESTMENT IN RURAL WATER SUPPLY SCHEMES FOR THE PERIOD 1986/87–1989/90 ($'000)

Expenditure to 30/6/87	1987/88 allocation	1988/89 estimated expenditure	1989/90 estimated expenditure	Cumulative 1986/87–1989/90
16 350	14 648	18 310	22 888	72 196

Investigations

Investigations, including hydrological and geohydrological for surface and ground water development are essential activities. Hydrological investigations are on-going activities which provide information for planning in the development of water resources. A network of 334 recorder stations and 211 gauge post stations provide regular hydrological data throughout the country. Sediment transport and sedimentation in reservoirs are also being investigated.

Investigation on ground water is also an on-going activity throughout the country. Efforts are underway to assess the ground water potential in the country. Investigations on Basement Aquifer, Gokwe Aquifer, Umboe Aquifer and Kariba South are a continuing process. Drilling operations for this purpose are underway in Lupane, Nkai and Nyamandhlovu.

In addition to hydrological and hydrogeological investigations, other regular investigations carried out on Dams and Water Supply Schemes will continue. Dam safety and water Pollution Control are also permanent features of the regular investigation programme. About $16,5 million will be spent on investigations during the Plan period.

DEVELOPMENT OF WATER RESOURCES ACCORDING TO PROVINCES

MASHONALAND EAST PROVINCE

The main annual rainfall in the Province ranges from 1 100 mm to approximately 650 mm.

Urban areas in the Province have adequate supplies of drinking and industrial water.

Piped water supplies and primary water supplies using boreholes and wells are being constructed in the Province to meet the water requirements of people in communal areas. Piped water supply schemes are recommended for resettlement schemes where people are grouped.

The dam construction programme includes the following:

Dam	*Cost* ($m)
Wedza	1,6 (completed)
Rufaro	4,8 (completed)
Mahusekwa	1,25
Longlands	7,5
Mudzi	0,5

MASHONALAND WEST

Rainfall in the province has a tendency to decrease northwards due to the fact that most of the rain is relief, with the highest totals recorded along the highveld. The northern part of the province is in the rain shadow except for occasional rains on the windward side of the mountain range. Agricultural activity in this northern portion relies on irrigation and hence the need to develop and construct water supply systems.

Many boreholes have been sunk, especially at district and rural service centres but these are far from adequate because many of them are of low yield and are not fully equipped.

A number of potential dam sites have been identified in the Province. However, further investigations are required to determine the feasibility of each of the sites.

The dam construction programme for the Province includes the following:

Dam	*Cost* ($m)
Clifton O.R.S.	3,6 (completed)
Manyame Balancing Dam	2,1 (completed)
Ngezi	22,5
Claw Dam Gates	4,7
Mhondoro Dams (3)	5,1

MASHONALAND CENTRAL

The Province has reliable and adequate rainfall. Many boreholes have been drilled to provide primary water supplies to the plateau area, especially in communal areas. In the valley, water supplies from underground sources have proved to be unreliable but recent geophysical tests carried out in the area have shown that potential exists for the development of underground water supplies in areas associated with alluvial materials.

Although there are many dams and boreholes in the Province, a lot more need to be constructed to provide water supplies to communal farmers and service centres in order to meet the requirement of the international Drinking Water Supply and Sanitation Decade to which Government is committed.

So far, the water resources development programme in the Province has not put sufficient emphasis on the provision of water for irrigation, particularly in the small scale commercial and communal farming areas. Necessary measures will be taken to improve the situation.

Mwenje Dam and Shamva Balancing Dam will be completed during the Plan period at an estimated cost of $5,64 million and $0,938 million, respectively. Mwenje Dam is designed to increase irrigation capacity in the Bindura area while Shamva Balancing Dam will balance the releases of ministerial water from Mwenje Dam and consequently avoid loss of water as well as ensure adequate storage reserve for Shamva water supply during periods of drought.

The following dams will be constructed in the Province during the Plan period:

Dam	*Cost* ($m)
Chimanda	1,4
Dande	19,3
Bindura	25,8
Lionshead	18,0
Silverstroom	18,0
Jumbo	23,4
Concession	12,0

MATEBELELAND NORTH PROVINCE

Water is of great significance in this province as the rainy season is generally short and the distribution of precipitation uneven. The shortage of water in the Province has constrained development in most areas.

It is, therefore, essential that the available water sources be developed systematically and utilized efficiently.

There is potential for developing surface water systems in the Bubi and Lupane districts.

Investigations are underway in the Nyamandhlovu and Lupane districts to determine the feasibility of developing ground water sources. These projects will examine the possibility of providing primary water supplies such as protected wells or boreholes for basic domestic use by rural communities and for water for livestock. In areas where ground water is not available, water will be provided from a treated surface supply through piped water systems.

The projects also include provision of water for irrigation schemes in the form of small, medium and large dams. Some of the large dams will have a dual purpose in that they will provide water for industrial, mining and rural resettlement service centres.

About 25 per cent. of the land in the Province is fertile and thus has potential for cultivation but cannot be used due to insufficient water, particularly in areas north of Lupane. The Tsholotsho irrigation scheme, which is the largest of the eight communal land irrigation schemes in the Province, can be expanded from the current 573 hectares to 4 000 hectares if additional water were available.

The Silalabuhwa Dam on the Insiza River was built in 1967 with storing capacity of 23,4 million cubic metres and is used for irrigation. Inspection of the dam over the past two years has revealed potential weakness in the abutments. Thus, strengthening of the thrust zones will be done to ensure the safety and future serviceability of the dam.

A number of dams will be built during the Plan period and they will include:

Dam	*Cost* ($m)
Kalope	1,5
Lugwala	2,7
Silalabuhwa (strengthening)	0,25

MATEBELELAND SOUTH PROVINCE

The Province lies in the dry natural regions of the country and has shallow infertile soils. The development of water resources in the Province is a prerequisite to the exploitation of the mineral resources in the Province, improvement of agricultural production, establishment of industries based on

mineral resources, expansion of towns and the transformation of rural areas. This because of persistent droughts, water shortage has become the greatest constraint to overall development of the Provinces. A number of dams have already been built to alleviate the situation. Other dam projects to be undertaken during the Plan period are as follows:

Dam	*Cost* ($m)
Mangwe	3,8
Shashani	13,0
Siwaze	5,0
Madabe Raising	1,6
Hollin's Block	2,4
Sivule	0,72
Mayfair Gates	3,6
Shobi	37,4
Bert Knott	3,9
Mtshabezi	10,0
Mwanakaridza	21,5

MANICALAND PROVINCE

During normal years, Manicaland Province receives the highest rainfall in the country. The Province also has many perennial rivers. For these reasons, the Province has great potential for irrigation schemes, especially along the east and west banks of Save River. Communal wells and boreholes, piped water supply, irrigation schemes and dams have been constructed in the Province. However, this has not exhausted the potentital for further development of water resources. In this connection, Government will increase the rate of exploitation of these resources.

The primary water supply programme which is intended to provide safe drinking water for all communities will be pursued during the Plan period. The water supply programme will include installation of water supply systems at Growth Points and Service Centres. Twenty seven Growth Points and Service Centres and four Resettlement Centres will be serviced. A complementary programme which includes a three tier pump maintenance system will involve communities in the maintenance and rehabilitation of their water points. This is intended to reduce Government's responsibility for community water supplies as well as operating costs.

The dam projects which will be implemented in the Province during the Plan period include the following:

Dam	*Costs* ($m)
Osborne	49,0
Chitowe	150,0

MIDLANDS PROVINCE

About 99,0 per cent. of the Province lies in Natural Regions III, IV and V. Surface water in the Province is not reliable. The main thrust of water resources development in the Province is therefore on the development of large-scale water supply systems and boreholes. The Province has several dams for irrigation purposes. There is, however, need to increase the number of water sources in order to increase agricultural activity. The following are dams under construction or planned for construction during the Plan period:

Dam	*Cost* ($m)
Biri	1,4
Hama	4,94
Insukamini	5,57
Sadza Raising	0,15
Modi Mataga	9,0
Swenoro Dam Raising	13,2
Murezu	2,5
Mtanke	4,0
Sungai	1,5
Musipane	1,92
Lower Damba	2,45
Hozori	10,0

MASVINGO PROVINCE

The Province lies in low rainfall areas. There are few perennial rivers in the Province. Groundwater provides most of domestic water supply in communal areas. The geology is unfavourable for good borehole water yield.

During good rainy seasons, sufficient water is available for domestic use in communal areas. In order to make certain that adequate supplies of water are available, additional water sources will be built. Emphasis will be placed on drilling of wells for domestic water supplies in communal areas because of their low unit cost.

The major dams to be constructed in the Province during the Plan period are listed in the table below.

Dam	*Cost* ($m)
Manyuchi	38,0
Mushwe/Mashava	6,35
Roswa	1,5
Neshuro	0,3
Mbindangombe	1,3

TOURISM

Tourism is not only an earner of foreign currency and a sector with great potential for increasing employment; it is also a source of national pride. During the Plan period, Government, thorugh the Zimbabwe Tourism Development Corporation (ZTDC), will develop tourism for the local people and foreign visitors. Z.T.D.C. also intends to establish its offices in all the Provinces. It will also increase its capital investment so as to expand as well as improve facilities in the sector.

The investment programme for the tourism sector is estimated at $33,643 million for the Plan period. Table 25 below provides details on the investment programme for the sector.

TABLE 25

TOURISM: CAPITAL EXPENDITURE 1986/87 — 1990/91 ($'000)

	1986/87	1987/88	1988/89	1989/90	Cumulative 1986/87–1989/90
Purchase of:					
Rainbow Hotel	—	1 150	—	—	1 150
Mtirikwi Lakeshore Lodge	—	390	—	—	390
Hunting equipment	—	0	1 000	—	1 000
Hotels					
A'Zambezi	250	—	—	—	250
Ambassador	100	—	—	—	100
Tours Operation	120	340	300	300	1 060
Office and training equipment	77	—	—	—	77
Hotel and Conference Centre	—	193	—	—	193
Expansion of:					
Christmas Pass Hotel	—	100	—	—	100
Victoria Falls Conference Centre	—	—	—	2 000	2 000
Construction of:					
Hot Springs Resort	—	—	100	—	100
300 Room Hotel, Harare	—	—	10 500	6 000	16 500
50 Room Hotel, Kariba	—	—	—	3 000	3 000
Chalets and Lodge, Kariba	—	—	700	—	700
Binga Hot Spring Complex	—	—	—	1 000	1 000
Victoria Falls Office Building	—	—	23	—	23
Joint Venture projects	—	—	2 000	2 000	4 000
Accommodation in National Parks	—	—	1 000	1 000	2 000
TOTAL	547	2 173	15 623	15 300	33 643