New Partnership for
Africa's Development (NEPAD)

Comprehensive Africa Agriculture
Development Programme (CAADP)

Food and Agriculture Organization
of the United Nations

Investment Centre Division

GOVERNMENT OF THE REPUBLIC OF MOZAMBIQUE

SUPPORT TO NEPAD–CAADP IMPLEMENTATION

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Volume III of V

BANKABLE INVESTMENT PROJECT PROFILE

Small Dams Rehabilitation/Construction Project

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MOZAMBIQUE: Support to NEPAD–CAADP Implementation

Volume I: National Medium–Term Investment Programme (NMTIP)

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NEPAD–CAADP BANKABLE INVESTMENT PROJECT PROFILE

Country: Mozambique

Sector of Activities: Irrigation Development

Proposed Project Name: **Small Dams Rehabilitation/Construction Project**

Project Location: Gaza, Inhambane, Sofala, Manica, Tete and Nampula Provinces

Duration of Project: 5 years

Estimated Cost:
Foreign Exchange ..... n/a
Local Cost..... n/a
Total ..... US$30.0 million

Suggested Financing:

Source	***US$ million***	***% of total***
Government	3.0	10
Financing institution(s)	26.7	89
Beneficiaries	0.3	1
Private sector	–	–
Total	***30.0***	***100***

MOZAMBIQUE:

NEPAD–CAADP Bankable Investment Project Profile

"Small Dams Rehabilitation/Construction Project"

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Abbreviations

ARA	Regional Water Administration
CAADP	Comprehensive Africa Agriculture Programme
CRA	National Water Council (*Conselho Nacional de Águas*)
DNA	National Directorate of Water Affairs (*Direcção Nacional de Águas)*
DNE	National Directorate for Energy
DPOPH	Provincial Directorate of Public Works and Housing
FIPAG	*Fundo de Investimento e Património do Abastecimento de Água*
IDA	International Development Association
ITCZ	Inter Tropical Convergence Zone
MADER	Ministry of Agriculture and Rural Development
MIREME	Ministry of Mining and Energy
MOPH	Ministry of Public Works and Housing
NEPAD	New Partnership for Africa's Development
NWD1	First National Water Development Project
NWP	National Water Policy
PCU	Project Co–ordination Unit

I. PROJECT BACKGROUND

A. Project Origin

I.1. The *Ministry of Public Works and Housing* through the *National Directorate of Water* (MOPH/DNA) has prepared the project for rehabilitation and construction of small dams and weirs (small water management infrastructure), which were affected by severe floods and/or the civil war. The overall objective is to ensure adequate water supply for human consumption, livestock and small–scale irrigation. It is intended to gradually achieve the1975 coverage level, which was of about 600 small dams. The project will firstly be implemented in six out of the ten provinces of Mozambique that are usually affected by severe droughts.

I.2. The project has been developed in accordance with the sector policy of provision of water for public use and irrigation purposes, which ultimately contribute to poverty alleviation, and socio–economic development of the country as a whole.

B. General Information

I.3. Mozambique is situated on the southern part of the East African coast between approximately 11º and 27ºS latitudes with a surface area of 799,380 km^2 and a 2,500 km coastline. These latitudes are susceptible to the development of tropical cyclones that originate over the warm waters of the Indian Ocean and track south–westwards across the Mozambique Channel producing widespread heavy rainfalls, high winds and associated floods. Cyclone incidences and severity are linked to the *La Niña* phenomenon, just as deficiencies of rainfall are often linked to *El Niño*. Seasonal movements of the *Inter Tropical Convergence Zone* (ITCZ) also influence the country.

I.4. Mozambique is highly vulnerable to disasters caused by climatic irregularities. In recent years it has seen frequent droughts, floods and cyclones causing negative impact on the country's economic and social development. The most significant of these disasters were the 1981–1984; 1991–1992; 1994–1995 droughts and the floods of 1977–1978; 1985, 1988, 2000 and 2001. In fact, floods and droughts are part and parcel of the rivers of the region. Mozambique needs large reservoirs for an efficient and more intensive use of the available surface water resources.

I.5. The country borders Tanzania to the north, Malawi, Zambia, Zimbabwe, South Africa to the west, Swaziland and South Africa to the south and the Indian Ocean to the east.

I.6. Mozambique has a population of about 18.9 million of which an estimated 70 % lives below the poverty line. The population yearly growth rate is estimated at about 2%.

I.7. Mozambique is riparian to nine of the fifteen international river basins in the SADC region. The rivers are the country's main water resource, of which more than 50% originate from upstream riparian countries. The country is extremely vulnerable to both lack of water during dry periods and to excess discharges during peak flows.

C. Climate

I.8. Mozambique is located between the intertropical and subtropical zones of the Southern Hemisphere; and is subjected to four main factors of atmospheric circulation:

- the position of the Southern Intertropical Front;

- anti–cyclones of the South Atlantic and Indian Oceans;
- depressions of the thermal origin during the hot season; and
- tropical cyclones over the Mozambique Channel.

I.9. Four types of climate can be distinguished in Mozambique:

- humid moderate, in upland areas
- rainy tropical, in most of the north of the country and in the coastal area south of the Save river;
- dry savannah, in most of the area south of the Save, and in Tete province (south of the Zambezi river);
- dry desert, in most of the inland areas of Gaza province.

I.10. There is a great variation in rainfall between the north and south of the country, and between coastal and inland areas. Along the coastal strip, mean annual rainfall is in the order of 800 to 1,000 mm. South of Pemba there is a reduction to below 800 mm, and between Beira and Quelimane, the figure is higher than 1,200 mm.

I.11. Because of the influence of the Northeast monsoon, which affects the north and the centre of country, and the influence of the high altitude, this area has mean annual rainfall of 1,000 to 2,000 mm, except in the region between Tete and Chemba, where just 500 to 600 mm of rainfall occurs in average annually. The rainy season, which is a hot and wet period, runs from November to March, and is followed by a dry and relatively cold season between April and October.

D. Water Resources

I.12. Most of Mozambique's rivers run from west to east, draining water from the high plateaux of central Africa to the Indian Ocean. With the exception of small rivers that drain in the coastal areas, most of the rivers have a torrential regime, with high levels of water for three or four months and reduced flows for the rest of the year, in accordance with the rainy and dry seasons.

I.13. The surface waters are the country's main water resources. Mean annual runoff is estimated at 216,000 million cubic meters (Mm^3), of which only 100,000 Mm^3 originate form rainfall inside Mozambique. The remainder originates from upstream countries, which is the reason that the inflow figure has been falling with the increased use of water in these countries.

I.14. In Mozambique, the availability per capita of surface water resources is currently about 5,556 m^3/per inhabitant/year, taking into account only the runoff generated in the country, or 12,000 m^3/inhabitant/year, including the flows from neighbouring countries. Both these figures, however, are constantly declining, due to the reduction in the flows from countries upstream. Should there be no further decline in the flows from countries upstream, and with the population growth, it is estimated that by year 2017 these figures will have fallen to just 3,227 and 6,970 m^3/inhabitants/year.

I.15. Compared with other parts of the world, Mozambique has a shortage of water. In Mozambique per capita water availability (excluding the inflows from countries upstream) is below the African average. This situation is worsened by the geographical and seasonal distribution of rainfall in the country, which results periodically in serious droughts in some parts of Mozambique and often covering all of Southern Africa region.

I.16. In Mozambique, the rainy season lasts for a relatively short period. On average about 60–80 per cent of the annual runoff occurs in just three months.

E. Existing Legal and Institutional Framework

I.17. The *National Directorate of Water* (DNA) is one of the National Directorates of the *Ministry of Public Works and Housing* (MOPH). The main functions of DNA include: policy making and planning for water resources management; provision of water supply and sanitation services; inventory and maintenance of adequate information of water resources and water needs at national and regional and river basin levels; establishment of water legislation and monitor its application; execution of investments for studies, development projects and capital works; co–ordinate the co–operation on shared watercourses.

I.18. At provincial level, *Provincial Directorate of Public Works and Housing* (DPOPH) do the co–ordination. At river basin level, *Regional Water Administrations* (ARAs) are responsible for operational activities. There are five ARAs, namely: ARA–South, ARA–Center, ARA–Zambezi, ARA–Center–North and ARA–North. The last two ARAs are still to be put in place. At central level, there exists the *National Water Council* (CNA), which is a consulting body of the Council of Ministers and of inter–ministerial coordination for water related issues. This Council is presided by the Minister of Public Works and Housing and integrates also the Ministers of Agriculture and Rural Development, Coordination for Environmental Action, Mineral Resources and Energy, Health and the National Directorate of Water.

I.19. The Water Law, approved in 1991, is the most important legal document in what concerns water resources management in Mozambique. The law stipulates that the water of public domain comprises all inland water (lakes and reservoirs), surface water, groundwater and the hydraulic works, equipment's and dependencies.

I.20. The law considers special regimes for water supply, irrigation, fisheries and aquaculture, industry and energy, hydropower, navigation and transport. Water supply for domestic consumption is given priority above all other private uses. The users of water for irrigation must take an intensive use of that water, taking adequate and economically justifiable measures to reduce water losses by infiltration, evaporation and drainage.

I.21. The law establishes an environmental licensing requirement for any public or private activity that may affect the environment. For instance, hydraulic works such as dams, dikes, channels and irrigation and drainage systems, require Environmental Impact Assessment studies.

I.22. In implementing the *National Water Policy* (NWP), laid down by the Government of the Republic of Mozambique in 1995, various activities and programmes are under way that make it possible to envisage significant improvements in water resource management in the near future.

I.23. These improvements will be linked not only to the definition of correct policies, informed by a modern vision of water management, but also to a greater allocation of human, material and financial resources to this area, both by the government and by the donors and international funding agencies.

I.24. In 1998, the government issued three decrees creating the framework for delegation of management of water supply systems and the required institutions, FIPAG and CRA.[1] The framework decree states that the operation and management of water supply systems can be given to private entities under concession, operation licence or management contract. In this way, the willingness to involve the private sector, as defined in the NWP, is materialised. The experience of delegation started with the cities of Maputo, Beira, Quelimane, Nampula and Pemba, where two contracts have been signed between FIPAG and private operator, Águas de Moçambique.

F. Recent Developments in the Water Sector

I.25. In 1998, the International Development Association (IDA) approved a credit to the Government of Mozambique towards the cost of the Mozambique *First National Water Development Project* (NWD1). This is a five–year project aimed at developing government's *National Water Development Programme*, which will consist of a set of sector reforms, studies and investments geared towards the implementation of the National Water Policy. The *National Water Resources Management Strategy*, which is currently being developed, is a component of the NWDP1 with overall objective of enhancing the strengthening of water resources management both within Mozambique and with respect to the joint management of internationally shared river basins. The strategy is expected to address all natural aspects of water resources systems which include surface water, groundwater, water quality, pollution and ecosystem protection, water uses in all sectors of the economy, legal and institutional framework, capacity building and issues related to national and regional objectives and constraints.

I.26. One of important interventions, among others, to be undertaken in the short term is maintenance works and rehabilitation of the existing hydraulic infrastructures, with emphasis on small and large dams.

II. PROJECT AREA

II.1. The proposed project area covers six provinces, namely: Gaza, Inhambane, Sofala, Manica, Tete and Nampula. The identification of sites for dam rehabilitation or construction will be carried out in these provinces, in coordination with Ministry of Agriculture/National Directorate for Agriculture Hydraulics (MADER/DNHA) and the Ministry of Mining and Energy/National Directorate for Energy (MIREME/DNE), with the involvement of the local communities. Site selection will be followed by feasibility studies for rural domestic water supply, irrigation and other purposes.

II.2. Gaza and Inhambane provinces are located in the south of the country, where most of the rivers consist of the terminal sections of international rivers, such as the Maputo, Umbeluzi, Incomati, Limpopo and Save. These rivers are characterised by high runoff coefficients, heavy salt–water intrusion at the river mouths (reaching more than 50 km into the interior), and broad and shallow valleys, with reduced storage potential, and consequently heavy evaporation losses and extensive flood

[1] FIPAG is the institution that receives from the State the assets of the water supply systems, with the responsibility to promote its management in an autonomous, efficient and profitable manner, through various types of contract with private operators.

CRA is the institution created to protect the interest of the consumer, with due respect to the interest of the private operator, the economic sustainability of the system. CRA looks particularly into tariffs and level of service.

plains. The increasing of water use upstream in the international basins also influences the water availability and the salt–water intrusion.

II.3. In Sofala, Tete and Manica provinces, in the central region of Mozambique, the river basins are almost all located within Mozambique, except the Zambezi, Pungoé and Buzi rivers, which are transboundary. The rivers rise in the mountainous border areas and descend gradually at the sea, where the heavy salt–water intrusion is evident. These rivers have a more permanent runoff regime when compared with the rivers in the southern Mozambique,

II.4. The Nampula province is located at northern part of the country, where the rivers of the northern region rise in the plateaux and the mountains. Some of the rivers have important waterfalls with steep slopes, with good hydropower potential. The Lurio, Licungo, Messalo and Ligonha rivers stand out. The Rovuma River forms the border with Tanzania.

III. PROJECT RATIONALE

III.1. Mozambique is poorly equipped in terms of essential hydraulic infrastructures (dams) for water storage. When compared with the neighbouring countries such as South Africa and Zimbabwe, Mozambique has very few and sparsely distributed dams. Before 1975 there were about 600 small dams in the country. At present there are less than 50 small dams throughout the country. Most of the dams have been destroyed due to various reasons including lack of clear policy for their maintenance, hydrological extreme events such as floods, and the 16 years of civil war.

III.2. The climatic variability, which influences the temporal and spatial distribution, explains the high vulnerability of Mozambique to extreme events such as, floods, cyclones and droughts. Droughts are main causes for water shortage for domestic, livestock, irrigation and other water uses. Mozambique experiences irregular rainfall distribution characterized by 3 to 4 months of rainfall (from December to March) and 8 to 9 months of dry season, form April to November. There is adequate rainfall along the coastal area and in the north of Zambezi river region. Water shortage periods are experienced in southern Mozambique, particularly in Pafuri, Chicualacuala and Chigubo (Gaza Province) and Funhalouro (Inhambane Province), where the annual average precipitation (400–500 mm) is by far less than the potential evapotranspiration (1,400 mm).

III.3. In the last 50 years, Mozambique has been affected by severe droughts in the years 1949/50, 1950/60 in the south and central regions, 1982/83 (in the south), 1991/92 (almost all the country), and recently 2000/2002 (in southern and central regions of Mozambique).

III.4. The programme for rehabilitation/construction of 50 small dams was therefore developed in order to ensure water storage capacity to address the issue of water requirement for rural water supply (domestic), irrigation, livestock and hydropower. This project relates to the first pillar of CAADP, *"Expansion of area under sustainable land management and reliable water control systems"*.

IV. PROJECT OBJECTIVES

IV.1. The overall objective of the project for rehabilitation/construction of 50 small dams is to sustainably and equitably utilise Mozambique water resources for social–economic development, poverty alleviation and food security. Specifically, the project aims at the following:

- provision of water for human consumption;
- improvement of small scale irrigation;
- provision of water for livestock and wildlife;
- poverty alleviation in rural areas;
- ensuring food security;
- generation of small scale hydropower for sustainable development;
- job creation and income generation.

V. PROJECT DESCRIPTION

V.1. The project will run for five years and will consist in the rehabilitation of 50 small dams, comprising three implementation phases:

- Inventory and sites identification;
- Surveys, project design and preparation of tender documents;
- Dam rehabilitation or construction.

Phase 1: Inventory and Sites Identification

V.2. The inventory and sites identification will be carried out in collaboration with MADER/DNHA and MIREME/DNE. Local communities will fully be involved during the process of inventory and sites identification. The involvement of local communities is extremely important in order to ensure ownership of the infrastructures.

Phase 2: Surveys, Project Design and Preparation of tender documents

V.3. Surveys and investigations will be carried out on the identified sites to assess the suitability of the proposed projects for domestic water supply, irrigation, livestock and hydropower.

V.4. Site selection will be followed by project design for each of the identified dam locations, for which a consultant will be contracted through a tendering process. In order to ensure private sector involvement, the tender will be launched as a national process. The selected consultant will be responsible for the project design and tendering documents for the next phase (dam rehabilitation or construction).

Phase 3: Dam Rehabilitation or Construction

V.5. Contracted national construction companies shall perform the dam rehabilitation or construction of 50 feasible earth dam sites.

V.6. Three of the dam sites have already been identified, and projects designs have been elaborated.

VI. INDICATIVE COST

VI.1. The preliminary cost estimate for the rehabilitation of 50 small dams is of about US$30 million, as shown below:

Phase	Cost (US$)
Inventory and sites identification	600,000
Surveys, project design and tendering	4,500,000
Dam rehabilitation or construction	23,400,000
Project coordination	1,500,000
Total	30,000,000

VII. PROPOSED SOURCES OF FINANCING

VII.1. The project will be financed from three sources: the cooperating partners, including the private sector, the government and the beneficiaries. The government contribution will be around 10% of the total cost, and the beneficiary contribution could be estimated at around 1% of the total cost. By the nature of the project under consideration, beneficiary contribution will be mostly in the form of providing manpower for dam construction or rehabilitation works.

VIII. PROJECT BENEFITS

VIII.1. The implementation of this project, benefiting about 20,000 persons, will have great impacts in the socio–economic development of the concerned regions, namely:

- increase the water availability for human consumption and livestock;
- promote the small scale irrigated agriculture;
- increase in agricultural production and productivity thereby contributing to food security;
- increase in rural household income due to the high crop yields;
- promote the sustainable development through development of small scale hydropower.

IX. IMPLEMENTATION ARRANGMENTS

IX.1. The MOPH through the DNA is the implementing agency. The project will be implemented under central supervision of DNA. The ARAs and DPOPHs will be responsible for undertaking supervision at river basin level and at provincial level (where the ARAs are not yet established). A *Project Co–ordination Unit* (PCU) will be established within DNA for the purpose of ensuring smooth coordination of the implementation of the project.

IX.2. Taking into consideration that this project involves strong components of irrigation and hydropower, MOPH/DNA will closely collaborate with MADER/DNHA and MIREME/DNE throughout project implementation.

X. TECHNICAL ASSISTANCE REQUIREMENTS

X.1. For the purpose of effective implementation of the project and taking into account the existing shortage of skills, the following technical assistance will be required:

- ***Hydraulic engineer/Civil Engineer***, for overall supervision of technical designs and works;
- ***Hydrologist***, to assess the watercourses in terms of hydrological feasibility;
- ***Economist***, to deal with all economic aspects, in particular the costs evaluation;
- ***Anthropologist***, to promote participation of local communities and grassroots groups.

XI. ISSUES AND PROPOSED ACTIONS

XI.1. For effective and sustainable implementation of the project for the rehabilitation/construction of 50 small dams the following issues need to be taken into consideration and addressed:

- ***Availability of hydrological data:*** Hydrological data and other relevant information will be required for effective designs of the dams and other hydraulic structures during the implementation of the project. Therefore data collection and analysis has to be intensified in the project areas. If need be, rehabilitation of the observation stations has to be carried out.
- ***Public participation:*** Implementation of the project for the rehabilitation/construction of 50 small dams has to be executed in a participatory manner to ensure ownership and sustainability. In this respect public awareness on the project should be carried out right form the beginning. Wherever possible NGOs should fully be involved.
- ***Appropriate technology:*** The use of appropriate technology to suit the requirement of a particular community in a given area must be respected in order to ensure continued operation and maintenance of the projects. In this regard stakeholders participation at project design stage is crucial.
- ***Capacity building at grassroots level:*** To ensure sustainable operation and maintenance of the projects, capacity building at grassroots level has to be developed along with the project development and implementation. Therefore appropriate training programs have to be conducted at all levels.
- ***Environmental considerations:*** During the rehabilitation and/ or construction of the dams and any hydraulic structures along the rivers or streams due considerations have to be taken with regard to the environment and the ecosystems within the basins. The community involved has to be made aware of the environmental and ecosystems requirements.

XII. POSSIBLE RISKS

XII.1. Due to the fact that an important part of the targeted areas are for rehabilitation, some problems could arise linked to the present viability of each site as a result of the severe deterioration of infrastructures not used for many years. Dramatic changes in the climatic conditions, verified in last years can affect the water availability in specific areas. Other risks may be associated with availability of both local and donor funding and extreme hydrological conditions of floods and droughts.