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## MOZAMBIQUE

# INTEGRATED STUDY AND PROJECT PREPARATION FOR COFAMOSA IRRIGATION PROJECT

## APPRAISAL REPORT

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**INTEGRATED STUDY AND PROJECT PREPARATION FOR COFAMOSA  
IRRIGATION PROJECT**

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## LIST OF ACRONYMS

ADB	:	African Development Bank
AWF	:	African Water Facility
BOQ	:	Bill of Quantities
COFAMOSA	:	Committee for the Facilitation of Agriculture between Mozambique and South Africa
ESIA	:	Environmental and Social Impact Assessment
ESMP	:	Environmental and Social Management Plan
GOM	:	Government of Mozambique
MPD	:	Ministry of Planning and Development
MDGs	:	Millennium Development Goals
MICOA	:	Ministry of Environment
MZRO	:	Mozambique Regional Office
Ha	:	Hectare
PARPA	:	Poverty Reduction Strategy Paper
PETROMOC	:	Petróleos de Moçambique, S.A.R.L--The Oil Company of Mozambique
PPP	:	Public Private Partnership
RFPs	:	Bank's Standard Request for Proposal
TOR	:	Terms of References
TIA	:	Tripartite Interim Agreement

**MOZAMBIQUE**  
**INTEGRATED STUDY AND PROJECT PREPARATION FOR COFAMOSIA IRRIGATION PROJECT**  
**RESULTS BASED LOGICAL FRAMEWORK**

HIERARCHY OF OBJECTIVES	EXPECTED RESULTS BY SECTOR AND THEME	REACH	PERFORMANCE INDICATORS SOURCE AND METHODS	Indicative Targets /Timeframe	Main Assumptions And Risks To Be Monitored
<b>Goal</b> <ul style="list-style-type: none"> <li>To contribute to the overall economic growth and poverty reduction</li> </ul>	<b>Impact</b> <ul style="list-style-type: none"> <li>Poverty level in Moamba and Magude Districts reduced</li> <li>Foreign currency earning</li> </ul>	<b>Reach</b> <p>Population of Maputo Province GOM</p>		<b>Target</b> MDGs targets by 2015	<b>Assumption</b> <ul style="list-style-type: none"> <li>Private sector interested to invest in the project</li> </ul>
<b><u>Objectives</u></b> <p>1. To undertake feasibility study and irrigation project preparation to enable the mobilization of funds for the development of 10,000 ha irrigated farmland</p>	<b>Outcome</b> <ul style="list-style-type: none"> <li>Utilization of water resources and infrastructure (Corumana Dam) water optimized</li> <li>Investment for 10,000 ha irrigated farm land development leveraged</li> <li>Efficiency of water productivity through irrigated high value crops production increased</li> </ul>	<b>Reach</b> <ul style="list-style-type: none"> <li>GOM</li> <li>Minimum of 200 farmer households</li> <li>Population in the Moamba and Magude Districts in general (86,184 inhabitants)</li> <li>Private sector</li> </ul>	<b>Indicator</b> <ul style="list-style-type: none"> <li>89 million Tons of sugar produced and/or 70 million liters of bio-ethanol produced</li> </ul> <b>Sources</b> <ul style="list-style-type: none"> <li>Progress report from GOM</li> </ul> <b>Method</b> <ul style="list-style-type: none"> <li>Review of Reports</li> <li>Bank field missions</li> </ul>	<b>Target</b> <ul style="list-style-type: none"> <li>7 years after completion of the study</li> </ul>	<b>Risk</b> <ul style="list-style-type: none"> <li>Private sector not interested in the project</li> </ul> <b>Mitigation</b> <ul style="list-style-type: none"> <li>Involve the private sector at all stages of planning and development</li> <li>Include incentives for investment and create enabling environment</li> </ul>
<b>Activities/Inputs</b> <ol style="list-style-type: none"> <li>Engage a consulting firm to undertake the study</li> <li>Undertake integrated water resources management study including availability and multipurpose use</li> </ol>	<b><u>Outputs</u></b> <ol style="list-style-type: none"> <li>Consultant Service procured</li> <li>Inception report prepared</li> <li>(3-6) The following topical technical reports</li> </ol>	<b>Reach</b> <ul style="list-style-type: none"> <li>GOM</li> <li>Minimum of 200 farmer households</li> <li>Population in the Moamba and Magude Districts in</li> </ul>	<b>Indictor</b> <p>(1)Signature of contract</p> <p>(2-11) Reports accepted by stakeholders and client</p> <p>(12) Successful stakeholder workshops carried out</p>	<b>Targets</b> <p>(1) December 2007</p> <p>(2&amp;12) February 2008</p> <p>(3-9 &amp; 12), September 2008,</p>	<b>Assumption</b> <ul style="list-style-type: none"> <li>The pre-feasibility level data is comprehensive and available</li> </ul> <b>Risk</b> <ul style="list-style-type: none"> <li>None availability</li> </ul>

HIERARCHY OF OBJECTIVES	EXPECTED RESULTS BY SECTOR AND THEME	REACH	PERFORMANCE INDICATORS SOURCE AND METHODS	Indicative Targets /Timeframe	Main Assumptions And Risks To Be Monitored
<p>3. Upgrade the baseline study from secondary data</p> <p>4. Undertake field study (Topo., soil, geo-technical, socio-economics, water balance, water and related engineering study etc)</p> <p>5. Undertake irrigated agronomy economical study for proposed crops</p> <p>6. Undertake market study for proposed crops to be produced</p> <p>7. Identify institution and capacity needs</p> <p>8. Prepare ESIA</p> <p>9. Undertake assessment of potential irrigated agriculture business plan model including PPP</p> <p>10. Prepare irrigation feasibility study and project preparation report</p> <p>11. Prepare a semi-detailed design, BOQ, and tender documents</p> <p>12. Propose a draft contract document for the PPP arrangement</p> <p>13. Organize workshops</p>	<p>are prepared</p> <p>a. Topography</p> <p>b. Soil</p> <p>c. Geo-technical</p> <p>d. Socio-economic</p> <p>e. Water balance</p> <p>f. Agro-economic</p> <p>g. Engineering Study</p> <p>h. Market study</p> <p>i. Institutional and capacity needs</p> <p>7. ESIA prepared</p> <p>8. Business model and PPP</p> <p>9. Feasibility Study report prepared</p> <p>10. Semi-detailed design, BOQ, and tender documents prepared</p> <p>11. Draft contract document for the PPP made available</p> <p>12. Stake holders workshops organized</p>	<p>general (86,184 inhabitants)</p> <ul style="list-style-type: none"> <li>• Private sector</li> <li>• AWF</li> </ul>	<p>Sources</p> <ul style="list-style-type: none"> <li>• AWF Report</li> <li>• Field mission reports</li> <li>• Workshop proceedings</li> </ul> <p>Method</p> <ul style="list-style-type: none"> <li>• Document Review</li> </ul>	<p>(10 &amp;12) November 2008</p>	<p>of data delaying the study and increasing the cost</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Data availability to be assessed at early stage of the study and Contingency amount allowed in the budget to gather data and information</li> </ul>

## **EXECUTIVE SUMMARY**

Economic policy reforms together with political stability and substantial donor support have contributed to Mozambique's macroeconomic stability, increased foreign direct investment, socio-economic development, and significant poverty reduction. The Government of Mozambique (GOM) is determined to promote continued economic growth and poverty reduction, for which, agriculture and rural development, as well as improvements in natural resources management, are considered key interventions in achieving economic growth and poverty reduction.

Under the COFAMOSA (Committee for the Facilitation of Agriculture between Mozambique and South Africa) Irrigation Project, the Government of Mozambique intends to develop an area of 29,000 ha under irrigation. Based on the prefeasibility study, the COFAMOSA Irrigation Project would be developed in 3 phases with 10,000 ha to be constructed during the first phase. Irrigation water will be provided by gravity from Corumana Dam through Sabie River. Implementation of the second and third phases will require the rehabilitation of the Corumana Dam to provide sufficient water to irrigate the additional area of 19,000 ha. The Government will provide the main infrastructure. In November 2006, the GOM granted water and land rights to COFAMOSA for an area of 10,000 ha, as a first phase of the project, in the Moamba District.

The study is considered to be under the AWF operational focus areas of providing support for improved water resources management at Maputo Province level. Additionally, for this project to become a bankable project and to trigger investment proposals, all the project data from the prefeasibility study would need to be further validated and updated. The main outputs for this study will be the preparation of a comprehensive Preparation Study report upon which the project investment will be based. The final report is to include analysis of technical, institutional, economic, social, environmental and financial aspects of the project. The study will also include the preparation of semi-detailed designs and bill of quantities (BOQ) for the main irrigation systems for the first phase of the project (10,000 ha) and a typical farm business model that will guide the farmers in the operations of their land investment. The study will also produce a draft agreement for potential public-private – partnership (PPP) arrangement. Based on findings of study, the GOM along with key stakeholders will organize a workshop to consider project implementation and funding.

In addition to COFAMOSA, the key beneficiaries of the project are the farmers in Moamba and Magude Districts as well as farmers from Inkomazi area in Mpumalanga in South Africa. The populations of Moamba and Magude Districts are estimated at 43,396 and 42,788 people respectively.

The proposed study will be conducted by a reputable and specialized consulting engineering firm over a period of 13 months with the overall budget estimated at EUR 1,276,200 including the organization of the financial resources mobilization workshop. The provision of the grant resources from the AWF is regarded as a catalyst that will trigger the larger investment envisaged in COFAMOSA Irrigation Project. It is, therefore, recommended for the AWF to grant an amount of 1,178,367 EUR to the Government of Mozambique to carry out the preparation study for COFAMOSA Irrigation Project.

# **1 BACKGROUND**

## **1.1 Origin of the Project**

1.1.1 Mozambique has witnessed rapid growth since achieving peace in 1992. Economic policy reforms together with political stability and substantial donor support (estimated to represent 60% of the national yearly budget of USD 700 million.) have contributed to macroeconomic stability, foreign direct investment, socio-economic development, and significant poverty reduction. Also, the achievements in poverty reduction mask significant regional variations, a slight increase in income inequality over 1997-2003, and still high levels of absolute poverty and malnutrition. Mozambique's medium-term poverty reduction strategy aims to reduce poverty headcount from 54% of population in 2002 to 45% in 2009, and to promote human well-being and economic development through rapid, inclusive and broad-based growth through the following three pillars: (i) good governance; (ii) human capital; and (iii) economic development. Agriculture and rural development, as well as improvements in natural resources management, are considered key interventions in achieving economic growth and poverty.

1.1.2 COFAMOSA is a committee for the Facilitation of Agriculture between Mozambique and South Africa. COFAMOSA was established in 2001 and operates from Moamba District, Maputo Province, Mozambique. Under the COFAMOSA Irrigation Project, COFAMOSA and the Government of Mozambique intend to develop 29,000 ha for irrigation. The project area is located in Moamba and Magude Districts of the Province of Maputo Mozambique, and has been selected, mainly, due to the accessible water from Corumana Dam on Sabie River, availability of good irrigable soils and close proximity to potential local and regional markets.

1.1.3 In preparation of this project, COFAMOSA completed a Pre-feasibility Study in July 2003. Results of the study showed positive indications on the proposed project and recommended that a full fledged feasibility study would be undertaken in addition to a social and environmental impacts assessment. In November 2006, the GOM granted water and land rights to COFAMOSA for an area of 10,000 ha, as a first phase of the project, in the Moamba District.

1.1.4 In pursuing its objectives, GOM requested the African Water Facility to finance the Integrated Study of the COFAMOSA Irrigation Project. On March 30, 2007, the African Water Facility has deemed this study as eligible for funding and the AWF, therefore, fielded a mission during 30 April – 11 May, 2007 to finalize the study TOR and prepare the appraisal report for the study.

## **1.2 Sectoral Priorities**

1.2.1 Although constraints exist, Mozambique possesses the fundamentals to realize its considerable agricultural potential. The country is endowed with natural resources, including numerous fertile agro-ecological zones, but only about 10 percent of its 36 million arable hectares are currently being cultivated. The National Water Policy was issued in 1995, listing principal policies. The Policy emphasized the importance to create conditions for the attraction of private investment to make full use of the existing investments already made in dams for irrigation and electricity generation, and to rehabilitate small water impoundments.

1.2.2 The National Irrigation Policy and its implementation Strategy were adopted in 2002, recognizing the great strategic importance vested with irrigation. The guiding principles are: water resources, although renewable, are not inexhaustible and therefore it is necessary to manage, control and preserve them rigorously; water is an economic resource, which deserves

an appropriate economic and social value; water and irrigated land are public assets whose use has to be regulated.

1.2.3 The Government of Mozambique's National Program for Agricultural Development (PRO-AGRI), was one of the first agricultural sector-wide approaches adopted in Eastern and Southern Africa. The first phase of the Government's program, PRO-AGRI-1, attracted substantial donor support – using a common flow-of-funds mechanism as a means of harmonizing donor interventions – and focused on agricultural aspects of the Poverty Reduction Strategy. PRO-AGRI-1 attained important achievements in relation to institutional reform at central level and in supporting decentralization to districts and provinces. PRO-AGRI-II began in 2006 and it recognized the importance of horizontal integration across sectors and, thus the importance of marketing, finance and rural roads for agriculture growth. Increasing overall productivity in rural areas is a specific objective of PROAGRI-II, which agriculture and agro-industry are specific focus. Credit and investment facilities are also proposed with a view of boosting the rural economy. Implementation of the sector program (PROAGRI-II) is expected to be an essential mechanism in helping to achieve the goals of PARPA-II for this sector.

1.2.4 The government is committed to rural growth and development. Additionally, Mozambique possesses the fundamentals to realize its considerable agricultural potential. However, due to budgetary constraints, the potential can only be achieved through public-private partnerships (PPP) in which the Government provides an enabling policy and legal environment and the private sector assumes the financial risks and reaches out to rural areas.

1.2.5 The cash crop sector has the potential for substantial yield increases. Today cash crops occupy roughly 5% of cultivated land and contribute around 5% of agriculture GDP, which in turn is about 6% of the country's overall exports. The traditional cash crop sector includes cotton, tobacco, cashew, sugar, and tea. Cotton and tobacco are grown under contract, cashew is a smallholder crop, and sugar and tea are plantation crops. As in the food crop sector, there is a major gap between potential and actual yields.

1.2.6 Under the National Agricultural Policy (PROAGRI II), more emphasis is given on production of higher value crops, including value-added processing. This will create employment opportunities and generate income for the rural population. Over the last few years, the sugar industry has been one of the fastest growing sectors in Mozambique economy. It has been successful in attracting a significant level of foreign direct investment. Sugar production in Mozambique has risen from 39,000 metric tons in 1998 to about 240,000 metric tons in 2006, largely due to improved productivity at both the farm and sugar mill levels through a rehabilitation program implemented by the sub-sector in the year 2000.

1.2.7 Efforts to substitute alternative fuels for petroleum are gaining attention in a world threatened by high price of oil, climate change, and instability in major oil-producing countries. Sugarcane is, by far, the most efficient of the current feed stock as it yields eight times as much energy as it is needed to produce the ethanol. The sugar industry in Mozambique has two potential markets in which to sell ethanol: the export market and the domestic market provided that the GOM decides to establish a national bio-fuel program, which would create a local market for bio-fuels including ethanol.



### 1.3 Problem Definition

1.3.1 Based on the prefeasibility study, the COFAMOSA Irrigation Project would develop 29,000 ha of irrigated land in possibly 3 phases, over a period of 10 years (first and second phase 10,000 ha each and the third phase of 9,000 ha). Irrigation water will be provided by gravity from Corumana Dam through Sabie River. Implementation of the second and third phase will require the rehabilitation of the Corumana Dam to provide sufficient water to irrigate the additional area of 19,000 ha. This project is expected to result in improved water resources management at Maputo Province level. Therefore, overall water demand analysis for all uses including ecosystems needs to be undertaken in this regard. In addition to the need to carry out detailed water assessment and engineering studies at the feasibility level, the pre-feasibility study identified the need for social and environmental assessments to determine the impacts on the ecology and present and future inhabitants. Sugarcane was also recommended for the project during pre-feasibility study due to the sugar/ethanol market potential in the region and elsewhere in addition to the availability of experiences in cane cultivation within COFAMOSA farmers.

1.3.2 For this project to become a bankable project and to trigger investment proposals, all the project data would need to be further validated and updated. The pre-feasibility studies will be upgraded to the feasibility level along with other preparatory activities including soil and topographic surveys; long-term water balance; environmental assessment at the strategic and project levels; market potential investigation; business model development and economic and financial analysis.

### 1.4 Beneficiaries and Stakeholders

1.4.1 The key beneficiaries of the project are the farmers in Moamba (Sabie Administrative Post) and Magude (Panjane Administrative Post) Districts as well as farmers from Inkomazi area in Mpumalanga in South Africa. The populations of Moamba and Magude Districts are estimated at 43,396 and 42,788 people, respectively.

1.4.2 According to the MOU between COFAMOSA Mozambique and Agriculture farmers from Nkomazi locality, District of Ehlanzeni, Mpumalanga Province, South African farmers will receive 40% allocation of the proposed 10 000-hectare (first phase) irrigation development for a period of 30 years. In exchange for the 30-year lease, farmers will share their business and agricultural skills with their Mozambican counterparts as part of skills transfer and job creation initiative. To date COFAMOSA has selected a total of 200 farmers for the first phase (10 000 ha) of the project of which 80 farmers are from the South Africa (10 of which are women) and the other 120 farmers from Mozambique (30 of which are women).

1.4.3 The Tripartite Interim Agreement (TIA) on the Projection and Sustainable Utilization of the Water Resources of the Inkomatie and Maputo Watercourses was signed between the South Africa, Swaziland and Mozambique on 2002 in Johannesburg, South Africa. The Tripartite Interim Agreement sets out the objectives of protecting the water resources of the Inkomatie and Maputo Basins and utilizing these in a sustainable manner. The envisaged study will support for improved transboundary water resources management at Maputo Province level, contributing to the application of the equity principle in utilizing the Inkomatie water resources and in the sharing of international waters. The study setup would also ensure full involvement of key authorities in charge of water resources management, water rights, planning and water development at regional, national, and basin level namely—ARA-SUL,

DNA, Ministry of Public Works and Housing, and Incomati Watershed Management Authority.

## **2 THE STUDY**

### **2.1 Impacts**

The implementation of COFMOSA Irrigation Project would contribute to reduce poverty levels in the Moamba and Magude Districts, Province of Maputo, in addition to increasing the foreign currency earning, through increased exports of high value crops that will include sugar and/or ethanol.

### **2.2 Outcomes**

2.2.1 The overall long term outcome of the study will be to enable Mozambique optimizing the land and water resources potential of the Sabie-Inkomatie area assigned to COFAMOSA with respect to water development for irrigation, while enhancing the socio-economic benefits of the project area and protecting the biophysical environment in the area.

### **2.3 Outputs**

2.3.1 The main study outputs will be the comprehensive Feasibility Study report upon which the project preparation and investment will be based. This final report is to include analysis of technical, institutional, economic, social, environmental and financial aspects of the project which will include an optimized long-term water resources assessment, allocation and utilization in the Inkomatie River Basin. The study will also include the preparation of semi-detailed designs and bill of quantities (BOQ) for the main irrigation systems for the first phase of the project (10,000 ha) and a typical irrigated farm business model that will guide the farmers in the operations of their land investment. The study will produce a draft agreement for potential public private partnership arrangement in the use and management of water resources for irrigation development. Based on findings of study, the GOM along with key stakeholders will organize a financial resources mobilization workshop to consider project implementation and funding.

### **2.4 The Study Activities**

2.4.1 The proposed irrigation project preparation study will be conducted by a reputable and specialized consulting engineering firm over a period of 12 months. The study will address various water resources management issues and design aspects the irrigation project including technical, institutional, legal, social, cultural, economic, and environmental ones. The preparation study will also include the preparation of semi-detailed designs and bill of quantities (BOQ) for the irrigation systems for the first phase of the project (10,000 ha). Additionally, the study will review and assess possible options for public-private partnership (PPP), as the Business Model, to manage the agriculture production based on irrigated sugar cane plantation, processing and marketing. After the conclusion of the feasibility study, the GoM in coordination with other stakeholder will organize a financial resources mobilization workshop to present the feasibility study findings and discuss financing plans with donors and private sector.

2.4.2 The Consultant shall propose, based on knowledge and experience, the best approach/methodology to undertake the Study taking into consideration all the aforementioned, but not limited to, the following sub-studies:

a) Water Resources Assessment and Management study

2.4.3 Based on the available data, the consultant will carry out an analysis of the implementation status of the interim water agreement between Mozambique, Swaziland and South Africa on the Inkomatie River and the institutional analysis of the Inkomatie Watershed Management Authority. Additionally, the study will include the analysis of the water resources status in the Inkomatie River Basin in terms of supply and demand by various sectors and future plans for water harvesting, allocation overall management requirements for sustainable utilization of the available water resource.

b) The Baseline Study

2.4.4 Prepare and present a detailed description and analysis of the prevailing situation in the project area from secondary and primary data. This will include water availability; topography maps; climatic data; characteristics of water and agriculture in the region; irrigation infrastructure and existing rural infrastructure serving the project area.; and socio-economic status of the current population and future projections.

c) Water Resources Engineering Study – Infrastructure Designs and Costs

2.4.5 The water resources study shall pay due attention to the water resources risks (hydrological (drought/flood) and water quality) in the view of risk mitigation. This will include an examination of the robustness of the water rights that have already been issued for the initial 10,000 ha irrigation. The project shall also initiate the process of ensuring the water rights for the remaining 19,000 ha which depends on the construction of gates at the Corumana Dam.

2.4.6 The Engineering study would include the following: undertaking of field investigation description of the water availability, land topography and soil quality, the suitability and need for irrigation and drainage; feasibility designs of new/rehabilitated irrigation infrastructure together with the feasibility level engineering drawings, cost estimates, and implementation schedules for the various project components: bulk irrigation water supply; bulk electricity supply; drainage effluents treatment; road infrastructure and irrigation development; general layout plans, showing location and principal feature of the main works required for the irrigation and drainage supply network, the location of water distribution points and supply to the plots, and description of the overall operation of various networks; A typical farm layout plan indicating the location and principal features of works required within the individual farms. The study outcomes will also include the preparation of semi-detailed designs and bill of quantities (BOQ) for the main irrigation systems, up to the farm gate for the first phase of the project (10,000 ha).

d) Irrigated Agriculture and Marketing Study

2.4.7 The Consultant will conduct investigations aimed at determining the most up-to-date information on the following items: water requirements for optimum yield conditions and soil and water conservation measures; consumptive use and irrigation system efficiency; water losses by percolation and seepage, characterization of the agricultural drainage effluents and pre-treatment required before released in receiving ecosystems. The study report is expected to include: proposal on total hectarage to be planted each year by farmers' group and expected crop yield; and recommendations on the appropriate agricultural practices, soil and water conservation measures, tillage, land preparation and cultural operations.

2.4.8 At the inception phase, the consultants will reaffirm the pre-feasibility recommendations on the selection of sugarcane for the project area. The consultants will also present the assessment for the current and potential future market for sugar production by Project, in addition to recommending suitable prices of each output (sugar/ethanol) which will later feed in the economic and financial analysis. The study will also give specific findings and recommendations on mechanisms for long term market equilibrium guaranteeing secure supplies of sugar; identify constraints and opportunities for maintaining competitiveness and propose a package for achieving long term sustainability.

e) Institutional Management and Capacity Building Needs Assessment

2.4.9 A detailed institutional review of the technical and financial capacities of the farmer group (COFAMOSA) and other involved miniseries and government agencies. This review will determine the needs assessment that the Project will have to fulfill in addressing the shortage of experienced personnel, skill gaps and lack of facilities. These outcomes will be translated into capacity building guidelines and plans.

f) Economic and Financial Analyses

2.4.10 In analyzing project costs and benefits, all basic assumptions will be clearly defined, as per the options chosen. Depending on the investment, operating and maintenance costs, the Consultant will estimate the project's economic and financial rate of return. The Consultant will assess the cost of maintenance and water charges, the possible trends and the capacity of beneficiaries to bear such charges. Based on field trips and sensitivity analyses, the Consultant will also describe major project risks, potential impacts on project feasibility, and safeguards to be incorporated in project design.

2.4.11 Financial and management options will be developed exploit all viable funding sources, whether public or private and to ensure the efficient management and maintenance of the investments. Additionally, the study will also develop a business model--workable PPP partnership model-- that will align financial incentives and that will allocate risks fairly among the different parties, including the Government of Mozambique, the sugar companies, PETROMOC, and the farmers' community. A typical farm business model will also be developed to guide the farmers in the operations of their land investment.

g) Environmental and Social Impact Assessment

2.4.12 The prefeasibility study revealed that the proposed project may have a number of significant impacts some of which could be irreversible. Consequently, according to the Bank's Environmental and Social Assessment Procedures (ESAP 2001), the project would be assigned an environmental category I, entailing the undertaking of a full Environmental and Social Impact Assessment (ESIA). The ESIA is intended to identify potential impacts on the biophysical, social, cultural and human environment from the proposed irrigation project and its identified components and recommend mitigation measures to reduce these potential impacts to an acceptable and compliance level particularly on water basin resources. The ESIA will also review the cumulative environmental and social impacts of the District Investment Plan (and projects) emphasizing irrigated sugar production as a crop commodity versus the generation of ethanol bio-fuel with its potential environmental and cross cutting issues.

## e) Preparation of the Study Final Report

2.4.13 Using these study results, the Consultant will propose various alternatives engineering designs, institutional set-up and financial models for the establishment of the Public-Private-Partnership with the most appropriate water resources management framework. The report will present an evaluation of the various alternatives based on engineering advantages and disadvantages; construction, financial and economic viability and O&M costs, in addition to the environmental, social and public health impacts. The feasibility report will be discussed through a stakeholders workshop after which the consultant will finalize taking into consideration the comments and suggestions raised by the stakeholders.

## f) Stakeholder Consultation Workshops

2.4.14 The Consultant will organize and facilitate two workshops which include all stakeholders from national ministries, para-public institutions, and the private sector. The first workshop will be carried out after the conclusions of the Inception Report and will discuss the study approach and scope the most significant issues and solicit feedback while the second workshop will seek comments on the study results, and options to finalize the draft final report.

2.4.15 After the completion of the final report, the GoM and other beneficiaries will organize a financial resources mobilization workshop to present the study findings to the donors, financing agencies and the private sector to solicit funds for the project implementation and prepare a financing plan for the project.

## **2.5 Risks**

2.5.1 The study implementation faces the risk of unavailability of basic data required for the Integrated Study which might cause some delays in the study implementation and increase in cost. In this regard and during the study appraisal, the team reviewed the data available and provided the estimated cost for collecting the missing information based on previous studies of similar nature and through obtaining quotations from local institutions for data acquisition. Meanwhile, during the inception phase, the consultant will undertake an assessment of data availability and adequacy. A contingency amount was allocated in budget to address this risk

2.5.2 The major risk the study findings faces would be related to the cost of the project implementation and being unable to attract private investments for the project. Ultimately the findings of the study would lead to viable choices of physical interventions, while envisaging sustainable and cost-effective development and addressing the critical environmental and social risks associated with the implementation of the project. Throughout the study stages broad stakeholders participation, including the private sector will be carried out to ensure strong ownership for the study findings and inclusion. On the other hand, there is a strong commitment from the GoM toward the development of the project area and providing the enabling environment for the private sector participation in developing the area for sugar and/or bio-ethanol.

## **2.6 Cost and Financing plan**

2.6.1 The overall estimated budget for the AWF funded Project is estimated at EUR 1,276,200. The AWF grant will be no more than EUR 1,178,367 to mainly support the study consultancy fees and the organization of the financial resources mobilization workshop. PETROMOC will provide up to EUR 73,574 covering the cost of the study management

(coordinator) and local operational expenses (two 4x4 vehicles, field and meeting allowances, etc). Other in-kind contribution will amount to EUR 24,26 will be provided by GOM through government staff participation in the study and the provision of office space for the consultancy team.

**Table 1 – Summary of Study Cost Estimates <sup>(1)</sup>**

Item	EUR ('000)			Source of Finance
	Local Cost	Foreign Costs	Total Cost	
Consultancy Service	539.54	616.77	1156.31	AWF
Financial Resources Mobilization Workshop	22.06		22.06	
Study Management (Coordinator)	26.47		26.47	PETROMOC
Operational Expenses	47.10		47.10	
Government Staff and office space	24.26		24.26	GOM
<b>Total</b>	<b>659.43</b>	<b>616.77</b>	<b>1276.2</b>	

<sup>(1)</sup> The German-South Africa- Tri Lateral Fund administered by GTZ has expressed interest to join, at a later stage, the study component on social and Economic Development, Employment and Environmental Standards.

## **2.7 Justification for AWF Support**

2.7.1 The study is considered to be under the AWF operational focus areas of providing support for improved transboundary water resources management at Maputo Province level. The proposed Integrated study is also very much inline with the themes supported by the African Water Facility of promoting the preparation of viable projects and building the pipeline for future investments in the RMCs. It is envisaged that implementation of the study activities will result in triggering investment in a potentially viable irrigation development project. The proposed Integrated Study will ensure capital investment project quality and enhance viability. Therefore, this study will enable the GOM to attract and make effective use of increased and appropriate investment needed to achieve the national objective of attaining the MDGs in poverty reduction

2.7.2 On the other hand, the project implementation is foreseen through a public-private partnership enhancing the private sector participation in Mozambique’s national development which is also an operational focus of the AFW.

## **3. IMPLEMENTATION**

### **3.1 Recipient**

3.1.1 The Government of the Mozambique will be the recipient of the grant and the Government agency coordinating the study activities will be the Ministry of Agriculture through the National Directorate of Hydraulics.

### **3.2 Implementation Arrangement and Capacity**

3.2.1 Given the multi-sectoral and multi-disciplinary nature of the work to be undertaken within this assignment, the proposed study will be conducted by a reputable consulting firm. The required Consultant should be a firm or consortium of firms (international and/or local), with the core firm having extensive experience in the elaboration of feasibility studies of agricultural water use and agro-industrial projects.

3.2.2 The Ministry of Agriculture through the the National Directorate of Hydraulics will coordinate the study activities. It will monitor the progress of the study, the flow of funds and report on the achievement of performance targets. It will coordinate with the Ministry of Planning and Development (MPD) for the funding aspects of the study, in mobilizing and channeling funds for the implementation of the program activities.

3.2.3 The Government of Mozambique will establish a Study Steering Committee, consisting of representatives from the concerned ministries and key stakeholders. The Steering Committee will ensure that the Integrated Study is professionally carried out in ways that it reconciles the interests and the benefits of the country and all the stakeholders of the project.

3.2.4 A full-time Study coordinator will be appointed for overseeing the project activities and day-to-day coordination and contacts with the study consultant and other government agencies. Institutional setup for the study is shown in Annex 3.

3.2.5 An Implementation Committee will also be established to provide technical backstopping to the study coordinator and interact on frequent basis with the consulting firm to provide any available technical information required by the Consultant to fulfill its assignment at the local and sector level. The Implementation Committee will also ensure achievement of study objectives; ensure that reports at all stages of the study are prepared by the Consultant and that the views of the beneficiaries are duly incorporated; and review all technical documents produced by the Consultant.

3.2.6 The Ministry of Environment (MICOA), in accordance with the EIA Regulations (decree No.45 of 2004) will be accountable to review and approve the ESIA's TOR and the ESIA draft study and ESMP, when available.

### 3.3 Performance Plan

The study outputs and set of critical and measurable indicators are summarized below for the project outputs:

Result	Critical Measurable Indicators	Targets
1. Consultant Service procured	Signature of contracts	December 2007
2. Inception report prepared	Report accepted by Stakeholders and Client	February 2008
3. (3-6) The following topical technical reports are prepared a. Topography b. Soil c. Geo-technical d. Socio-economic e. Water balance f. Agro-economic g. Engineering Study h. Market study i. Institutional and capacity needs	Report accepted by Stakeholders and Client	March – September 2008
4. ESIA prepared	Report accepted by MICOA	September 2008
5. Business model and PPP	Report accepted by Stakeholders and Client	October 2008

Result	Critical Measurable Indicators	Targets
6. Feasibility Study report prepared	Report accepted by Stakeholders and Client	October 2008
7. Semi-detailed design, BOQ, and tender documents prepared	Report accepted by Stakeholders and Client	December 2008
8. Draft contract document for the PPP made available	Report accepted by Stakeholders and Client	December 2008
9. Stake holders workshops organized	Successful workshop carried out	January 2009

### 3.4 Implementation Schedule

3.4.1 The following is the proposed schedule of activities for study implementation:

1. Signing of the consultancy service contract	M
2. Mobilization of Consultants	M+1
3. Inception Report	M+3
3. Interim Report	M+6
4. Preparation of draft final report & Workshop	M+9
5. Final Report	M+10
6. Project Designs and BBQ	M+12
7. Financial Resources Mobilization Workshop	M+13

Where M stands for the date of signing of consultancy services agreement and the numerical figures represent months. A bar chart to this effect is attached as Annex 4.

### 3.5 Procurement

3.5.1 All procurement of services financed by the AWF will be in accordance with the ADB Rules and Procedures for the use of Consultants, as modified by the Operational procedures of the AWF, using the relevant Bank Standard Bidding Documents.

3.5.2 Technical Assistance or Consultant services estimated at about EUR 1.16 Million will be procured through competition on the basis of international shortlist using the selection procedure of combining technical quality with price consideration using the Bank's Standard Request for Proposal (RFPs). The Consultancy service will be undertaking the study in accordance with the Terms of Reference, annex 5.

3.5.3 The financial resources mobilization workshop (section 2.4.15) estimated at EUR 22,060 to be carried at the end of the study will be procured through Direct Contracting by the GOM.

3.5.4 All goods and services of the components "Study Management", "Operational Expenses" and "Government Staff and office space" are totally financed by the GOM and PETROMOC. The procurement of these goods and services will be in accordance with the national Rules and Procedures of Mozambique".



### 3.6 Disbursement Arrangements and Expenditure Schedule

3.6.1 The AWF funds will be disbursed using the Special Account method of disbursement. The funds for the study management will be channeled through the Ministry of Agriculture, which will open a Special Account denominated in foreign currency in a Bank acceptable to the AWF. The operation of the account will be the sole responsibility of the Ministry of Agriculture. Disbursements of funds will be made on revolving method basis whereby funds will be deposited in the special account, which will be replenished periodically based on the reports on previous expenditures and work plan for the following period. A disbursement schedule based on the activity implementation schedule is presented in Table 2.

**Table 2: Disbursement Schedule**

SOURCES OF FINANCING	'000 EUR			
	1 <sup>st</sup> Semester	2 <sup>nd</sup> Semester	3 <sup>rd</sup> Semester	Total
African Water Facility	404.709	462.524	311.138	1178.371
PETROMOC	24.52	24.52	24.52	73.56
GOM	8.09	8.09	8.09	24.27
<b>Total Financing of Costs</b>	<b>445.038</b>	<b>503.957</b>	<b>349.262</b>	<b>1276.201</b>

3.6.2 The financial management capacity at the National Directorate for Hydraulics was found to be adequate considering the relatively small number of financial transactions expected in the study. The Bank Regional Office in Mozambique is expected to provide its support for managing the study special account. Payments will be made by the Implementing Unit to the Consultant based on the work flow and that performance with respect to terms of reference (TOR) reports of the assignment as follow:

Payment	%	Deliverable	Period
Advance Payment	20	Contract signature and letter of Guarantee	Dec 07
First Interim Payment	15	Inception Report	March 08
Second Interim Payment	15	Interim Report	June 08
Third Interim Payment	25	Draft Final Report	Sept 08
Final Payment	25	Final Reports	Dec 08
Financial resources mobilization workshop		Provision of Workshop	Jan 09

### 3.7 Accounting and Audit Arrangements

3.7.1 In the interest of fast tracking the implementation of the Study, the AWF will recruit and retain an auditor to perform ex post evaluation or supporting documents review and audit the Study. The AWF will require that a statement of expenditure and supporting documents review be performed and certified by the independent auditor at predetermined intervals to ensure that funds have been utilized in line with the grant agreement. The costs of such audit shall be paid from the AWF operation budget not from this grant.

### **3.8 Monitoring, Evaluation and Reporting Arrangement**

3.8.1 The foundation for the overall project monitoring (and evaluation) systems will be the logical framework and a series of key performance indicators. The monitoring indicators will compare performance with the set targets.

3.8.2 The Preparation Study shall be carried out in the following structure: 1) Inception Report, 2) Draft Interim Report and 3) Draft Final Report. Feedback from AWF, the operation complex and MZRO shall be provided to the consulting firm for all the reports. The draft final report will be formally presented and discussed in a workshop involving all key stakeholders. On the basis of the results of the workshop, and feed back from all stakeholders, the final report shall be produced as well the semi-detailed design and BOQ for the first phase of the project (see section 3.4.1). By the completion of the Study, the GoM with other beneficiaries will organize another workshop to present the study findings and solicit funds for the project implementation.

## **4 EFFECTIVENESS, EFFICIENCY AND SUSTAINABILITY**

4.1 A full time Study Coordinator who will be in charge of the study to ensure high level professional inputs and provide collective decision making during the conduct of the study. The Study Steering Committee will ensure that all the concerned departments are actively involved and will internalize the outputs of the study for subsequent implementation of the recommendations.

4.2 In the conduct of the study the consultant will carry out discussions and dialogues with officials from the Government agencies, and Local Governments staff in addition to undertaking site visits, as needed, to the project area. As part of the study process, the Consultant will work closely with local counterpart staff (including COFAMOSA) assigned to the study to transfer know-how through participation in the field visits, and discussions. The Consultant will also assess the long-term requirements of human resources development and capacity building at all levels and makes appropriate recommendations to be incorporated in the study output for consideration during the implementation stage of the proposed project.

4.3 The consultant will hold participatory workshop which will allow all stakeholders including beneficiaries, and development partners to contribute in the study preparation. The participation of the beneficiaries, in particular, in the discussions expressing their needs and choice of technologies and systems, which will be managed and operated by them, will positively emphasize sustainability of the infrastructure to be proposed in the study. This will raise their consciousness about the infrastructure to be provided and the need for their contributions in future.

## **5 CONCLUSION AND RECOMMENDATIONS**

### **(i) Conclusions**

5.1 The COFAMOSA Irrigation Project is aligned with the Mozambican's investment strategies and programs for food security and poverty alleviation. The project is also in compliance with the objectives and priority areas described in the Bank Group's 2006-2009 Country Strategy Paper (CSP) for Mozambique. The project supports the Bank Group's strategy which aims to promote economic cooperation and regional integration of RMCs which will also in line with MDG 8 aiming to develop a global partnership of development.

5.2 The Integrated Study is essential to the development of the Sabie-Inkomatie basins as it will identify and provide preliminary designs and costs for the necessary project infrastructure as well as perspectives for the long-term water resources utilization, especially for agricultural use. Additionally, the study will address social and environmental impacts and suggest mitigation measures to be adopted during the project semi-detailed design and implementation. The institutional and financial arrangements proposed by the study will provide a workable business and financial model that will ensure the project sustainability while achieving its developmental objectives.

(i) Recommendations and Conditions

5.3 In the light of the foregoing, it is recommended that the African Water Facility approves a total grant not exceeding EUR 1,178,367 million to the Government of Mozambique to undertake the study described earlier in section 2.4.

5.4 The following conditions for first disbursement from the grant should be met:

- (i) The appointment of Study Coordinator acceptable to AWF (Para 3.2.3)
- (ii) Establishing of an the Special Account in a bank acceptable to AWF (Para 3.6.1)

5.5 Other condition

- (i) The establishment of the Study Steering Committee (Para 3.2.3)

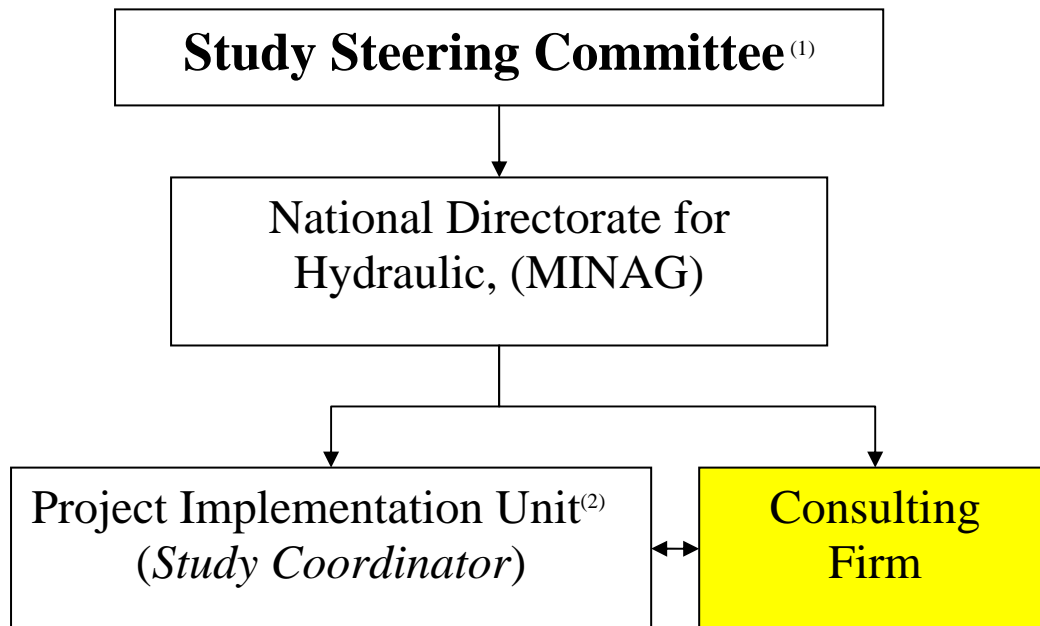


## Annex 2

### Estimated Costs for the Preparation Study for COFAMOSA Irrigation Project

	Type	QTY	Unit Cost (Euros)		Cost (Euros)		Total Cost
			Local Cost	Foreign Cost	Local Cost	Foreign Cost	
<b>African Water Facility Grant</b>							
<b>Staff Costs</b>							
Team Leader	p.m	12.0		11,397		136,765	136,765
Water Resouces Engineer	p.m	2.0		11,397		22,794	22,794
Water systems and Irrigation Engineer	p.m.	7.5		9,706		72,794	72,794
Dam Engineer	p.m	1.0		9,706		9,706	9,706
Civil Engineer (Rural infra-structure)	p.m.	5.0	5,662		28,309		28,309
Road Engineer	p.m.	2.0	5,662		11,324		11,324
Electromechanical Engineer	p.m.	5.0		9,706		48,529	48,529
Power supply and electricity Engineer	p.m.	3.0	5,662		16,985		16,985
Soil Classification Expert	p.m.	2.0	5,662		11,324		11,324
Agronomist and crop specialist	p.m.	2.0	5,662		11,324		11,324
Sugar cane processing expert	p.m.	3.0		9,706		29,118	29,118
Ethanol Production expert	p.m.	3.0		9,706		29,118	29,118
Institutional Expert.	p.m.	2.0		9,706		19,412	19,412
Legal Expert	p.m.	2.0	7,353		14,706		14,706
Financial Expert	p.m.	2.0	7,353		14,706		14,706
Agricultural Economist & Marketing Expert	p.m.	2.5		9,706		24,265	24,265
Technicians and support staff	LS						3,676
<b>Sub-total Staff Cost</b>							504,853
<b>Resettlement Action Plan and ESIA</b>							
						224,265	224,265
<b>Study Expenses</b>							
Topographic Survey	LS				110,294		110,294
Soil Survey	LS				55,147		55,147
Geotechnical works	LS				51,471		51,471
International Travel	L.S				14,706		14,706
Local Transport	LS				7,353		7,353
Maps and Reports Production	LS				14,706		14,706
Others	LS						22,059
<b>Subtotal</b>							275,735
<b>Office Equipment</b>							
Computers	Unit	4.0	1,103		4,412		4,412
Printer	Unit	2.0	735		1,471		1,471
Plotter	Unit	1.0	6,618		6,618		6,618
Photocopy Machine	Unit	1.0	3,676		3,676		3,676
Fax	Unit	1.0	2,941		2,941		2,941
Office supplies					1,471		1,471
Others							1,471
<b>Subtotal</b>					-		22,059
<b>Organization of Workshop</b>	L.S	2.0			58,824		58,824
<b>Contingencies (6.5%)</b>					70,573		70,573
<b>Total Consultancy Service</b>							1,156,308
<b>Organization of the Final Stakeholdes Workshop</b>					22,059		22,059
<b>Grant Total</b>					<b>561,602</b>	<b>616,765</b>	1,178,367
<b>PETROMOC-Contribution</b>							
<b>Project Management</b>							
Study Coordinator	month	12.0	2,206		26,471		26,471
<b>Operational Expenses</b>							
Vehicles (2)	month	24	1,103		26,471		26,471
Vehicles O & M	month	24	346		8,294		8,294
Drivers	month	24	143		3,441		3,441
DSA	month	12	588		7,059		7,059
Meetings	month	LS	1,838		1,838		1,838
<b>Subtotal (PETROMOC)</b>							73,574
<b>GoM Contribution (in kind)</b>							
Office Space	month	12	735		8,824		8,824
Field accommodation	month	3	735		2,206		2,206
Staff Time	month	36	368		13,235		13,235
<b>Subtotal (GOM)</b>							24,265
<b>Total Cost for the Feasibility Study</b>							<b>1,276,205</b>

**Annex 3**  
**Study Organization Chart**



<sup>(1)</sup> Steering Committee Membership may include the following:

- Ministry of Planning and Development (MPD)
- Ministry of Agriculture (MINAG)
- Ministry for the Coordination of Environmental Affairs (MICOA)
- Ministry of Water and Public Works
- ARA-SUL
- Maputo Provincial Government authorities
- Inkomatie Watershed Management Authority.
- PETROMOC
- COFAMOSA

<sup>(2)</sup> In line the GOM decentralization policy, the Project Implementation Unit will be based on Maputo Provincial Directorate for Agriculture.

**Annex 4**  
**Integrated Study for COFAMOSA Irrigation Project - Implementation Schedule**

Study Activities and Milestones	2008																	2009	
	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
President Approval	O																		
Entry into force		X																	
Procurement of the Consultancy Services		X	X	X	X														
Award of Contract					O														
Mobilization of Consultants					X														
<b>Technical Studies</b>						X	X	X	X	X	X	X	X						
Water Resources Assessment Study						X	X	X	X	X	X	X	X						
Baseline Study							X	X											
Engineering Study									X	X	X	X	X	X	X				
Irrigated Agriculture and marketing Study								X	X	X	X	X	X						
Institutional Management and Capacity Building Needs Assessment;												X	X						
Policy, Regulatory and Legal Framework												X	X					X	
Financial and Economic Analysis														X	X				
Environmental and Social Impact Assessment (ESIA & RAP)									X	X	X	X	X	X	X				
<b>Submission of Inception Report</b>								O											
<b>Stakeholders Workshop</b>								O											
<b>Submission of Interim Report</b>										O									
<b>Submission of draft Final Report and Workshop</b>														O					
Analysis and Comments Consideration														X	X				
<b>Final Report</b>																O			
<b>First Phase Semi-Detailed Design and BOQ</b>															X	X	X		
<b>Financial Resources Mobilization Workshop</b>																		O	

X Study Activity    O Study Milestone

## **Terms of Reference**

### **1 Introduction**

1.1 Mozambique has witnessed rapid growth since achieving peace in 1992. The economy growth has reached 8% annually between 1994 and 2004, though from a very low base and the national poverty headcount index fell from 69% in 1996 to 54% in 2002. Economic policy reforms together with political stability and substantial donor support (estimated to represent 60% of the national yearly budget of \$700 million U.S.) have contributed to macroeconomic stability, foreign direct investment, socio-economic development, and significant poverty reduction. Yet Mozambique remains one of the poorest countries of the world, with a per capita income of US\$230 in 2003, well below the average for Sub-Saharan Africa at US\$500. Also, the achievements in poverty reduction mask significant regional variations, a slight increase in income inequality over 1997-2003, and still high levels of absolute poverty and malnutrition.

1.2 Meanwhile, the Government of Mozambique (GOM) is determined to promote continued economic growth and poverty reduction. Absolute poverty reduction is the main priority for all Government action, as reflected in its Five-Year Program 2005-2009 and in its Poverty Reduction Strategy Paper (PARPA-I, soon to be followed by PARPA-2). Mozambique's medium-term poverty reduction strategy aims to reduce poverty headcount from 54% of population in 2002 to 45% in 2009, and to promote human well-being and economic development through rapid, inclusive and broad-based growth through the following three pillars: (i) good governance; (ii) human capital; and (iii) economic development. Agriculture and rural development, as well as improvements in natural resources management, are considered key interventions in achieving economic growth and poverty reduction.

### **2 The Agriculture Sector**

2.1 Although constraints exist, Mozambique possesses the fundamentals to realize its considerable agricultural potential. The country is endowed with natural resources, including numerous fertile agro-ecological zones, but only about 10 percent of its 36 million arable hectares are cultivated. Mozambique has 104 river basins, 20 million hectares of forests, and a coastline of 2500 km of white-palm-fringed beaches with three major ports. The current government is committed to rural growth and development. However, due to budgetary constraints, the potential can only be achieved through public-private partnerships (PPP) in which the Government provides an enabling policy and legal environment and the private sector assumes the financial risks and reaches out to rural areas.

2.2 The Government of Mozambique's National Program for Agricultural Development (PRO-AGRI), was one of the first agricultural sector-wide approaches adopted in Eastern and Southern Africa. The first phase of the Government's program, PRO-AGRI-1, attracted substantial donor support – using a common flow-of-funds mechanism as a means of harmonizing donor interventions – and focused on



agricultural aspects of the Poverty Reduction Strategy. PRO-AGRI-1 attained important achievements in relation to institutional reform at central level and in supporting decentralization to districts and provinces. PRO-AGRI-II began in 2006 and it recognized the importance of horizontal integration across sectors and, thus the importance of marketing, finance and rural roads for agriculture growth. Increasing overall productivity in rural areas is a specific objective of PROAGRI-II, which agriculture and agro-industry are specific focus. Credit and investment facilities are also proposed with a view of boosting the rural economy. Implementation of the sector program (PROAGRI-II) is expected to be an essential mechanism in helping to achieve the goals of PARPA-II for this sector.

2.3 The cash crop sector has the potential for substantial yield increases. Today cash crops occupy roughly 5% of cultivated land and contribute to some 5% of agriculture GDP, which in turn is about 6% of the country's overall exports. The traditional cash crop sector includes cotton, tobacco, cashew, sugar, and tea. Cotton and tobacco are grown under contract, cashew is a smallholder crop, and sugar and tea are plantation crops. As in the food crop sector, there is a major gap between potential and actual yields.

2.4 More emphasis on production of higher value crops, including value-added processing, will create employment opportunities and generate income for the rural population. Sugar is likely to be one of the most important export commodities in the future with removal of the EU subsidies and Japan that is projected to be importing around 75% of the world's fuel ethanol by 2012, according to statistics provided by Ethanol Africa.

### **3 The Irrigation Sector**

3.1 Water resources are amply available in the country, yet water abstraction averages 635 million m<sup>3</sup>/ year, representing only 0.3% of total renewable water resources. With a potential irrigated area of about 3 million hectares, irrigation of more land will increase the yield and quality of cash crops. Mozambique's irrigated areas lie mainly in the central and northern provinces, with the Zambézi basin accounting for nearly 60% of the total. There is less irrigated land in the south, about 300,000 hectares. Out of the 3 million hectares that are estimated to be irrigable, about 97,000 are equipped for irrigation but only 37,000 (or 40%) actually are irrigated. Of the three types of irrigation — large-scale public, donor-funded small-scale, and farmer-run micro irrigation — smallholdings are most likely to be expanded where the second and third types of irrigation are available. The first type is mainly used by large commercial farmers. For example, about 36,000 hectares are currently cultivated for the production of sugar cane.

3.2 The long-term sustainable use of natural resources and, more specifically, land, forests, wildlife and water are key ingredients of the Government's strategies for sustainable development. In the Poverty Reduction Strategy, the GoM has committed itself to promote and enforce the sustainable use of natural resources for the benefit of the country as a whole, and to encourage the cultivation of renewable resources. The 1991 Water Law is based on a river basin approach towards water management. According to this law, water and hydraulic structures of public interest are State property. By law, the Ministry of Public Works and Housing is responsible for water management. Furthermore, the social, economic and environmental impacts of

hydraulic works have to be assessed before their implementation. At the national level, water management is the responsibility of the National Water Directorate (DNA), while at the regional level the five Regional Water Administrations (ARAs) are the responsible entities. They control the irrigation systems and collect water fees. The only ARA fully operational by 2000 was ARA-Sul (South), and is in charge of the southern part of the country up to the Sabie River, where most problems of water management exist. In areas not yet covered by an ARA, the Provincial Directorates of Public Works and Housing are the authority responsible for water resources management in the province.

3.3 The National Water Policy was issued in 1995, listing principal policies with the main aim being to guarantee the attainment of a sustainable water supply and sanitation. Declarations pertaining to agricultural water management in the policy focus on the private sector participation in order to obtain full benefit from existing irrigation and hydroelectric schemes. The Policy also emphasized the importance to create conditions for the attraction of private investment to make full use of the existing investments already made in dams for irrigation and electricity generation, and to rehabilitate small water impoundments.

3.4 The National Irrigation Policy and its implementation Strategy were adopted in 2002, recognizing the great strategic importance vested with irrigation. The guiding principles are: water resources, although renewable, are not inexhaustible and therefore it is necessary to manage, control and preserve them rigorously; water is an economic resource, which deserves an appropriate economic and social value; water and irrigated land are public assets whose use has to depend on a license.

## **4 The Sugar Sector**

4.1 Over the last few years, the sugar industry has been one of the fastest growing sectors in Mozambique economy. It has been successful in attracting a significant level of foreign direct investment. Sugar production in Mozambique has risen from 39 000 tons in 1998 to about 240 000 tons in 2006, largely due to improved productivity at both the farm and sugar mill levels through a rehabilitation program implemented by the sub-sector in 2000.

4.2 A key objective of the Mozambique sugar industry is to grow in size over the next few years in order to capture greater economics of scale and become cost competitive producers. The industry, therefore, must increase its supply of sugarcane. At present, the vast majority of cane is grown on large estates that are owned by the milling companies. However, this production model does not have a strong socio-economic dimension to increase the number of local farmers involved in commercial agriculture in order to boost rural income and alleviate poverty. The out-growers schemes are successfully promoted in many countries, including South Africa, Zambia, Malawi and Tanzania. Similarly, Mozambique has plans for integrating more stallholders/independent cane growers, e.g. The MAFAMBISSE Project which is to develop 2.000 ha under independent cane growers at Mude District.

4.3 The profitability of sugar and its sustainability will depend on EU and domestic protection policies. Under the EBA negotiated with Mozambique in 2000, the country is to obtain free access to the EU market as of 2009. However, the EU policy reform on sugar has reduced the price paid for sugar in the EU and the price for

sugar will fall by 12.7% by 2008. Prices may be further reduced from 2013 if additional reform of the sugar regime takes place.

4.4 Sugar growing and processing has scale economies and requires substantial capital investments in the form of irrigation, land, rail, and processing facilities. Smallholder models are also feasible as in the sugar sub-sector in Mozambique as well as other countries (Kenya and Swaziland) but that form would require greater partnership between public and private sectors in shouldering the public costs involved.

4.5 Efforts to substitute alternative fuels for petroleum are gaining attention in a world threatened by high price of oil, climate change, and instability in major oil-producing countries. Bio-fuel crops sequester carbon dioxide from the atmosphere while they are growing, offsetting the greenhouse gases released when the fuel is subsequently burned. Sugarcane is, by far, the most efficient of the current feed stocks—yielding eight times as much energy as is needed to produce the ethanol. The sugar industry in Mozambique has two potential markets in which to sell ethanol: domestic market provides that the GoM decides to establish a national bio-fuel program, which would create a local market for fuel grade ethanol; and for the export market. Mozambique has unlimited duty-free access to the growing EU ethanol market. If GOM decides to go for 10% mix, the domestic market will be very limited, between 9 and 10 million liters per year; even if the mix goes up to around 25% (which would only be in the medium term), domestic demand would only be equivalent to approximately 24 or 25 million liters per year. Xinavane alone, purchasing additional molasses from Maragra, could produce around 16 million liters from molasses.

4.6 A third ethanol potential market for Mozambique is the SADC region especially South Africa that currently consumes up to 80% gasoline of the whole region. However, there is a need to analyze the constraints on access, such as policies and harmonization of standards with neighboring countries. As the COFAMOSA project involves farmers from both Mozambique and South Africa, and the reported decision by Tongaat-Hulett, an important South African sugar company that is planning to build ethanol plant in Mozambique, it is possible that the project could open up access to the South African market. Currently, the draft South African strategy on bio-fuels envisages the use of domestically-produced bio-fuels.

## **5 Project Context, Study Area and Beneficiaries**

5.1 Under the proposed COFAMOSA Irrigation Project, the Government of Mozambique intends to develop an area of 29,000 ha for irrigated land under sugar cane for sugar and ethanol production. The project area is located in Moamba and Magude Districts of the Province of Maputo, and has been selected, mainly, due to the accessibility of water from the Corumana Dam on the Sabie River, availability of good irrigable soils and the close proximity to potential local and regional markets for sugar and bio-ethanol. COFAMOSA is a committee for the Facilitation of Agriculture between Mozambique and South Africa. COFAMOSA was established in 2001 and operates from Moamba District, Maputo Province, Mozambique.

5.2 The goal of the project is to reduce poverty levels in the Moamba and Magude Districts of Mozambique through increased exports of sugar and ethanol from

Mozambique to the region and beyond. Based on the preliminary studies, the project aims to: (i) develop 29,000 ha of irrigated land in possibly 3 phases, over a period of ten years (first and second phase 10,000 ha each and the third phase of 9,000 ha) (ii) re-settle over 500 farmers in the project area (iii) make use of already existing investment in Corumana Dam and available good irrigation soils; (iv) create 18,000 jobs (70%) of economically active people in the area); and (v) make permanent impact in districts of Moamba and Magude and the overall Mozambican national economy. The study would validate the above mentioned data and make recommendations based on the situation on the ground.

5.3 The Project is situated in the Sabie Administrative Post in Moamba and Magude Districts in Maputo province. The populations of Moamba and Magude Districts are estimated at 43,396 and 42,788 people respectively. The key beneficiaries of the project are the farmers in Moamba (Sabie Administrative Post) and Magude (Panjane Administrative Post) Districts as well as farmers from Inkomazi area in Mpumalanga in South Africa. According to COFAMOSA arrangement, South African farmers will receive 40% allocation of the proposed 10 000-hectare (first phase) irrigation development for a period of 30 years. In exchange for the 30-year lease, farmers will share their business and agricultural skills with their Mozambican counterparts as part of skills transfer and job creation initiative. To date COFAMOSA has selected a total of 200 farmers for the first phase (10 000 ha) of the project of which 80 are from the South African region and 120 from Mozambique.

5.4 In preparation of this project, COFAMOSA completed a Pre-feasibility Study on July 2003. In November 2006, the GoM granted water and land rights to COFAMOSA for an area 10,000 ha for Phase I of the project. Irrigation water will be provided by gravity from Corumana Dam through Sabie River. Implementation of the second and third phases will require the rehabilitation of the Corumana Dam to provide the additional water needed to irrigate the remaining area of 19,000 ha. The GoM plans to provide the project area with the proper infrastructure in terms of roads, power, and other social and farm services. Sugar cane will be the main crop to be grown in the area to supply cane for sugar/ethanol production. The chain of sugar cane plantation, production, processing and marketing of sugar and/or ethanol will be managed through a Public-Private-Partnership between the GoM, farmers group (COFAMOSA), the Sugar Company, and PETROMOC as the ethanol off-taker. The project has the following main components: i) Infrastructure Development which would comprise detailed engineering design, land preparation, drainage system, installation of irrigation head works which include pump stations, main and sub-main pipelines, storage/balancing reservoirs and infield irrigation distribution systems; ii) Crop development and farmers support which would mainly be production of sugarcane and food crops, the related farm machinery, and training of staff and beneficiaries; iii) Farm and social infrastructure comprising bulk electricity, inter-connector roads, bulk water supply, farmers' and supervising field managers' houses, storage facilities and office space, a school, drinking water facilities and feeder roads; iv) Establishment of two private sugar mills and a refinery; and v) Project management including the recruitment of the technical assistance services, HIV/AIDS awareness campaigns and the implementation of the Environmental and Social Management Plan (ESMP), including a biodiversity baseline and a resettlement action plan for the 29, 000 ha.

## **6 Objective of the study**

6.1 The overall long term outcome of the study will be to enable Mozambique optimizing the land and water resources potential of the Sabie-Inkomatie area assigned to COFAMOSA with respect to water development for irrigation, while enhancing the socio-economic benefits of the project area and protecting the biophysical environment in the area.

6.2 The main study outputs will be the comprehensive Feasibility Study report upon which the project preparation and investment will be based. This final report is to include analysis of technical, institutional, economic, social, environmental and financial aspects of the project which will include an optimized long-term water resources assessment, allocation and utilization in the Inkomatie River Basin. The study will also include the preparation of semi-detailed designs and bill of quantities (BOQ) for the main irrigation systems for the first phase of the project (10,000 ha) and a typical irrigated farm business model that will guide the farmers in the operations of their land investment. The study will also produce a draft agreement for potential public private partnership arrangement in the use and management of water resources in irrigation. Based on findings of study, the GOM along with key stakeholders will organize a financial resources mobilization workshop to consider project implementation and funding.

## **7 The Study Scope and Structure**

7.1 The proposed study will be conducted by a reputable and specialized consulting engineering firm over a period of 12 months. The scope of the Feasibility Study will cover various project design aspects, including technical, institutional, legal, land tenure, policy, social, cultural, economic, and environmental ones including a re-settlement action plan. In addition, capacity building needs assessment will be carried out. Due to the nature of the project, the Feasibility Study is also expected to elaborate on the local, regional and international potential markets for sugar and ethanol. To assist the project financing structure, the Study will explore the possibility of Mozambique benefiting from the Clean Development Mechanism (CDM), through the sale of carbon credits. Additionally, the Study will review and evaluate possible options for a Public-Private Partnership (PPP) to manage the project water conveyance systems, roads, sugar cane plantation, production, processing and marketing of sugar and ethanol. The Consultant will also look at the different business models suggested by COFAMOSA in relation to the sugar companies establishing two private sugar mills and a refinery as well as to the Petromoc model for ethanol production and perhaps suggest alternative models. Finally, the Consultant will also prepare the Feasibility Study report and associated annexes which later could be further elaborated up to the preparation stage of COFAMOSA Irrigation project. The study will also include the preparation of detailed designs and bill of quantities (BOQ) for the main irrigation systems for the first phase of the project (10,000 ha).

7.2 The Consultant shall propose, based on knowledge and experience, the best approach/methodology to undertake the Study taking into consideration all the aforementioned, but not limited to, the following sub-studies:

## **h) Water Resources Assessment and Management Study**

7.3 Based on the available data, the consultant will carry out an analysis of the implementation status of the interim water agreement between Mozambique, Swaziland and South Africa on the Inkomatie River and the institutional analysis of the Inkomatie Watershed Management Authority. Additionally, the study will include the analysis of the water resources status in the Inkomatie River Basin in terms of supply and demand by various sectors and future plans for water harvesting, allocation overall management requirements for sustainable utilization of the available water resource. The water resources management and assessment study will include the following:

- An analysis of the implementation status of the interim water agreement between Mozambique, Swaziland and South Africa on the Inkomatie River and the institutional analysis of the Inkomatie Watershed Management Authority;
- Water resources status in the Inkomatie River Basin in terms of supply, demand and water balance by various sectors and future plans for water harvesting and allocation;
- An analysis of possible climate change impact on the Sabie-Inkomatie River and catchment system, noting that the reality of global warming was manifesting locally in the severe flood event in 2000 of the Sabie River;
- The water resources study shall also include an examination of the robustness of the water rights that have already been issued for the initial 10,000 ha irrigation. The project shall also initiate the process of ensuring the water rights for the remaining 19,000 ha which depends on the construction of gates at the Corumana Dam.
- Irrigation infrastructure, with the main focus on Corumana Dam and future rehabilitation plans, in addition to structures for water conveyances, control and distribution

## **i) The Baseline Study - detailed description and analysis of the prevailing situation in the project area**

7.4 The Consultant is expected to carry out the following activities:

- Review available technical data, studies and reports that are relevant to the scope of the project. The Government will make available to the consultant, at no extra cost, copies of the documentation (including maps and satellite image) in its possession. These include all previous studies carried out on the Corumana Dam watershed and Sabie-Inkomatie river basins. Particular attention should be given to the studies carried out on the project area, including the Feasibility Studies prepared in the late 80's and early 90's, including soil studies, population/demographic census, soil surveys, vegetative cover, forests inventory, ecological zoning, etc., These studies were further detailed as integral parts of the National Irrigation Development Master Plan (NIMDP) in 1992, together with the Sabie/Inkomatie Basin. Finally, the Pre-Feasibility Study which was prepared by COFAMOSA in July 2003.
- Undertake field investigation, when necessary, to confirm the available information. The Consultant will also meet extensively, as appropriate, with

the various governmental and private institutions to collect data and information.

- Based on the above, a list of the available data and information will be included and will be used as appropriate within the various chapters of the Feasibility Study report.
- Prepare and present a detailed description of the status of the infrastructure, water and agriculture sectors highlighting the recent sector experience, best practices and lessons learned. The baseline study will include the following:
  - Topography maps (1:25,000 up to 1:5,000 if necessary), relevant satellite images and aerial photos for use in the assessment of soil, topography, geology, river basins, stream network, and land and water resources;
  - Climatic data (temperatures, winds, rain, evaporation);
  - Characteristics of agriculture in the region (soils, crops, land tenure and ownership, irrigation practices, farmers organizations);
  - Existing rural sector financing systems;
  - Assess the institutional capacity to provide adequate and timely services to irrigated sugar cane production, in the area of extension and the use of auxiliary farmers.
  - Road conditions and plans for rehabilitation and construction of new ones;
  - Electricity grid and plans for grid extension and/or off-grid electrification in the project area
  - Current use of electricity in the area, including source of generation, as well as non-electricity energy consumption
  - Forecasted electricity demand
  - Current status regarding co-generation at the existing sugar factories, legal framework for selling electricity to the national grid, potential for co-generation at new facilities.
  - Description of any ongoing project or program addressing the energy situation in the project area
  - Availability of social infrastructure (schools, hospitals, markets);

#### **j) Irrigated Agriculture Study**

7.5 At the incept phase, the consultants is expected to reaffirm the pre-feasibility recommendations on the selection of sugarcane for the project area. The Consultant will conduct investigations aimed at determining the most up-to-date information on the following items: water requirements for optimum yield conditions and soil and water conservation measures; consumptive use and irrigation system efficiency; water losses by percolation and seepage, characterization of the agricultural drainage effluents and pre-treatment required before released in receiving ecosystems. The study report is expected to include: proposal on total hectarage to be planted each year by farmers' group and expected crop yield; and recommendations on the appropriate agricultural practices, soil and water conservation measures, tillage, land preparation and cultural operations.

7.6 A soil survey of the project area will be undertaken by the consultant's team. A detailed soil map will be produced and shall form the basis for detailed land classification and exact delineation of the irrigable lands. The method of soil survey

and land classification shall be based on appropriate FAO guidelines for land evaluation for irrigation agriculture. The Institute for Agrarian Research of Mozambique (IIAM) of the Ministry of Agriculture (MoA) will provide the consultant's team with available data, maps and reports on the soils of project area.

7.7 Based on the obtained soil data, the consultants will carry out an evaluation of soil quality to determine soil suitability for sugar cane growth, which should be based on the consideration of morphological, physical, and chemical properties of the soil profiles.

7.8 The Consultant will conduct investigations aimed at determining the most up-to-date information on the following items:

- water requirements for optimum yield conditions and fertilizer/pesticide needs (with an emphasis on Integrated Pest Management);
- suitable sugar cane varieties and recommended agronomic practices;
- soil conservation measures;
- consumptive use and irrigation system efficiency;
- water losses by percolation and seepage, characterization of the agricultural drainage effluents and pre-treatment required before released in receiving ecosystems;
- agricultural support service facilities, including credit extension and input supply.

7.9 Based on the above, the Feasibility Study report is expected to include:

- A proposal on total hectareage to be planted each year by farmers' group and expected crop yield;
- Recommendations on the appropriate agricultural practices, soil and water conservation measures, tillage, land preparation and cultural operations, including the promotion of IPM;
- Status of and recommendations toward the provision of inputs such as seed, fertilizers, pesticides, mechanization, fertilization program for sugarcane, extension services and credits for COFAMOSA.

### **k) The Water Resources Engineering Study – Infrastructure Designs and Costs**

7.10 The Consultant will conduct technical studies in the fields indispensable for determining the required future infrastructure in the project area. In particular, that will involve the water availability; topographic survey of the zone (29,000 ha) at the appropriate scale, geo-technical surveys to determine the soil-bearing capacity and the availability of construction materials. Field studies conducted at the plots should also help defining the technical criteria for designing the project components.

7.11 The Consultant will also assess the irrigation water requirements in relation to the hydrological characteristics of the water sources, including considerations of pumped and/or gravity irrigation, drainage, assess the condition and functionality of existing water control irrigation and its suitability for improvement or development. Land clearing and leveling needs will also be evaluated and considered in the cost estimates.



7.12 Based on the review carried out under the baseline study, the consultants will propose, if needed, changes to the regulatory instruments for water allocation and uses, including water charges policies, regulations, and role of the of Inkomatie Water Management Authority.

7.13 Work in close collaboration with Electricity of Mozambique to estimate electricity load demand forecasts as well as establish typical load profiles for the Irrigation Systems and communities to be electrified. The consultants will also select the present distribution lines which will not be overloaded in a foreseeable future so they can be utilized. Additionally, it also expected to establish the basic outline design objectives that will lead to reliable and safe supply of electric energy, namely: Mechanical Design Objectives (poles, conductors); and Electrical Design Objectives (transfer characteristics, conductor capacity, distribution transformers).

7.14 The consultants will investigate the current use of or potential for electricity co-generation at the existing sugar factories and determine the potential for co-generation at the new facilities. The consultant will investigate the policy and legal frameworks regarding private power generation, feeding electricity into the national grid as well as private distribution of electricity;

7.15 In Mozambique, the high transportation costs act as a disincentive to producers. In general, the underdeveloped rural roads network fails to adequately connect productive areas to consumption centers. The Consultant will, therefore, carry out, if necessary, road inventory and condition survey in the project area. The road assessment will also include the missing cross drainage structures (bridges and culverts) and deteriorated roads with some stretches where poor soils cause traction difficulties.

7.16 The Consultant will also consider all alternative options for irrigating sugar cane and carry out detailed economic analysis for the technologically suitable methods of irrigation with view to recommending the most effective and technologically advantageous approach to irrigation development, operation and maintenance.

7.17 Using these results, the Consultant will propose alternative scenarios for project design and implementation including:

- Current and future water availability for the project area, taking into consideration the installation of the gates for Corumana Dam and/or the planned construction of the Moamba Major Dam on the Inkomatie River; Analysis for the dam rehabilitation should not be limited to irrigation but also consider all other downstream benefits including hydropower, flood management and drinking water supply.
- Power supply options and roads construction alternatives to serve the project area with due consideration to the comparative analysis of costs involved in crushing of the additional case from COFAMOSA project by the existing sugar plants or setting up new sugar mills capacities.

7.18 The proposals from Phase I will include estimated costs for each scenario and will be discussed and analyzed and presented in the project draft final report and discussed by the project stakeholder in a workshop.

7.19 Finally, the main outcomes of the Engineering study would include the following:

- Description of the land topography and soil quality, the suitability and need for irrigation and drainage;
- Feasibility designs of new/rehabilitated irrigation infrastructure together with the feasibility level engineering drawings, cost estimates, and implementation schedules for the various project components: bulk irrigation water supply; bulk electricity supply; drainage effluents treatment; road infrastructure and irrigation development;
- General layout plans, showing location and principal feature of the main works required for the irrigation and drainage supply network, the location of water distribution points and supply to the plots, and description of the overall operation of various networks;
- A typical farm layout plan indicating the location and principal features of works required within the individual farms.
- Detailed designs and bill of quantities (BOQ) for the main irrigation systems for the first phase of the project (10,000 ha).

#### **I) Marketing study**

7.20 The three phases of COFAMOSA project is also expected to add around 300,000 tons of sugar by 2017. The Consultant is, therefore expected to prepare and present a detailed description of the following areas related to sugar production:

- The current international trade agreements and preferences in agricultural commodities that are related to sugar. In addition to international, regional and bilateral intergovernmental agreements, the review will also address the national schemes that tax and otherwise regulate export/import of sugar;
- Review and update available technical data, studies and reports that are relevant to sugar production and local, regional and international markets, in particular the studies supported by CEPAGRI titled “Appraisal of the Impact of Sugar Pricing Policy and Investment in the Sugar Industry of Mozambique” and “The Adaptive Strategy and Action Plan the Mozambican sugar industry” which were carried by LMC International Ltd on October 2004 and March 2006 respectively;

7.21 Sugar Processing: The Consultants will review the existing processing facilities in Maragra and Xinavane. The Consultant, through a technological and economic studies, will assess the viability of expanding the existing sugar processing facilities or the establishment of new sugar mills independent of those owned by the sugar companies. In this connection, the consultants will study the following:

- Capacities of the sugar plants’ machinery and equipment and their levels of utilization;
- Additional quantities of sugar cane which can be crushed by the existing factories with the current plant, machinery and equipment;

- Identification of additional equipment or alteration in the milling and process technology and the least additional cost to process additional cane to be produced by the three phases of COFAMOSA project;
- Costs associated with transporting the additional sugar cane from the COFAMOSA project area to the existing sugar plants;
- Comparative analysis of costs involved in crushing the additional sugar cane from COFAMOSA project by the existing plants after incurring the costs of their expansion, if any, and costs of associated with setting up new sugar mills capacities of which should be commensurate with the projected cane availability from the project. The comparative analysis will also consider the recurrent costs of the two options;
- Evaluate the potential use of funding under the Clean Development Mechanism towards the costs of the ethanol production facility.
  - Environmental audits of the existing sugar mills in Maragra and Xinavane and the environmental review of the ethanol production plants will be addressed within the scope of the proposed ESIA Study.

7.22 As potential for ethanol production from COFAMOSA project could be up to 70 million liters per 10,000 has, the Consultant is expected to prepare and present a detailed description of the following areas related to bio-ethanol production:

- Taking into consideration that the market for crude oil remains very volatile and highly sensitive, the Feasibility Study will assess the future of ethanol market prices in Mozambique, at the regional level (e.g. South African market and EU as well as world markets);
- Address the challenges of ethanol production, marketing and commercialization, including the economic supply size of molasses at the project site to minimize transportation costs and to justify construction and operation of an economically and environmentally efficient ethanol production facility;
- The Consultant need to take into consideration and update, as needed, the study on the potential for Bio-Fuel Production in Mozambique which will start in early 2007. The study is financed and coordinated by the World Bank, the Government of Mozambique and the Italian Embassy. The first phase of the study will focus on the feasibility study of bio-fuels in Mozambique, namely its technical assessment and its economic, social and environmental sustainability. The second phase will address the design of a national bio-fuels strategy and the required Policy and legal framework.

7.23 The consultants will present the assessment for the next 10 – 15 years, of the current and potential future market for sugar and ethanol production by COFAMOSA Project, in addition to recommending suitable prices of each output (sugar/ethanol) which will later feed in the economic and financial analysis. The following will have to be put into consideration:

- Price levels at each level of the market chain;
- Mode of transport of the products to the market and the transport cost;
- Input requirement and costs;
- Level of investment required and possibility of using existing facilities for sugar processing;
- Cost of production;
- Opportunity costs of producing ethanol from sugarcane juice rather than sugar.
- Profit margin and rate of return to the farmers group (COFAMOSA), Sugar Estates, the petroleum Company (PETROMOC) and the project as whole; and
- Social benefits which would outweigh economic justifications, in any, must be clearly spelt out.
- Cross-cutting issues of poverty reduction, gender, land allocation, HIV/AIDS and private sector participation.

### **m) Institutional Management and Capacity Building Needs Assessment**

7.24 A detailed survey of the involved entities, organizations and institutions at national, provincial and district levels and their respective institutional capacities will be thoroughly carried out. The survey and institutional assessment will address the organizational, managerial, administrative and legal requirements specific for the implementation and operation of the project. The survey will assess the state of the farmers' group and various entities' preparedness to implement such investment activities. This will involve management methods and techniques, including M&E procedures, organizational arrangements, planning, staffing and training, financial management systems and performance, operation and maintenance systems, inter-agency coordination and sectoral policies as well as institutional arrangements related to decentralized systems.

7.25 The outcome of this survey will determine the needs assessment that the Project will have to fulfill in addressing the shortage of experienced personnel, skill gaps and lack of facilities. These outcomes will be translated into capacity building guidelines and plans.

7.26 A detailed institutional review of the technical and financial capacities of the Ministry of Agriculture (especially its Extension Services), the Ministry of Housing and Public Works, the Ministry of Health, and the Ministry of Education will also be undertaken in order to ensure that they could fulfill their obligations within the project area. The institutional assessment of MICOA will be undertaken within the scope of the ESIA Study.

### **f) Economic and Financial Analyses**

7.27 Economic, financial, risk and sensitivity analysis of the project will be undertaken up to the preparation level. This will include cost/benefit analysis of identified options and methodologies. Any costs induced by the potential project should be quantified and analyzed, including environmental and social risks, downstream impacts, compensation package for the resettlement of displaced and/or affected peoples, etc.

7.28 Additionally, in analyzing project costs and benefits, all basic assumptions will be clearly defined, as per the options chosen. Depending on the investment,

operating and maintenance costs, the Consultant will estimate the project's economic and financial rate of return. The Consultant will assess the cost of maintenance and water charges, the possible trends and the capacity of beneficiaries to bear such charges. Based on field trips and sensitivity analyses, the Consultant will also describe major project risks, potential impacts on project feasibility, and safeguards to be incorporated in project design.

7.29 Finally, the Consultant will prepare and submit the following:

- A narrative description of the analysis, including quantification and description of benefits, methodologies, and key assumptions;
- Fully documented Excel spreadsheets / COSTAB supporting the economic analysis;
- A draft financing plan including ADB, other potential donors, Government, private sector and beneficiary contributions.

### **g) Environmental and Social Impact Assessment**

7.30 In accordance with Article 3 of the EIA Regulations (Decree No. 45 Of 2004) of Mozambique, the proposed COFAMOSA is a category A project and is subject to a full-fledged Environmental and Social Assessment Study with a Public Consultation (ref: agriculture activities of more than 350 ha with irrigation). In accordance with the Bank's Environmental and Social Assessment Procedures (ESAP) of 2001, any project directly affecting land use areas of 2,000 ha and more, such as large irrigation and drainage projects, shall be assigned to Category 1, thereby requiring a detailed Environmental and Social Impact Assessment (ESIA), including the preparation of an ESIA Report and Environmental and Social Management Plan (ESMP). A Resettlement Action Plan (RAP) is also mandatory in view of the large population that is expected to migrate to the area from other districts in Mozambique and from South Africa once the full potential of the project is realised.

7.31 The objectives of the ESIA are to identify potential impacts on the biophysical, social, cultural and human environment from the proposed COFAMOSA's Irrigation Project and its four identified components and to compare these with feasible alternatives (including the "without project" option). The ESIA will describe the policy, legal and administrative framework in Mozambique including the Bank's Integrated Environmental and Social Impact Assessment Guidelines and other international standards. The project description and justification will detail and analyse the physical, biological and social conditions within the project area, project alternatives, potential direct, indirect and cumulative impacts and their significance. The Environmental and Social Impact Assessment (ESIA) will propose mitigation/enhancement measures, an environmental hazard management, an environmental and social monitoring program, public consultations and conclusive remarks leading to an action plan.

7.32 An Executive Summary of the ESIA Report in a non-technical language is required. It will outline the processes and procedures used, the baseline social and environmental conditions, the alternatives considered, the mitigation/enhancement measures, the monitoring program and the consultations with stakeholders. In addition the institutional capacities of MICOA and the cost of the implementation of the ESMP, and, if required, of the resettlement plan will also be included. The Executive

Summary shall be written in English and in Portuguese for the public consultation purposes. Annexes should include the list of professionals and organizations having contributed to the preparation of the ESIA report, the list of consulted document, including maps, detailed baseline data referred to in the report, and records of the consultation meetings with primary and secondary stakeholders.

#### **h) Business Model--Policy, regulatory and legal framework for potential PPP**

7.33 The Consultant will review and summarize relevant Government laws, statutes, policies, procedures, and manuals on water, agriculture and irrigation, agro-industry and rural infrastructure development. Assess and update information on the status and funding mechanisms of the agriculture and agriculture related rural infrastructure projects (rural roads, water conveyance, irrigation schemes, etc.) in the country and the project area in particular.

7.34 Crucial to the success of this project is the establishment of an appropriate institutional framework. The Consultant will, therefore, carry out a critical analysis of the advantages and disadvantages of introducing an independent farmers self-managed irrigation system, vis-à-vis the inclusion of irrigation services in the package of support services from the control (nucleus) estates. Other variants of approach to sugarcane irrigation development and management at both the estate and farmers levels should be examined.

7.35 Financial and management options will be developed to advise on appropriate land sizes assignment to various parties engaged in the project including the operator, COFAMOSA and local communities. Those options will also exploit all viable funding sources, whether public or private and to ensure the efficient management and maintenance of the investments. Additionally, the study will also develop a Business Model--workable PPP partnership model-- that will align financial incentives and that will allocate risks fairly among the different parties, including the Government of Mozambique, the sugar companies, PETROMOC, COFAMOSA and the local farmers' community.

7.36 A typical farm business model will also be developed to guide the farmers in the operations of their land investment.

#### **i) Preparation of the Study Final Report**

7.37 Using these study results, the Consultant will propose various alternatives engineering designs, institutional set-up and financial models for the establishment of the Public-Private-Partnership. The report will present an evaluation of the various alternatives based on engineering advantages and disadvantages; construction, financial and economic viability and O&M costs, in addition to the environmental, social and public health impacts. The feasibility report will be discussed through a stakeholders workshop after which the consultant will finalize taking into consideration the comments and suggestions raised by the stakeholders (Section 8.4).

#### **j) Stakeholder Consultation Workshops**

7.38 The Consultant will organize and facilitate two "Decision" workshops which include all stakeholders from national ministries, para-public institutions, and the

private sector. The first workshop will be carried out after the conclusions of the baseline study and will discuss the study approach and solicit feedback while the second workshop will seek comments on the study results, and options to finalize the draft final report.

7.39 After the completion of the final report, the GoM and other beneficiaries will organize a financial resources mobilization workshop to present the study findings to the donors, financing agencies and the private sector to solicit funds for the project implementation and prepare a financing plan for the project.

## **8 Methodology and Approach**

8.1 The Feasibility Study shall be carried out in the following structure: 1) Inception Report, 2) Draft Interim Report and 3) Draft Final Report. Feedback shall be provided to the consulting firm for all the reports. The draft final report will be formally presented and discussed in a workshop involving all key stakeholders. On the basis of the results of the workshop, the final report shall be produced within a month period. By the end of the study, the consultant is also expected to provide the detailed designs and BOQ for the project first phase of 10,000 ha. It should be noted that the ESIA report will be prepared and presented according to the requirements in Annex 5.

### *8.2 Preparation of inception report (2 months)*

8.2.1 Through the Inception Phase, the Consultant will carry out an extensive revision of the available baseline physical, biological, social, cultural, economic, institutional, legal, policy, and technical data, studies and information. The consultant will study all aspects of rural development plans within the project framework. The consultant will also undertake field reconnaissance and meet key departments and partners concerned by the study. The broad exploratory survey will touch all areas of concern to the study, especially the physical and human environment, social and economic factors.

8.2.2 The Inception Report will evaluate available data and assess the need for additional information to prepare the Project's Feasibility Study. The Inception Report will describe the methodology adopted by the Consultant for the Study and the development of a detailed Work plan and time schedule. The report, detailed plan, and time schedule must be approved by the client before they become final.

### *8.3 Interim Report (3 months)*

8.3.1 After compilation of the existing documentation and collection of the available data, the additional data which might include sampling and analysis of soils and water, aerial photography, topography of some areas, etc. The Consultant's work will cover the assessment of current related policies, legal and regulations, including land tenure policies and water allocation issues and procedures; quantity and quality monitoring; database management; sharing costs and benefits

8.3.2 The Interim Report will include outcomes of interviews, preliminary results of the various studies (a-h) described in sections 7.1 - 7.29. This exhaustive information collection and close consultation with stakeholders will also lead to the preparation of

detailed description and an analysis of the project options and components which should also be included in the Feasibility Study.

8.3.3 Feedback will be provided on the Interim Report by the Mozambican authorities and the Bank and it is expected that comments will be reflected in the draft Final Report.

#### 8.4 *Preparation of draft Final Report (3 months)*

8.4.1 Using these results, the Consultant will propose various alternatives engineering designs, institutional set-up and financial models for the establishment of the Public-Private-Partnership between the GoM, the farmers' group (COFAMOSA), the sugar companies and PETROMOC.

8.4.2 The report will present an evaluation of the various alternatives based on engineering advantages and disadvantages; construction, financial and economic viability and O&M costs, in addition to the environmental, social and public health impacts.

#### 8.5 *Organization and Facilitation of the Workshops*

8.5.1 The Consultant will organize and facilitate the workshops mentioned earlier in sections 7.38- 7.39

#### 8.6 *Preparation and delivery of Final Report and annexes (1 month)*

8.6.1 The Consultant will incorporate the comments and suggestion raised in workshop and, on the basis of the Feasibility Study, the consultant will prepare the final Study Report following the format generally adapted by the Bank Group and in accordance with the chapter headings set out in Annex 3. The final report will include the following:

- Description of the rationale for the project, identifying performance indicators (result-based log frame) and analysis, and reviewing key problems and opportunities and highlight recent sector experience and lessons learned;
- Overview of the main sectors and sub-sectors related to the project;
- Summary of the Poverty Reduction Strategy for the project area and the Executive Summary of the Environmental and Social Impact Assessment Study, including the resettlement plan, if appropriate;
- An institutional analysis of the proposed executing agencies for the project and required institutional support for assuming fully their role and responsibilities;
- Identification and description of the project components, including capacity building needs;
- Costs estimates and a financing plan for the proposed Project;
- Economic, financial, social, and environmental analysis in accordance with ADB guidelines,
- Project risks and mitigation strategies;
- Implementation arrangements that reflect appropriate linkages at central and local level with the private sector, other ministries and stakeholder participating in the Project;



- Contract packages and procurement methods, and plans and implementation schedule for major activities; this will include consulting requirements, and detailed Terms of Reference and a schedule of inputs for consulting service;
- Monitoring framework in accordance with ADB requirements incorporating appropriate arrangements and indicators for monitoring and evaluation;
- The Consultant will submit its own conclusion regarding the sustainability of the Project. The conclusion will be influenced, among others, by technical, financial, economic, social and environmental considerations. Consequences of the implementation, operation and management of the proposed development will also be considered when making any conclusion and recommendations;
- Appropriate annexes will include the sub-studies carried in support of the final Feasibility Study Report;
- Final reports requirements for the ESIA are listed under Annex 5.

8.6.2 The consultant will submit by the end of the study period the detailed designs, BOQ and bidding documents for the first phase of the project (10,000 ha).

8.6.3 All reports should be prepared in English with Portuguese's Executive Summary. Reports should be issued in 5 copies and submitted to GoM (3 copies) and the MZRO (2 copies).

8.6.4 The Consultant should regularly communicate with the study coordinator on any other work plan or impacts on progress as soon as they are foreseen or actually occur, to seek solutions or approvals. The Consultant should also ensure through day-to-day contacts that the study coordinator is fully informed about the status and progress of the work and the contract.

## **9 Study Implementation Arrangement**

9.1 The Ministry of Agriculture through the National Directorate of Hydraulics will coordinate the study activities. It will monitor the progress of the study, the flow of funds and report on the achievement of performance targets. It will coordinate with the Ministry of Planning and Development (MPD) for the funding aspects of the study, in mobilizing and channeling funds for the implementation of the program activities

9.2 The Government of Mozambique will establish a Study Steering Committee, consisting of representatives from the concerned ministries and key stakeholders. The Steering Committee will ensure that the feasibility study is professionally carried out in ways that it reconciles the interests and the benefits of the country and all the stakeholders of the project.

9.3 A full-time Study coordinator for overseeing the project activities and day-to-day coordination and contacts with the study consultant and other government agencies. Institutional setup for the study is shown in Annex 6.

9.4 A Technical Committee will also be established with a similar composition of the steering committee and will provide technical backstopping to the study coordinator and interact on frequent basis with the consulting firm to provide any available technical information required by the Consultant to fulfill its assignment at the local and sector level. The Technical Committee will also ensure achievement of

study objectives; ensure that reports at all stages of the study are prepared by the Consultant and that the views of the beneficiaries are duly incorporated; and review all technical documents produced by the Consultant.

9.5 The Ministry of Environment (MICOA), in accordance with the EIA Regulations (decree No.45 of 2004) will be accountable to review and approve the ESIA's TOR and the /ESIA draft study and ESMP, when available.

## **10 Summary of the Implementation schedule**

10.1.1 The study will be implemented over a total period of 12 months starting from the time the consultancy service contract is signed. The following is the proposed schedule of activities for study implementation:

1. Signing of the consultancy service contract	M
2. Mobilization of Consultants	M+1
3. Inception Report	M+3
3. Interim Report	M+6
4. Preparation of draft final report & Workshop	M+9
5. Final Report	M+10
6. Project Designs and BBQ	M+12
7. Financial Resources Mobilization Workshop	M+13

Where M stands for the date of signing of protocol agreement and the numerical figures represent months. A bar chart to this effect is attached as Annex 4.

## **11 Consultant's Commitments**

11.1 The Consultant will undertake to respect all commitments set forth in the contract with the Government and implement all works required, including those sub-contracted. The Consultant will be fully responsible for conducting the study. He will, within the allotted timeframe and in accordance with established norms, put in place specialists, support structures, organization and logistics indispensable for the smooth implementation of his mission. He will remain in permanent contact with the study coordinator, program and specify operations to implement in concert with the follow-up unit set up within the Ministry of Agriculture.

11.2 At the end of the contract, all goods procured for the study or for which the consultant would have filed and claimed reimbursement will be handed over to the Government. The consultant will also forward all documents and dossiers as well as computer data produced during study implementation to the Government.

## **12 Government's Commitments**

12.1 The Government will put at the consultant's disposal all available information and documentation (reports, technical documents, maps, etc.). It will facilitate all local authorizations and contacts with other projects and partners active in fields of relevance to the study, and will introduce the Consultant to farmers and cooperatives operating in the study area. The Government of Mozambique will put adequate offices and furniture at the National Water Directorate at the Consultant's disposal throughout the study.

12.2 The Republic of Mozambique shall undertake to extend to the Consultant and other expatriate staff working with him, the following facilities and exemptions: (i) exemption from immigration restrictions for them and members of their family; (ii) residence visas, permits and authorizations needed to travel within the country; and (iii) authorization to import foreign exchange into the country in accordance with regulations in force. The Government, where necessary, shall authorize the re-exportation of the foreign exchange balance on completion of the study. Sale of personal equipment on which exemption had been granted but not re-exported at the end of the study shall be subject to regulations in force in Mozambique.

### PROFILES OF KEY INDIVIDUAL CONSULTANTS

Given the multi-sectoral and multi-disciplinary nature of the work to be undertaken within this assignment, the required Consultant should be a firm or consortium of firms (international and/or local), with the core firm having extensive experience in the elaboration of feasibility studies of agriculture and agro-industrial projects. Ideally, the consultant should propose a team that has at least the following capacities:

- Knowledge of Mozambique's water resources; agricultural and agro-industrial sectors with the main focus on sugar cane production;
- Knowledge of, and experience of analyzing, sugar and bio-fuels markets;
- Experience of the planning and design of water conveyance system and large scale and on-farm irrigation schemes;
- Knowledge of technological and technical aspects of the process of producing bio-fuels;
- Experience in analyzing the environmental and socio-economic impact of agro-industrial development;
- Knowledge of environmental issues associated with the production and processing of sugar cane for bio-fuels; and
- Experience in the preparation of engineering project feasibility studies and the formulation and preparation of developmental project, in particular in the agriculture and agro-industrial fields.

The Consultant should mobilize a multi-disciplinary team with the proper mix between international and national consultants. The team should have, at least the following core competencies:

<b>Description</b>		<b>QTY</b>
Team Leader	p. m.	12.0
Water Resources Engineer	p. m.	2.0
Water systems and Irrigation Engineer	p.m.	7.5
Dam Engineer	p. m.	1.0
Civil Engineer (Rural infra-structure)	p.m.	5.0
Road Engineer	p.m.	2.0
Electromechanical Engineer	p.m.	5.0
Power supply and electricity Engineer	p.m.	3.0
Soil Classification Expert	p.m.	2.0
Agronomist and crop specialist	p.m.	2.0
Sugar cane processing expert	p.m.	3.0
Ethanol Production expert	p.m.	3.0
Institutional Expert.	p.m.	2.0
Legal Expert	p.m.	2.0
Financial Expert	p.m.	2.0
Agricultural Economist & Marketing Expert	p.m.	2.5
Gender Specialist	p. m	1.0
Technicians and support staff	LS	

The ESIA study team will be composed of a national lead environmental assessment specialist, a biologist/ecologist, a hydrologist and water resources management expert, a bio-ethanol specialist, an agro-industry expert, public health specialist, a sociologist/gender specialist, an agronomist (ref: specialized in Integrated Pest Management) and a public participation specialist. All the national consultants shall be registered at MICOA in accordance with the Mozambican EIA Regulations.

The level of efforts for the preparation of the ESIA is estimated at five months plus 1 month for the Public Consultation (total 6 months) as follows:

Proposed ESIA Study Team

<b>Description</b>	<b>Unit</b>	<b>QTY</b>
Environmental Assessment Specialist – Team Leader	p. day	120
Biologist/ecologist (aquatic/terrestrial)	p. day	50
Hydrologist and Water Resources Management Expert	p. day	50
Bio-ethanol Expert	p. day	40
Chemist (sugar) and environmental Auditor	p. day	20
Public Health Specialist	p. day	40
Socio-Economist Specialist (Resettlement Action Plan (RAP) ) +local team	p. day	70
Sociologist/Gender Specialist	p. day	10
Agronomist (Integrated Pest Management IPM	p. day	20
Public Participation Specialist	p. day	20

\*Note: Complementary studies are included within the level of efforts of the technical resources mentioned above

1. Institutional Assessment of MICOA on the undertaking of regular environmental inspection/audits at the sugar mills for compliance with environmental regulations and pollution standards for sugar mills (liquid effluents, air emissions, solid waste handling and management, cleaner production measures, etc.) and a monitoring program of diffuse pollution levels in surface and groundwater downstream of the agricultural lands – Team Leader
2. Detailed social impact study (including resettlement issues and institutional framework for its implementation) to draw a full demographic and socio-economic profile of the District inhabitants and how their lifestyle and socio-economic conditions will be affected by the proposed project. This Study could take into account the Social Assessment done for the Sasoil project and the consultative process for the land allocation (10,000 ha) under the Land Act. In accordance with the Bank’s Gender Policy, the social impacts will be disaggregated by gender – Sociologist/Resettlement Specialist
3. Environmental audits of the Marraga and Xinavane sugar mills plants, if the existing sugar mills expansion scenario is considered, and the inclusion of the ethanol production plants and co-generation plants within the scope of the ESIA Studies – Team Leader
4. Preparation of the detailed ToRs for an External Monitoring Agency in order to ensure the compliance of the irrigation project with the ESIA’s ESMP, compliance with national legal and regulatory framework and international standards (e.g. ISO 14000) – Team Leader
5. Preparation of the IPM Manual and Training Curriculum - Agronomist



**Annex 3:**  
Proposed Table of Content of the Integrated Study

**Executive Summary**

- 1. ORIGIN AND HISTORY OF THE PROJECT**
- 2. THE AGRICULTURAL SECTOR**
  - 2.1 Overview of the Sector
  - 2.2 Land Tenure and Land Use
  - 2.3 Poverty, Gender and Health Issues
  - 2.4 Sector Development Constraints
  - 2.5 Sector Development Strategy and Priority Policy Reforms
  - 2.6 Agricultural Sector Development Program
- 3. IRRIGATION, AND RURAL INFRASTRUCTURE SUB-SECTORS**
  - 3.1 Overview of Irrigation Sub-sector
  - 3.2 Overview of Rural Infrastructure for Agriculture
  - 3.3 Overview of Sugar and bio-Ethanol
  - 3.4 Institutional Framework
  - 3.5 Donor Interventions
  - 3.6 Lessons Learnt from Past Interventions in Mozambique
- 4. THE PROJECT**
  - 4.1 Project Concept and Rationale
  - 4.2 Project Area and Beneficiaries
  - 4.3 Strategic Context
  - 4.4 Project Objective
  - 4.5 Project Description
  - 4.6 Production, Markets and Prices
  - 4.7 Environmental Impacts and Mitigation Measures
  - 4.8 Project Cost
  - 4.9 Sources of Financing
- 5. PROJECT IMPLEMENTATION**
  - 5.1 Executing Agency
  - 5.2 Institutional Arrangements
  - 5.3 Supervision and Implementation Schedule
  - 5.4 Procurement Arrangements
  - 5.5 Disbursement Arrangements
  - 5.6 Monitoring and Evaluation
  - 5.7 Financial Reporting and Auditing
  - 5.8 Aid Co-ordination
- 6. PROJECT SUSTAINABILITY AND RISKS**
  - 6.1 Recurrent Costs
  - 6.2 Project Sustainability
  - 6.3 Critical Risks and Mitigating Measures
- 7. PROJECT BENEFITS**

- 7.1 Financial Analysis
- 7.2 Economic Analysis
- 7.3 Social Impact Analysis
- 7.4 Sensitivity Analysis

## **8 CONCLUSIONS AND RECOMMENDATIONS**

- 8.1 Conclusions
- 8.2 Recommendations

Annexes: Executive Summary of the Environmental and Social Impact Assessment Study



#### Annex 4. Integrated Study for the COFAMOSA IRRIGATION PROJECT - Indicative Schedule

Study Activities and Milestones	2008												20					
	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J
President Approval	O																	
Entry into force		X																
Procurement of the Consultancy Services		X	X	X	X													
Award of Contract					O													
Mobilization of Consultants					X													
<b>Technical Studies</b>						X	X	X	X	X	X	X	X					
Water Resources Assessment Study						X	X	X	X	X	X	X						
Baseline Study							X	X										
Engineering Study									X	X	X	X	X	X	X			
Irrigated Agriculture and marketing Study								X	X	X	X	X	X					
Institutional Management and Capacity Building Needs Assessment; Policy, Regulatory and Legal Framework												X	X				X	
Financial and Economic Analysis														X	X			
Environmental and Social Impact Assessment (ESIA & RAP)									X	X	X	X	X	X	X			
<b>Submission of Inception Report</b>								O										
<b>Stakeholders Workshop</b>								O										
<b>Submission of Interim Report</b>										O								
<b>Submission of draft Final Report and Workshop</b>														O				
Analysis and Comments Consideration														X	X			
<b>Final Report</b>															O			
<b>First Phase Semi-Detailed Design and BOQ</b>															X	X	X	
<b>Financial Resources Mobilization Workshop</b>																		O

X Study Activity    O Study Milestone

## **Annex 5. Detailed Social Impact Assessment, and ESIA activities are listed under**

### **PROPOSED TERMS OF REFERENCE** **ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)/** **ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN/** **RESETTLEMENT ACTION PLAN (RAP)**

#### **1.0 INTRODUCTION**

1.1 As part of the Comprehensive COFAMOSA Feasibility Study the Consultant will be required to carry out an Environmental and Social Impact Assessment study (ESIA) as well as prepare an Environmental and Social Management Plan (ESMP) and a Resettlement Action Plan (RAP) ) as indicated in the main TORs

#### **2.0 PROJECT'S CONTEXT**

Within the context of the Maputo Development Corridor Agreement (1996) and related bilateral agreement between the Provinces of Maputo (Mozambique) and the Mpumalanga (South Africa) on economic cooperation, COFAMOSA (Committee for the Facilitation of Agriculture between Mozambique and South Africa), composed of 200 small and medium scale farmers (120 farmers from Mozambique and 80 from South Africa), presented its statutes in 2001 to the Ministry of Agriculture (MINAG) in order to obtain its registration. This registration was obtained the same year. Since then, the goal of COFAMOSA has been the development of 29,000 ha of irrigated lands in the Moamba District for sugar cane production. Considering the excellent soils for irrigation purposes and the availability of water from the reservoir of the Comurana Dam, 35,000 ha of the Sabie/Nkomati lower watershed was assigned for irrigation purposes since the early 1980. Feasibility studies on the preparation of irrigation schemes downstream of the Comurana Dam (completed in 1989) were done in 1981 (ref: Bonifica S.p.A Roma) and within the context of the National Irrigation Development Master Plan (NIDMP) in 1992. More recently, COFAMOSA has realized, through the recruitment of a consultancy firm, Du Plessis & Burger (PTY) Ltd and Conningarth Economists, an additional Pre-Feasibility Study in July 2003. The GoM, through the Provincial Government of Maputo, has allocated to COFAMOSA for the development of the 1<sup>st</sup> Phase (10,000 ha) in the Sabie-Nkomati area. The 2<sup>nd</sup> and 3<sup>rd</sup> Phase of the project is respectively of 10,000 ha and 9,000 ha. However, the phases are conditional on the installation of the gates on the Comurana Dam. In addition, ARA-SUL has confirmed the water rights to COFAMOSA for these lands starting in 2009. All the key conditions are now addressed to update the previous feasibility studies prepared for this operation.

#### **3.0 PROJECT'S JUSTIFICATION**

The GoM considers COFAMOSA as very important for the socio-economic development of Mozambique (potential pilot/anchor project) for the following reasons:

- This is a multilateral project (South Africa/Mozambique);

- Public (GoM)-peoples (COFAMOSA Association) /private (national sugar companies for the sugar mills and refinery)/para-statal (Petromoc for the bio-ethanol commercialization and marketing) partnership (PPP);
- Selection of sugar cane (for bio-ethanol production);
- It is part of a component of a large scale investment plan in the Moamba District (installation of the gates on the Comurana Dam, rehabilitation of the road (30 km) between Moamba and Sabie, rehabilitation of the bridge in Moamba (over the Nkomati River), extension of the existing irrigation lands, power generation at the Dam, etc.);
- Impact on poverty alleviation with positive direct impacts on two districts (Moamba and Magude, Maputo Province), potential of generating a total of 18,000 permanent jobs and 7,500 additional ones (estimate based on the development of 29.000 ha);
- Maximization of the agricultural potential of Mozambique and optimization of the existing infrastructure (Comurana Dam);
- Strengthening the institutional capacity of sector ministries in managing complex projects and Petromoc (buyer of the bio-ethanol production and responsible for its commercialization on the domestic and southern Africa markets).

As well, as outlined in its PRSP, the GoM's main concern is to fight poverty. Water is prioritized in the key government strategy papers. In the agriculture sector, the main goal is to guarantee that peoples can feed themselves. The direct and indirect benefits of the project will be increased agricultural outputs, human resource development, and creation of employment opportunities and improved participation of the food-insecure segments of the population.

The main project activities will be directed towards the production of sugar cane for the production of bio-ethanol. Social facilities will also be constructed and/or rehabilitated under this project.

#### **4.0 PROJECT'S COMPONENTS**

The project encompasses the following components :

- Infrastructure Development in 29,000 ha for irrigation purposes which would include tender-engineering design (conveyance of bulk water from the Comurana Dam), land preparation, drainage system, installation of irrigation head works which include pump stations, main and sub-main pipelines, storage/balancing reservoirs and in-field irrigation distribution systems); impacts on water resources and water balance.
- Agriculture and crop development which would mainly include the production of sugarcane and food crops, the related farm machinery, and training of staff and beneficiaries; impacts on footprint, on water balance, on river water quality, on public health and on food security.
- Farm and social infrastructure comprising bulk electricity, inter-connector roads, bulk water supply, housing for farmers and supervising field managers, storage facilities and office space, schools, drinking water facilities and feeder roads; impacts on footprint and on wastes disposal.

- Establishment of 2 private Sugar mills and a refinery. Since the production system for ethanol and sugar is basically the same, the project will follow the Brazilian model in which the mills may produce both sugar and ethanol. They switch from one product to other depending on the market; impacts on river pollution, on wastes disposal and on public health.
- The set up of a bio-ethanol infrastructure and distribution network in the region of the project but also to outside markets including the South African market and potentially other southern neighboring markets; socio-economic and environmental impacts, on food security and on poverty.

## **5.0 LEGISLATIVE FRAMEWORK**

5.1 A summary of applicable requirements is described herewith.

Mozambique's Framework Environmental Act (No. 20 of 1997), the EIA Regulations (Decree No. 45 of 2004) and the EIA Guidelines (general and sector-specific EIA guidelines – in preparation), the Land Act (Decree No. 66 of 1998), the Forestry and Wildlife Act (1997), the Water Act and any other policies and guidelines applicable in Mozambique which could serve as reference points for the preparation of the ToRs for the ESIA Study of this irrigation investment

Bank's ESAP and Integrated Environmental and Social Impact Assessment (IESIA) Guidelines

AfDB's EA Guidelines for Irrigation (Appendix 1)

AfDB's EA Guidelines for Crop Production (Appendix 5)

AfDB's EA Guidelines for Road and Railway (Appendix 7)

AfDB's EA Guidelines for Dams and Reservoirs (Appendix 9)

AfDB's Involuntary Resettlement Policy

Other requirements include World Bank's policy on natural habitats, policy on pest management, resettlement issues, land titling issues, IFC Policy statement on forced labor and harmful child labor (March 1998), World Bank's sugar manufacturing guidelines (July, 1998), World Bank's plantations guidelines (July, 1998), general environmental guidelines (July, 1998), occupational health and safety guidelines (June, 2003), hazardous materials management guidelines (December, 2001), pesticides handling and application guidelines (July, 1998), etc.;

## **6.0 SCOPE OF WORK**

The scope of the ESIA study will encompass the construction and operation of the four project components, namely 1) the infrastructure development of 29,000 ha of irrigation lands in Moamba District, 2) crop development (sugar cane), 3) farming and social infrastructure, 4) the establishment of 2 private sugar mills and refinery for sugar and/or ethanol. As part of the scope of work, the biodiversity assessment of the first 10,000 ha allocated to COFOMASA and which could surround or be part of a new designated National Park extending the scale of the Trans-frontier Park and mirroring the Kruger National Park in its entire length, will feed into the Environmental and Social Impact Assessment (ESIA).

The ESIA study will consider the numerous on-going and planned development proposals within the Moamba District and in the adjacent Magde District. These include the potential installation of retention gates on the Comurana Dam; increased power generation at the Dam site; and the extension of the existing irrigated lands along the Sabie and Incomatje River.

In terms of sugar/ethanol production, the construction/operation of new sugar mills and/or capacity expansion of the existing sugar mills in Xinavane and Marragra and refineries, the establishment of ethanol plants, electricity co-generation, water transfer from the proposed construction of the Moamba Major Dam on the Incomatje River to Maputo city, etc.) will be reviewed. The cumulative environmental and social impacts, of ethanol production for energy security versus cash crops and sugar for food security, on land distribution and use, water management, water rights and allocation, water quality from liquid effluents, will be assessed.

Natural resources management (e.g. establishment of the Sabie Game Reserve around the reservoir and a buffer zone along the Sabie/Incomatje water banks), aquatic and terrestrial ecosystems resilience and their absorptive capacity and, finally, social impacts will not be ignored. Trans-boundary impacts of the potential expansion of the water reservoir from the Comurana Dam on the Kruger National Park will also be documented.

## 7.0 ROLE AND RESPONSIBILITY OF CONSULTANTS

### 7.1 The Consultant will:

- Hold discussions with relevant Government officials to define and understand project goals, objectives and the type of activities to be supported by proposed projects / programmes;
- Review the Mozambican Directiva and any other regulatory documents relevant to the conduct of an ESIA;
- Review the ADB ESAP 2001 requirements;
- Review all available environmental reports relevant to the study especially related to current issues affecting the area of the project (29, 000 has) directly and indirectly affected areas, determine the zones of impact and influence of the project and project users/ targets in the surrounding areas;
- Review and advice on the standard designs, specifications, manuals and handbooks available from government relevant to the new proposed canal infrastructure, as well as the expansion of the Comurana Dam and their applicability to the proposed interventions;
- Review the details of the ESIA requirements as described below and comment and advise the Government and the Bank on the suitability of these details preferably in the inception report or shortly after the Environmental and Social/Gender Specialists begin their work;

### 7.2 Conduct the Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) :

- Provide a full description of the project and the study areas under consideration for the project;

- Provide a full description of the environment comprising physical, chemical, biological, and socio-cultural aspects of the study, directly and indirectly affected areas and sensitive habitats; include also a biodiversity assessment of the first 10,000 has of phase 1 project;
- Describe the pertinent regulations and standards governing environmental quality, pollutant discharge to surface waters and lands, waste treatment discharge and water reuse, solid waste management, agriculture and landscape, protection of sensitive species, etc;
- Identify and discuss potential environmental and social impacts;
- Discuss alternatives to the proposed pre-feasibility and feasibility level projects including the option for “no projects”;
- Develop mitigation measures in response to the impacts discussed above;
- Assess the socio-economic impacts of the project (in addition to the Resettlement Action Plan (RAP) and propose possible mitigating measures to address any negative consequences.
- Develop an Environmental and Social Management Plan (ESMP) with associated costs;
- Develop an Environmental Monitoring Programme with associated costs; and,
- Undertake Public consultation or any consultation with relevant study stakeholders, beneficiaries, NGOs, etc. This would also include discussion with the relevant Government ministries including MICOA (e.g. agriculture, water, environment, rural development).

The following is an indicative list of tasks to be performed during an Environmental and Social Impact Assessment (ESIA) and a feasibility study:

- In consultation with the Government confirm the study target area and groups from the position of potential environmental and social impacts;
- Review all relevant background documents concerning agriculture, irrigation environment, social, water and bio-ethanol sectors, such as the Government strategy to attain the Millennium Development Goals (MDGs), National Water Resources Policy and Strategy, the study on Raising the Full Supply Level of the Corumana Dam (January 2002) and Bio-fuels Strategy workshop (July 9-11) financed by FINESSE but organized by the government, the World Bank and the Italian Embassy.
- Gather relevant sector data, in particular, poverty and gender disaggregated data as well water, environmental, sugar cane production and future bio-ethanol services in the target study areas and appropriate technologies, their capital, operations and maintenance costs and their likely sustainability;
- Visit and consult with relevant stakeholders in the study target areas and assess their priority needs and propose measures to provide water, and industrial waste water treatment services for sugar cane production and/or ethanol production ;
- Identify existing local institutions, assess their capacities, their weaknesses and propose possible measures to build and strengthen their capacities to enable them to devise adequate instruments and implement integrated interventions encompassing the provision of water, and industrial water treatment services;
- Explicitly define indicators to facilitate monitoring the achievement of goals, objectives and outputs. State which unit or agency will be responsible for

monitoring and evaluation of the project and its impact assessment. Identify the required type of report, frequency and audit mechanisms that would ensure capturing the salient features of good water quality

- Hold discussions with major donors to learn from their past experience within the water, irrigation, agriculture, sugar cane production and ethanol conversion, environment and social and in particular draw on the lessons learned as well as specific best practices for the water sector that could be built into proposed projects / programmes;
- Discuss and agree with relevant donors (World Bank, etc..) on possible coordination mechanisms, co-financing arrangements (if possible), and ensure complementarities of the proposed activities with other donor supported projects / programmes in the water, sugar cane production and ethanol sectors;
- Review the existing institutional arrangements and assess the adequacy of capacity (i.e. staffing levels, skills mix, etc) to implement proposed environmental and social interventions at national and regional levels, and the required support for capacity building;
- Propose an adequate institutional framework for the implementation of the environmental and social interventions and agree with the Government a streamlined, but effective implementation arrangement suitable for the undertaking these interventions. Also clearly define the role and responsibility of each institution or entity involved in the implementation of the interventions, in particular the ministries concerned with water, irrigation, agriculture and environment;
- Ensure inclusion of the costs associated with the ESMP and EMP are included in the feasibility-level components and by category of expenditure, showing foreign exchange and local cost elements using standard tender formats. Also propose and present an adequate financing plan and source of funding; and,

#### **4.0 MAIN ENVIRONMENTAL AND SOCIAL ISSUES**

The preliminary positive and negative biophysical and social issues are the following (this is not an exhaustive list) :

Potential positive issues:

- Access to agricultural lands and related infrastructure for poor Mozambicans;
- Generation of revenues for small-holders from agricultural yields and cash crops;
- Increased local development and employment opportunities (estimated at 18,000 direct jobs (70% of economically active people in the area – this estimated is based on the establishment of 29,000 ha of irrigated lands);
- Development of productive and social infrastructures (sugar mills, roads, rural electrification, schools, health clinics, etc.);
- Improvement of living and health conditions due to the provision of houses, water supply and sanitation, increased and diversified source of food supply, public health education (ref: HIV/AIDS), access to day-care center for children, access to energy sources, etc.;
- Improvement of soil characteristics and reduced wind erosion due to the use of fertilizers and windbreaks;
- Potential use of agricultural drainage water to grow trees, orchards or woodlots;

- Potential development of eco-tourism and fishing activities around and in the Corumana dam's water reservoir;
- Migrants living in better conditions with improved socio-economic conditions;
- Increase in land values and prices due to the water access and related irrigation infrastructure;
- Increased gender opportunities as a target of 50% of the beneficiaries will be women;
- Involvement of the small-holders farmers, including women, in the decision-making process in the management of the irrigation system;
- Increased opportunities for women training on sustainable agricultural practices and social issues (family planning, HIV/AIDS, etc.);
- Strengthening of the Cofamosa Association to manage productive and social infrastructures.

Potential negative issues:

- Land tenure, land distribution, land conflicts, etc.
- Loss of grazing areas, deforestation and impacts on biodiversity resources due to the clearance of indigenous plants and trees for the establishment of 10,000 ha of irrigation lands;
- Potential risk to the downstream Sabie and Incomati aquatic ecosystem and the quality and quantity of their water resources due to water abstraction for irrigation and released of liquid effluents (agro-chemicals and pesticides) from the lands and the sugar mills;
- Potential impacts on the endemic species in the Sabie and Inkomati Rivers and riparian vegetation;
- Potential risks of soil erosion during the land preparation activities;
- Potential risks for erosion of bank erosion due to sudden change in flow rates in the river, changes in aquatic and riparian fauna and flora
- Potential risks to surface and underground waters due to agricultural drainage and agro-chemicals;
- Potential risks of salt water intrusion (in the downstream portion of the Nkomati River) due to reduced ecological flow from the dam and/or uncontrolled water abstraction;
- Proliferation of alien vegetation and bush encroachment in case of improper agricultural practices;
- Increased pressure on lands, unplanned settlements and productive activities;
- Influx of seasonal agriculture workers during the harvesting season;
- Increased incidence and prevalence of water-borne diseases, which are common to irrigation projects and STDs, including HIV/AIDS.

## **5.0 REPORTING AND SUGGESTED FORMAT**

5.1 As explained in the main TORs, the total duration of the feasibility study is estimated at 12 months divided into three phases: i) Inception Report and Baseline Survey; ii) Pre-feasibility Level Study; and, iii) Feasibility Level Study.

The Environmental and Social Impact Assessment (ESIA) will follow the three-step approach however there are a number of steps to be undertaken by the proponent prior to starting the study. These are:



- Submit an intention note to MICOA which is basically an executive summary and a project description
- Submit the TORs and a pre-feasibility study to MICOA, in Portuguese, and the selected name of the environmental consultant. MICOA should approve the TORs before the start of the study
- Once the TORs are approved the Consultant can start the study. The completed Environmental and Social Impact Assessment (ESIA) study must be approved and validated by MICOA.

The Environmentalist/Social Specialists will contribute:

- A separate short inception report within one month of mobilization;
- A draft ESIA report consistent with the Pre-feasibility Level Study guidelines and a Final ESIA and ESMP report consistent with Feasibility Level Study guidelines contained in the main TOR to include:
  - a. Executive Summary (2-3 pages);
  - b. Policy, legal, and administrative framework;
  - c. Study description;
  - d. Significant environmental and social impacts of pre-feasibility level recommendations and solutions;
  - e. Analysis of pre-feasibility level/feasibility level alternatives, recommendations and solutions including "no project" options;
  - f. Preliminary analysis of proposed Environmental and Social mitigation measures with cost implications final analysis to be included at Feasibility Level);
  - g. Summaries of any (public) consultations with study stakeholders, beneficiaries, NGO, government agencies, etc;
  - h. (ESMP and EMP with associated costs included at Feasibility Level);
  - i. Conclusions;
  - j. List of references;
  - k. Appendices;
    - i. Brief synopsis of relevant sections of the Mozambican Directiva General, 2006
    - ii. Records of (public) consultations including lists of attendees, etc
    - iii. Other data and information
    - iv. Maps

The Environmental and Social Impact Assessment (ESIA) will be part of the feasibility study. The Bio-ethanol expert will provide input on the environmental and social guidelines of bio-fuels and besides being site or project specific, will contribute to the market study described earlier as follows:

Assess the consequences and impacts of Mozambican bio-ethanol production on

- 1) Reduction of CO<sub>2</sub> emissions and other pollutants
- 2) Environmental and social impacts
- 3) Impact on balance of payments

The expert will clarify:

- The sugar industry status in Mozambique and particularly in the Maputo, Moamba and Magde regions
- The sugar regime and its reform (after the war)
- Projected impacts of sugar reform
- Ethanol strategies if any (biofuels workshop)
- Potential for bio-ethanol production in the region (volumes and economics)
- Capacity of the markets (local and international particularly SA) to absorb bio-ethanol
- Significance of Mozambican ethanol production for different fuel markets in Africa
- Technologies, policies, practices and skills required for different technologies
- Policy context (biofuels workshop)
- Best practices to ensure long-term sustainability
- Possible roles for different actors, e.g. Brazil, Germany