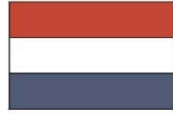




Southern African
Development Community

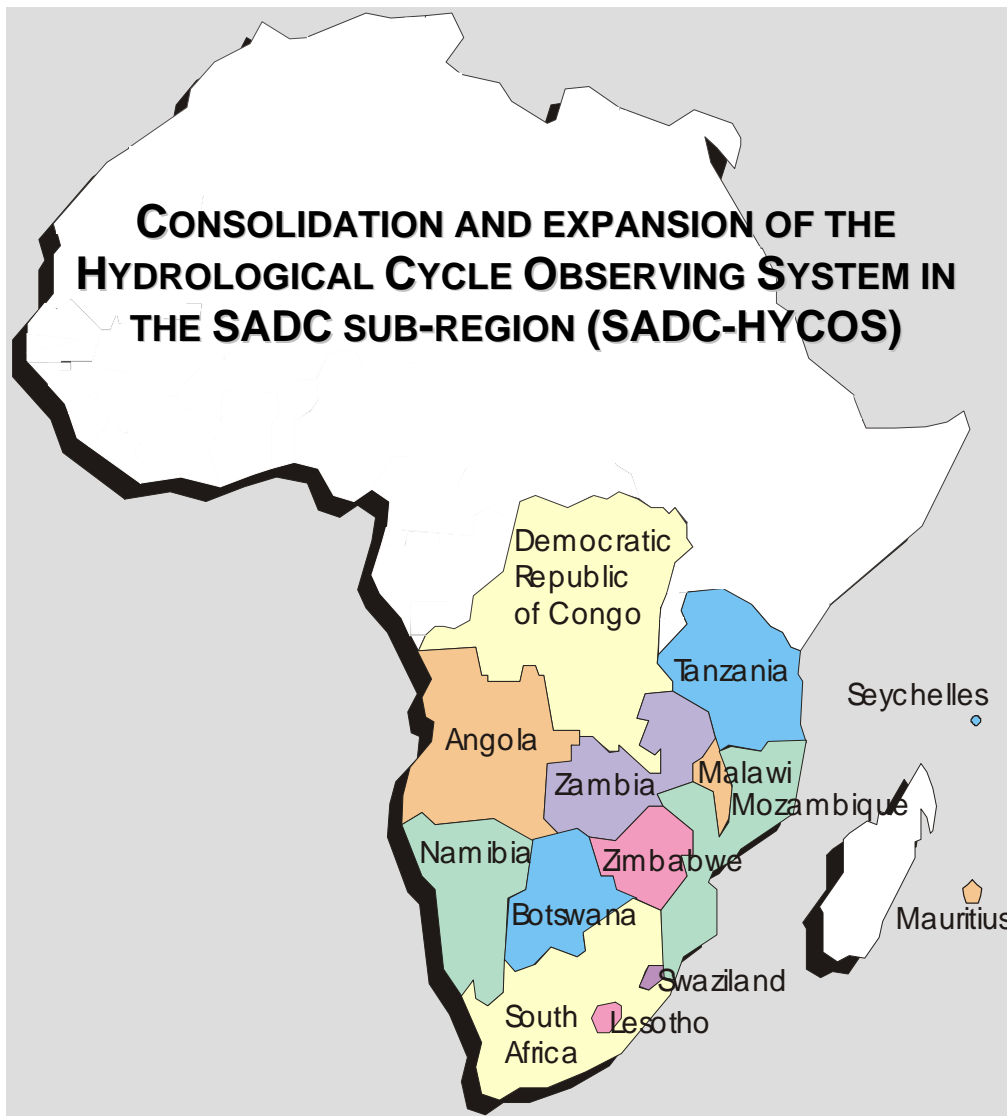


The Netherlands
Ministry of Foreign Affairs



World Meteorological
Organization

SADC-HYCOS – PHASE II



A project under the SADC Regional Strategic Action Plan for the
Integrated Water Resources Development and Management
in the SADC Sub-Region

Draft Implementation Document

March 2002

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ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
CBO	Community Based Organization
CIDA	Canadian International Development Agency
DCP	Data Collection Platform
DWAF	Department of Water Affairs and Forestry
ELMS	Environment and Land Management Sector (SADC)
EU	European Union
EC	European Commission
FAO	Food and Agriculture Organization (United Nations)
FEWS	Flood and Early Warning System (SADC Food and Security Sector)
FRIEND	Flow Regimes from International Experimental and Network Data
GEF	Global Environmental Facility
HYCOS	Hydrological Cycle Observing System
MoU	Memorandum of Understanding
NGO	Non Governmental Organization
NHS	National Hydrological Service
NORAD	Norwegian Agency for Development Cooperation
PCN	Project Concept Note
PRC	Project Regional Centre
RSA	Republic of South Africa
RSAP	Regional Strategic Action Plan
SADC	Southern African Development Community
SSAHA	Sub-Saharan Africa Hydrological Assessment
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WMO	World Meteorological Organization
WSCU	Water Sector Coordination Unit (SADC)
WHYCOS	World Hydrological Cycle Observation System
WIAG	WHYCOS International Advisory Group

EXECUTIVE SUMMARY

With the establishment of the SADC Water Sector Coordinating Unit (WSCU) in 1996, the conditions were created to manage water and water projects on a regional basis. To address regional water issues, the WSCU identified and prioritized 31 projects and developed summarized statements of each, referred to as Project Concept Notes.

Since 1993, the World Meteorological Organization (WMO) has been developing the World Hydrological Cycle Observing System (WHYCOS) which has, as one of its objectives, the contribution of hydrological data and information for regional and global studies of the impact of climate phenomena on water freshwater resources. This programme is implemented through a series of regional projects, each designed to meet the specific needs of the region.

Phase I of the SADC Hydrological Cycle Observing System (SADC-HYCOS) was conceived as a regional component of WHYCOS and naturally fell under the coordination of the WSCU in accordance with Project Concept Note No.15.

SADC-HYCOS was established to promote regional cooperation between the National Hydrological Services (NHSs) and to set-up a regional information system on water resources. The project provided for the enhancement of the real-time hydrological observation network through the installation of 50 Data Collection Platforms (DCPs), the establishment of a Project Regional Centre in Pretoria, South Africa and the training of hydrological personnel from the participating countries. The project terminated on 31 August 2001.

The value of SADC-HYCOS in providing data and information for regional water resources management was clearly recognized and deeply appreciated by several Government Ministers of SADC Member States during the International Conference on the Mozambique Floods (Maputo, October, 2000).

In order to build on the achievements of the project after August 2001, the WSCU, in collaboration with the Canadian International Development Agency (CIDA), developed a "**Framework Document for the Consolidation and Expansion of SADC-HYCOS**", which provides the basic terms of reference for further development of SADC-HYCOS. The current **Implementation Document** was prepared in consultation with WMO and provides a detailed description of the activities to be undertaken in the implementation of Phase II of the Project.

The SADC-HYCOS Phase II is designed to consolidate and expand on the project activities that were initiated during the first Phase. The consolidation will address the need for further institutional strengthening, building capacity in using the new technologies for maintenance and operation of DCPs, and in the development and management of national and regional databases using common standards and operating practices. The expansion will aim at ensuring that the system is fully responsive to regional needs for water resources assessment, drought monitoring and flood forecasting. This will include improvement of the real-time observation network and data transmission and reception capability, development of a regional water resources information system, as a decision-making tool for water management, generating hydrological products for both national and regional applications and continuing the training of staff.

A. CONTEXT

A.1 Description of the Sector

The Southern African Development Community (SADC) was created in 1980 as an instrument to promote economic development in the South African region. From an initial membership of twelve countries, it has now increased to fourteen. Twelve of these are continental and include Angola, Botswana, The Democratic Republic of Congo, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. The other two are the island countries of Mauritius and Seychelles. The 1992 Treaty, which officially created SADC, places a priority on a regional approach to sustainable development within the broad themes of poverty alleviation, food security, and industrial development. The overriding objective of SADC is the attainment of an integrated regional economy on the basis of balance, equity and mutual benefits for all Member States.

The continental SADC region has a total land area of nearly 6.8 million km² with 15 large river basins dissecting the region. Regional estimates place the annual average renewable freshwater resource at 650 billion m³, distributed in rivers, lakes and groundwater bodies. All of the continental SADC countries share these water resources with one or more neighboring countries. Both seasonal and annual rainfall vary considerably within the region, leaving some areas with an abundance of water and others under severe water stress. The region's water resources are used for a variety of purposes, including hydroelectric power generation, navigation, fishing, tourism, irrigation and livestock watering, domestic and industrial supplies, as well as the maintenance of the ecosystems.

In 1995, recognizing the importance of water resources in the region, the SADC Ministers responsible for water resources mandated the SADC WSCU and the SADC Secretariat to develop a Regional Strategic Action Plan for integrated water resources development and management. In November 1998, the Regional Strategic Action Plan for Integrated Water Resources Development and Management in the SADC Region (1999 - 2004) was presented to the international community at a Roundtable Conference.

The strategy reaffirmed the importance of the region's water resources and its influence on all aspects of the region's economic and social performance. The strategy identified seven major areas requiring intervention.

1. Legal and Regulatory Framework - National water legislation in most SADC countries is inadequate and weakly enforced. To address the legal and regulatory aspects of transboundary and shared river systems, country specific laws pertaining to the use of these waters need to be consistent with widely accepted international water principles.
2. Institutional Strengthening - Lack of integrated plans has been recognized as one of the major constraints in promoting sustainable development and equitable sharing of water resources in the SADC region.
3. Sustainable Development Policies - Legislation, policies and economic instruments need to be improved to encourage the conservation and sustainable use of the region's water resources.
4. Information Acquisition, Management and Dissemination - Integrated water management is dependent on having appropriate information, managing this information, and making it available to a large and diverse number of end users. Regional and national capacities, and data and information systems need to be improved and strengthened through better technology, trained human resources, and access to capital.

5. Awareness Building, Education and Training - There is a lack of awareness among the general public about the state of the region's water resources as well as the economic, social, environmental and political issues. Decision makers need to develop specific skills in negotiation, dispute resolution and integrated resource management.
6. Public Participation - The challenge for the region is to involve all stakeholders more fully in policy formulation, Project design, implementation, operation and maintenance.
7. Infrastructure – Most of the infrastructure is inadequate or has outgrown its design life and cannot accommodate the growing demand for multipurpose use.

Using the strategy, the Roundtable Conference identified some 31 actions, interventions and priority projects for the region. A list of these projects, potential donors and interested agencies is included in **Annex 1**. In April 1999, a panel of consultants produced Project Concept Notes (PCN) for each of 31 projects that had been identified through the Regional Strategic Action Plan. The PCNs were presented to the Cooperating Partners who in turn were requested to identify projects of interest.

It was anticipated that the Cooperating Partners would assist with the further elaboration of the PCNs into full project proposals. The objective of the further elaboration was to identify the full scope, design and budget for the project. Once completed, the elaborated project proposal would contain all the necessary information for the Cooperating Partners to make a decision on support for the project in the context of the Cooperating Partners strategic investment areas.

Project Concept Note 15 was prepared for the expansion of the SADC Hydrological Cycle Observation System (SADC-HYCOS) under the information acquisition and management theme of the Regional Strategic Action Plan. The SADC Member Countries have identified the need for realtime information for water resources management and the associated capacity to collect and disseminate the information. The Member Countries recognize the importance of readily accessible water resource information to regional economic and social development, to regional disaster mitigation and to regional environmental protection. A number of other PCNs which have links to SADC-HYCOS are listed in Annex 2.

A.2 Background on SADC-HYCOS Phase I

In many parts of the world, the systems for collecting and managing water-resources information are inadequate, and are often deteriorating, precisely at the time when there is a rapid increase in the demand for such information for the development and management of these resources. This situation is particularly evident in Africa. The World Bank/UNDP Sub-Saharan Africa Hydrological Assessment (SSAHA), carried out during 1988-1994, confirmed that there was considerable deterioration in the capacity of the National Hydrological Services (NHSs) to supply data and information on the state of their water resources.

Particular difficulties faced by the NHSs include inadequate human and financial resources to maintain observing stations, differing procedures and standards for collecting, processing and quality assurance of data between various national agencies and between countries, unreliable telecommunication systems, and outdated systems for the management and the dissemination of information.

In response to the needs established by the SSAHA, and by other similar surveys in various regions of the world, the World Meteorological Organization (WMO), in association with the World Bank, launched the World Hydrological Cycle Observing System (WHYCOS) in 1995, with the following objectives:

- To promote and facilitate the exchange, and use of water-resources data and information, using modern information technologies, including the Internet.
- To strengthen the technical and institutional capacities of the NHSs to collect and process hydrological data, to meet the needs of their end-users for information on the status and trend of water resources;
- To support the NHSs in enhancing the development and operation of adequate hydrological observation networks, so that they would provide information of a consistent quality, transmitted in real-time or near-real-time as required to national databases and regional information systems.

WHYCOS has been planned and is being developed through a series of regional HYCOS projects

Figure 1 shows the general scheme of a HYCOS data collection and dissemination network. **Figure 2** shows the status of Development of the WHYCOS Programme.

For the SADC Region, the establishment of a reliable region-wide hydrological network and information system on water resources has been a long standing priority objective. The importance of this objective was acknowledged by the Region when regional water resources matters were coordinated by SADC Environment and Land Management Sector (ELMS) and by the SADC Water Sector established in 1996.

The SADC – Hydrological Cycle Observing System (SADC-HYCOS) was planned and is being implemented in close collaboration with the NHSs and with the WMO. It is one of the projects initiated immediately after the establishment of a number of regional water resources coordinating bodies.

SADC–HYCOS Phase I had as its objective, the provision of water resources data and information in the form needed for decision making on all aspects of integrated water resources development and management. In particular, it was considered to be most valuable in:

- Establishing sound plans for sustainable utilization of water resources;
- Implementing the shared water agreements;
- Forecasting, monitoring and managing floods and droughts ;
- Managing pollution and protecting aquatic ecosystems.

The first phase of SADC-HYCOS was launched in 1998 and was completed in August 2001. It was funded by the European Commission (EC) with a grant of 1.96 million Euros. The Project objectives were the following :

- Installation of a network of 50 DCPs for the collection and data transmission via the Meteosat data collection system at 3-hourly intervals (**Annex 3**);
- Support to NHSs in enhancing the management of the national databases by providing software (especially HYDATA) and training;
- Setting-up a regional data base of current data from the DCP network and historical data and information provided by the NHSs and the UNESCO-IHP Southern Africa FRIEND project. The information is accessible through an Internet server. The data base and the server are maintained by the Project Regional Centre (PRC), which is hosted by the NHS of the Republic of South Africa (RSA) and located in Pretoria;

- Enhancement of regional cooperation among the NHSs, and between the NHSs and the PRC.

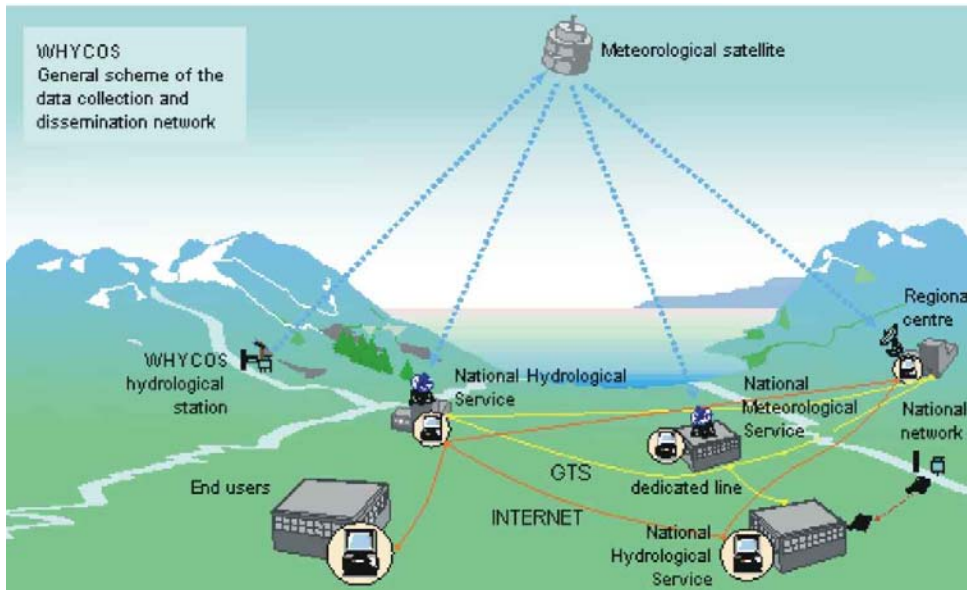


Figure 1: General scheme of data collection and dissemination network

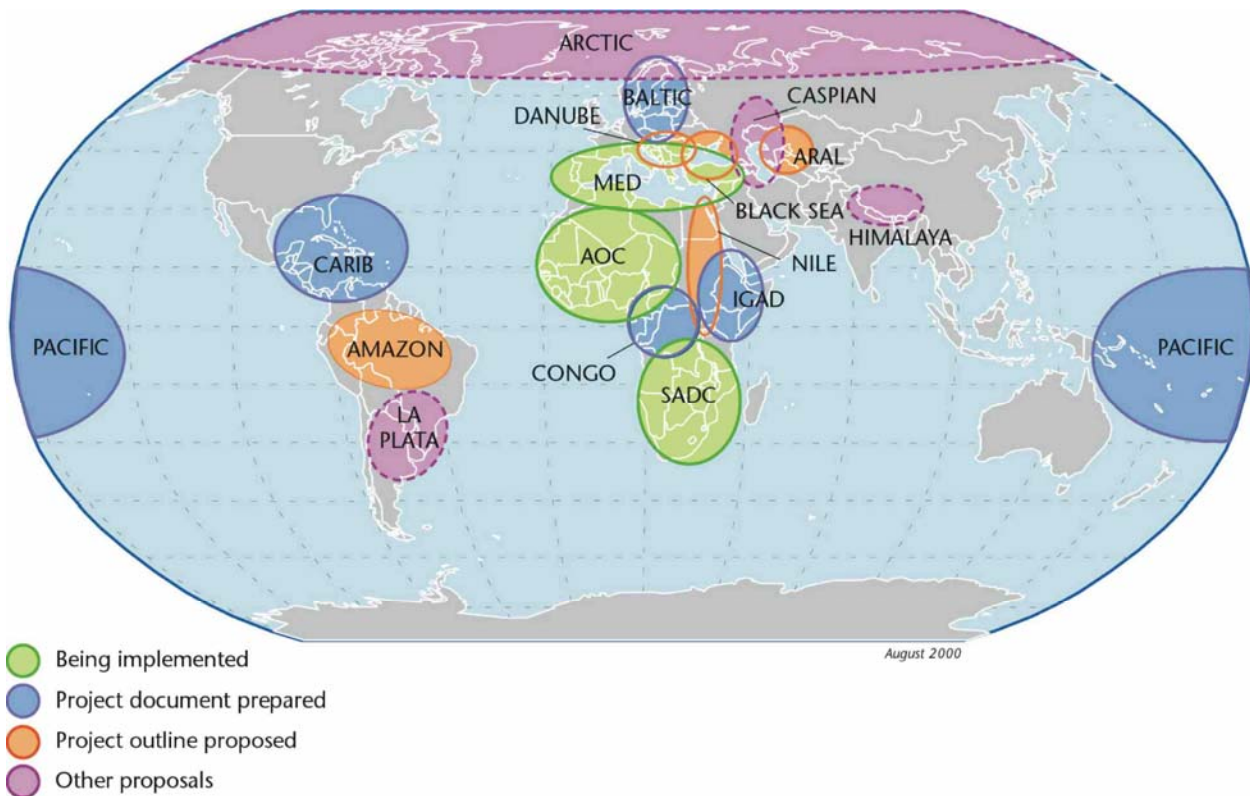


Figure 2: Status of Development of the WHYCOS programme

A.3 Phase II - Expansion of the SADC-HYCOS Project

The SADC-HYCOS Phase I project was conceived as an instrument to foster cooperation between SADC Member States in providing hydrological, meteorological and basic water quality data to SADC Members and other end-users. As such, it was designed first to involve Member States into the project (by adopting the philosophy of equitable sharing of infrastructure) and secondly by providing information on important rivers and basins for the security and wealth of the people. The Phase I is considered a success from the perspective of the cooperative mechanism that has been established to address water-related problems on a sub-regional scale and that the nucleus of a water resources information system is in place for this purpose.

Already in 1998, soon after work had started on Phase I of the project, the SADC Water Sector recognized the benefits of SADC-HYCOS and took steps to further its consolidation and expansion as one of the key projects in the Regional Strategic Action Plan (RSAP) for Integrated Water Resources Development and Management. Both the consolidation and expansion aspects of the proposed Phase II will require a re-examination of the adequacy and appropriateness of the current observation network, the water resources information system and the management and coordination procedures of the SADC-HYCOS. The development of Phase II of the project will be carried out in consultation with river basin organizations in the region. WMO will continue to provide the overall technical supervision of the Project. Accordingly, a second phase of the project is proposed with the following objectives:

- To include the new SADC Member States which did not participate in or benefited from Phase 1 of the Project;
- To undertake a comprehensive review of the hydrological observation network throughout the SADC region and propose appropriate improvements to meet the water resources management needs; to ensure that the equipment installed and the water resources information system established are put to optimum use in a sustainable manner. (This implies that adequate national staff would be made available to participate in the Project activities and be appropriately trained);
- To expand the observational network with Meteosat DCPs or other types of hydrological stations as required, according to the identified needs (i.e. flood monitoring/forecasting on specific rivers, water sharing with downstream users, assessment of the water resource);
- To expand the water resources information system and to ensure its easy accessibility to all NHSs.

B. PROJECT JUSTIFICATION

B.1 Primary Benefits

The primary benefit of the Project is improved and reliable water resources data and information availability and dissemination for regional and national water resources management. Sectors benefiting will be flood control and disaster mitigation, drought forecasting and management, irrigation management, protection of aquatic ecosystems, and the monitoring of international agreements for shared and transboundary rivers.

The SADC-HYCOS project, as described in the Framework Document, provides the underpinning to further develop and implement the revised Protocol on Shared Watercourses, for the establishment and functioning of the regional basin organizations and for the decentralization of water management responsibilities to stakeholder representatives.

In addition, the hydrological data and information made available under SADC-HYCOS on a regional scale provide the foundation for many of the other 31 priority projects listed in the Regional Strategic Action Plan. As a result the SADC-HYCOS project will enhance and facilitate regional cooperation among the Member countries.

The SADC-HYCOS project also provides an enabling environment for policy development, and support for emergency preparedness and vulnerability assessment. The Project provides fundamental information needed for the development of adaptive strategies and actions in response to the adverse effects of climate change on poverty alleviation, food security, environmental protection, and social and economic development.

B.2 Secondary Benefits

The secondary benefits of the SADC-HYCOS project include capacity building, institutional strengthening, and improved institutional linkages. For example, the regional and national capacity and competency of the National Hydrological Services will be improved. Their ability to operate and manage systems for water resource monitoring, data management, data exchange and information dissemination in both a national and regional context will be strengthened.

The SADC-HYCOS Phase II will consolidate and enhance the benefits of the Phase I and will provide improved awareness of drought susceptibility, improved awareness of flood susceptibility, improved information for water dependent projects, and provide basic data on water quality at selected sites. The increased regional awareness and enhanced regional institutional capacity will assist the SADC Member Countries to reduce their vulnerability to water-related disasters and to improve their ability to adapt to the adverse effects of climate variability and climate change and development demands on water resources.

B.3 Expected End-of-Project Situation

The SADC-HYCOS Phase II will further consolidate and expand the key elements of the Phase I project. It will undertake a comprehensive review of the observation networks in the sub-region and propose a redesign as required to cover both real-time and non-real-time reporting stations. The purpose of the Project is to ensure that the installed equipment and the water resources information system and related training are put to optimum use in a sustainable manner, to ensure that SADC Member Countries who have not participated are included and realize benefits from the Project, and to strengthen hydrological activities in support water management.

The expected end-of-project situation will be:

1. Timely, reliable and representative water resources data and information readily accessible to all SADC Member Countries;
2. Improved methods for the collecting, processing, archiving and sharing of water data and information within the SADC sub-region;
3. Improved interpretation and presentation of water information in forms needed to support water management, disaster mitigation and policy decisions at the SADC sub-regional level;
4. Improved technical, professional, management and institutional capacity within the NHSs for water resources monitoring and data and information dissemination;
5. Improved collaboration between the Hydrological (water quantity and quality) and Meteorological Services at the national and sub-regional levels.

The operational outputs expected by the end of the Project are:

- A comprehensive redesign of the network of hydrological observing stations in the sub-region, to address identified regional needs such as sharing of water, sharing benefits of water, environmental protection, flood forecasting and warning on the major water courses.
- The establishment and operation of this network of key monitoring stations on the freshwater bodies within the SADC sub-region contributing reliable and timely data;
- The establishment and management of national and sub-regional databases to support shared river basin management;
- A common information management strategy for the regional exchange and dissemination of water resources data and information,
- Common data analysis tools and information products available to the user community, and
- A collaborative model for the sustainability of the Project activities.

In addition, the operational outputs will include staff skilled in the operation and maintenance of the data collection and information management systems, as well as in data analysis and information presentation for decision-making.

B.4 Reasons for Assistance

The SADC sub-region is facing an emerging water crisis. The crisis is related to the arid to semi-arid climate, high population growth, increasing industrialization and urbanization, an increasing demand for irrigation water for food production and food security, and increasing water pollution. In addition, the water resources of the sub-region are shared and thus require a consultative and integrated institutional approach to their development and management. Floods are also a crucial issue and have been notably devastating in 2000 especially along the downstream parts of the major transboundary rivers..

The scope of the inter-jurisdictional nature of the shared water resources in the sub-region is significant. The fourteen Member Countries of the Southern Africa Development Community share 15 major river basins whose combined drainage areas cover as much as 70 percent of the land surface of the sub-region and contain over 90 percent of the sub-region's 145 million people.

Considering this transboundary nature of sub-region's water resources, the SADC-HYCOS project is both an underpinning and enabling project for the management and development of these shared water resources. Shared data and information, which is reliable and timely, provides the cornerstone for understanding the resource, its geographical, seasonal, and annual availability and variability. Furthermore, the institutional framework for the SADC-HYCOS project creates a favourable atmosphere and working conditions through the sharing of information and joint consultations at the technical, professional and institutional levels.

Joint management of transboundary and shared water resources requires information sharing and consultative processes which over time builds confidence between neighbouring countries and prevents conflicts. Joint management would build capacity within the region for water resources monitoring and assessment, as well as water resources planning, development and management.

Important strategic considerations are:

- Water resources data and information is a key pre-condition for effective water resources management;
- The availability and variability of the regions water resources is a key consideration in environmental management especially in the semi-arid conditions experienced in the SADC sub-region;
- Water resources data and information is key element for the inter and intra country cooperation on water resources management;
- The issues related to floods (forecasting, warning, mitigation) have to be addressed at the regional scale as the major river basins are all shared by several countries;
- Complete and reliable sub-regional data sets further the development of adaptation strategies to reduce the vulnerability of the sub-region to the adverse effects of climate variability and change;
- The Project builds and enhances the capacity of the national Hydrological Services in the SADC sub-region.
- The Project strengthens the sub-regional value of the SADC WSCU and the SADC Protocol on Shared Watercourses.

From the above, it is can be concluded that the long-term results of the financial and technical assistance would be both positive and substantial. The Project will provide a cornerstone for sub-regional cooperation and for the development and implementation of a comprehensive approach for water development and management. Both are key elements in poverty reduction, food security, economic development, social and gender equality, and environmental sustainability.

Commitment to the Project can be successfully used to lever further technical and funding support through strategic investments, partnerships and coordination with other developmental organizations in the sub-region.

The visibility of the SADC-HYCOS project is high due to the sub-regional nature of the Project and the direct link to the WMO and other related international organizations. The Project provides a positive communications opportunity with the international community as well as with the stakeholder and Non-Governmental Organizations (NGO) in the sub-region.

C. PROJECT DESCRIPTION

C.1 Project goals

The overall goals of the Project are that the participating countries will, individually and collectively:

- Attain the technical capability for sustainable development, effective management and equitable use of the freshwater resources of the sub-region;
- Establish a Water Resources Information System as an effective decision-making tool

The Project will be carried out in two Stages:

Stage 1: This will be devoted to detailed Project design and to the preparation of an implementation plan.

An assessment will be carried out to enhance the design of the hydrological observing network, in order to satisfy the data requirement for the major identified water management issues at regional scale. The location of each station will be identified and a field survey will be carried out for establishing the precise hydrographic and topographic features of each site. In collaboration with the concerned National Hydrological Service, the specifications of the monitoring equipment will be determined, taking into account the specific purpose of the station and cost effectiveness in terms of purchase, operation and maintenance of the equipment.

For each participating country, the required counterpart personnel will be identified and officially assigned to the Project

Verifiable performance indicators will be developed against which the achievements of the Project will be measured.

This Stage will also include the organization of a meeting of stakeholders to adopt the implementation plan, to select the Implementing Agency and to finalize agreements on participation of national staff to the Project. The duration of Stage 1 is expected to be six months.

Stage 2: This will be devoted to the implementation of the four components of the Project which are described in Section C. 3 below. The duration of Stage 2 is planned to be forty-two months.

C.2 Project purposes

The Project has three main purposes that contribute to achieving the above goal:

1. To assist the participating countries to establish the institutional capacity to assess the status and trend of their national water resources on a continuing basis and to provide adequate warnings of water-related hazards;
2. To establish basic hydrological monitoring and data capture systems, using technology that balances modernity, economy, robustness, and suitability for the circumstances of the SADC sub-region;
3. To establish hydrological databases and information systems that provide users with the information they require, to the standards (including accuracy, timeliness, usability, etc.) they need, and that provide a secure repository of information for an indefinite future.

C.3 Project components

The Project will build on the achievements of Phase I of SADC-HYCOS. It is planned to be delivered in four distinct components:

- Improvement of the network of hydrological observing stations;
- Further development of the sub-regional and national water resources information systems;
- Identification and development of hydrological products of regional interest;
- Training and awareness building.

A description of each component is provided below. Details of the activities under each component, the expected results and corresponding indicators are included in the Logical Framework provided in **Annex 4** of the document.

Component 1: Improvement of the network of hydrological observing stations

This will provide for the up-grading of 100 data collection stations. The final specifications for station types will be elaborated during stage I of the Project, but it is assumed that fifty stations would be equipped with DCPs for the real-time data transmission. This will significantly expand the network of real-time reporting stations and thus enhance the capacity of the national Hydrological Services for flood forecasting and warning. The stations will be located so as best serve the broader "regional" aspects of water resources assessment and hydrological forecasting. For ease of installation, maintenance, operation and training, equipment should be standardized as much as possible. All stations will be equipped for water level recording (and subsequent river discharge determination). Some of the DCPs may be fitted with additional sensors to monitor rainfall, meteorological parameters (such as radiation, wind speed, etc.) or certain water quality parameters. The training of national staff in the maintenance and operation of DCPs will be carried out by the equipment supplier as part of the procurement contract. The tasks under this component are:

- Organization of procurement and delivery of equipment
- Installation of equipment and operationalize stations
- Establishment of data transmission and reception procedures
- Training of staff in the installation, maintenance and operation of equipment, with particular attention to DCPs.

Component 2: Further development of the regional and national water resource information systems

Work was initiated during the Phase I of SADC-HYCOS in developing a regional database. This consisted of the installation of a sever at the PRC, supply of computer equipment and software (HYDATA) to NHSs and training in data management procedures. Real-time data from the network of DCPs are transmitted to the PRC.

In order to develop products of value to the sub-region, it is essential that the database be further expanded. This will be done by including historical data sets from selected stations throughout the sub-region. The Water Resources Information System will contain meta-data on the data holdings, station history and basin characteristics and descriptions of the tools and products which have been developed to give added value to hydrological data. The tasks under this component are:

- Comprehensive analysis of the needs of the participating countries leading to design (or selection) of a database structure, database management system, and software that meet those needs. (This will call for a review of the HYDATA system introduced in Phase I);
- Provide or upgrade computer hardware at each Service, and install the database management system software thereon;
- Review the regional database at the regional centre, and develop protocols for data exchange with national databases;
- Develop and introduce procedures for quality assurance and archiving of incoming data;
- Transfer existing data onto the regional and new national databases;
- Develop standard procedures for basic analysis, summary and presentation of hydrological data and statistics, and prepare basic products such as water resources assessments for particular river basins;

- Train staff in the use and maintenance of all components of the database management system and associated procedures. Training will be primarily on-the-job instruction in each service, with an introductory two weeks regional training course supported by follow-up on-the-job assistance and advice.

Component 3: Identification and development of hydrological products of regional interest

The principal application areas where hydrological information is needed are water resources assessment (both quantitatively and qualitatively) and flood and drought management. This component will survey the needs and develop the tools for the analysis of the data and the presentation of the information in a form that would aid the various levels of decision-making. The experience of other HYCOS projects, especially MED-HYCOS, in developing hydrological products, will be used to full advantage. The tasks foreseen under this component are:

- Survey the needs for hydrological products in the sub-region;
- Arrange for the transfer and adaptation of tools and products already developed by other HYCOS projects;
- Provide training to staff of the national Services in the use of the new tools and products.

Component 4: Training and awareness building

This component will consist of two sub-components:

- Training of personnel of the NHSs on the activities identified in the Project components 1, 2 and 3 above, as well as on other assessed needs;
- Public awareness campaign and sensitizing water agencies and decision-makers.

Training will be carried on all levels from the technicians to the professionals (University graduates) and numbers will be adjusted according to the specific needs of the countries. The training will be conducted through regional courses conducted at the Project Regional Centre and through roving in-service sessions.

D. ORGANIZATION AND MANAGEMENT

The Project will be implemented with technical support provided by international and national personnel. A **project Regional Steering Committee** will be established to oversee Project policy, strategy and implementation of the Project. Further, an **Implementing Agency (IA)**, to be identified in one of the National Hydrological Services of the SADC Member States will be appointed to take responsibility for Project management. The Implementing Agency will establish a **Project Management Unit (PMU)** which will work in close collaboration with the PRC. The PMU will be headed by a **Project Manager** who will be responsible for ensuring that the Project objectives and outputs are achieved, and for all communication with the stakeholders of the Project. The Project Manager will be assisted by an **Hydrologist** and by an **Electronic Data Processing Specialist**. The job descriptions of the Project Manager, the Hydrologist and the Electronic Data Processing Specialist are given in **Annex 6**. Experts to staff the PMU should preferably be drawn from within the region, with due attention given to competence and experience of the candidates in the selection process. The selection of the staff of the PMU will be approved by the Regional Steering Committee based on the recommendations of WMO and the WSCU. Project management will be guided by an annual Project plan, against which the Implementing Agency will report to the Project Steering Committee semi-annually.

The wide range of capabilities needed for the Project is likely to demand several providers, working under sub-contracting arrangements. Subject to successful capacity building, Project activities progressively will be transferred to participating countries, principally their NHSs. At the same time, a regional technical support capability for instrumentation, data transmission, and database management will be established at a Project Regional Centre. Given the participating countries' preference for in-country, hands-on training, PMU staff will need to spend considerable time (around four weeks per year) in each country. **Figure 3** shows the recommended Project management structure.

D.1 Responsibilities of Implementers

The responsibilities of participants in the Project are outlined in the following sections.

D.1.1 Regional Steering Committee

The Regional Steering Committee will be the highest executive body of the Project. Its role will be to ensure Project coherence and to oversee Project policy, strategy, and implementation. It will decide on any changes to the Project document and approve the annual work plans and budget (**Table 1**). The Committee will consist of a representative from each participating country and the external support agency (Cooperating Partner), and would be serviced by the SADC WSCU which will have the strategic oversight of the Project. The existing SADC Water Resources Technical Committee which has served as the core membership of the Steering Committee for Phase I of the Project could be considered to continue this role. To ensure that the Committee is fully effective, it will be desirable to obtain the commitment of the participating countries (through MoUs with the Implementing Agency) to make available representatives who will be able to devote the time needed for the work of the Committee.

Table 1: Responsibilities of the Regional Steering Committee

- | |
|--|
| <ul style="list-style-type: none">• Determine Project policies and strategies• Manage conflicts or disagreements among participating countries and organizations• Select the Implementing Agency• Approve selection of professional staff of the PMU• Approve the Project implementation plan• Approve annual work plans and budget• Oversee and monitor Project implementation• Approve any changes to the Project document• Assess Project progress and success• Provide a communication channel with regional bodies and other interests |
|--|

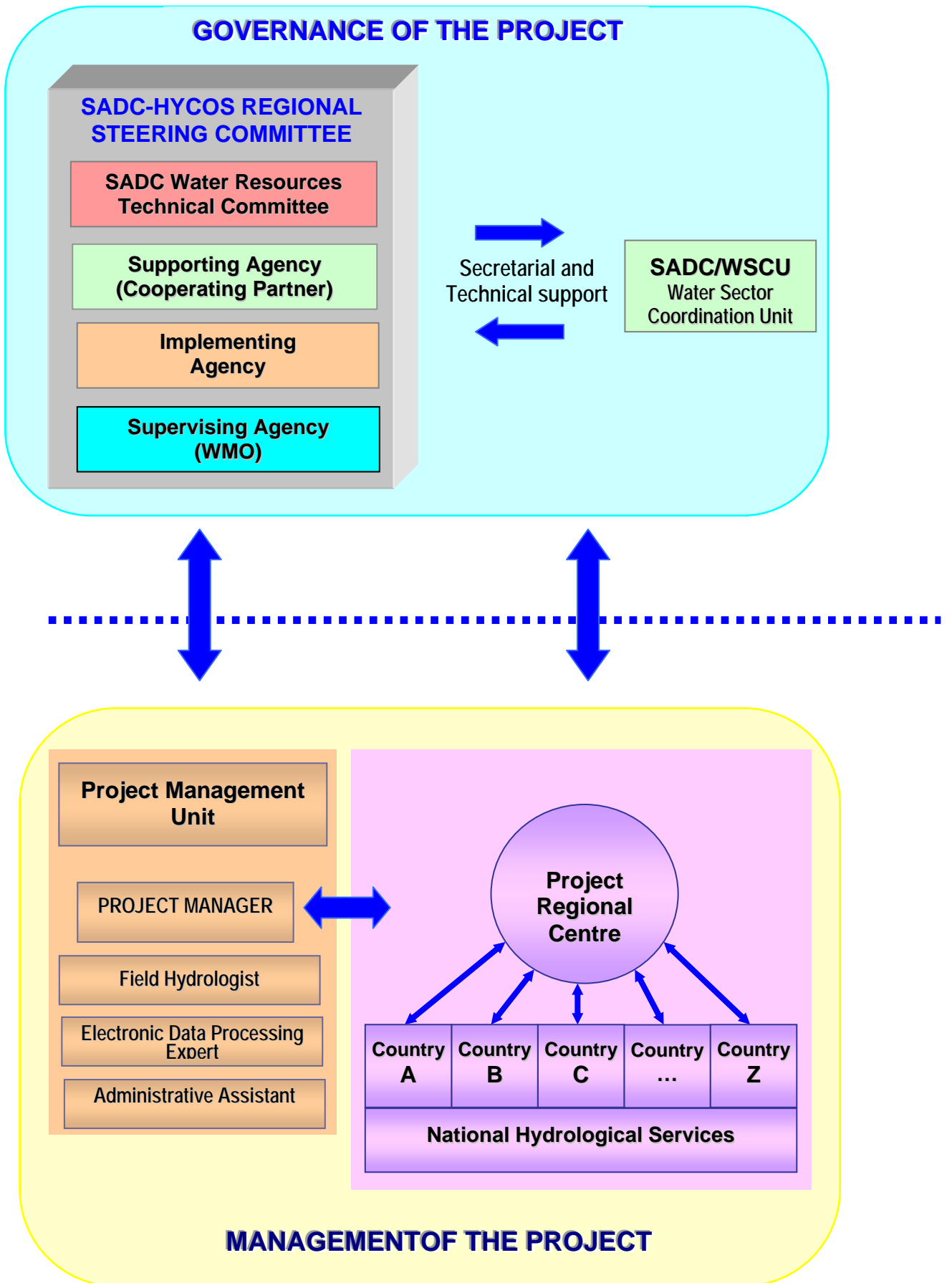


Figure 3: Project Management and Reporting Structure

D.1.2 Implementing Agency

The Implementing Agency will be responsible for implementation, management and administrative/financial control of the Project (**Table 2**). The essential characteristics of the Implementing Agency are demonstrated project management capabilities and wide acceptability to project participating countries, donors and stakeholders. The Implementing Agency will establish a Project Management Unit. The Project Management Unit will carry out the Project activities under the responsibility and control of the Implementing Agency to which it will report regularly.

Table 2: Responsibilities of the Implementing Agency

- | |
|---|
| <ul style="list-style-type: none">• Obtain, coordinate and administer Project funding• Prepare a draft Project implementation plan• Set-up a Project Management Unit (PMU)• Prepare a proposal for redesigning/enhancing the hydrological field network, to meet crucial identified needs at the SADC regional level• Coordinate the Project with other water-related projects in the region• Manage the tender process for the provision of services and procurement of equipment under the individual sub-projects• Manage contracts for the providers of services• Manage procurement of materials and equipment• Provide administrative control of the Project• Monitor and report to the Supervising Agency and to other stakeholders on the progress of the Project• Monitor and report to the Cooperating Partner and to the Supervising Agency on financial matters relating to the Project |
|---|

D.1.3 Participating countries

The participating countries will have a number of responsibilities for Project implementation (**Table 3**). To assure Project success and to help assure post-Project sustainability, it will be essential to have the agreement of participating countries to act on these responsibilities, in the form of a Memorandum of Understanding (MoU). The partner countries should commit themselves to provide the real-time data generated under the Project as well as historical data essential for the expansion of the Regional Database and the development of hydrological products. The likelihood of Project success will be increased if funds can be provided to participating country NHSs to cover their Project-related costs.

Table 3: Responsibilities of the participating countries

- | |
|---|
| <ul style="list-style-type: none">• Provide support to missions by staff from the Project Regional Centre and contractors• Provide appropriately qualified staff to participate in Project activities, as required• Manage any impediments to successful Project implementation (e.g. land access)• Carry out installation and other work required to establish the sub-projects, with the assistance where needed of the Project Regional Centre and contractors• Perform ongoing, routine activities related to operational water resources assessment and monitoring, and to the operation and maintenance of Project installations• Disseminate data and information to users, and to the Project Regional Centre• Provide information about the Project to national interests and the public |
|---|

D.1.4 Project Regional Centre (PRC)

The Project Regional Centre (PRC) is the dedicated structure of the Implementing Agency. It will act as a focal point to coordinate the project activities implemented in and by the participating countries, foster regional cooperation in the fields of water resources assessment, monitoring and management, and provide a forum for exchange of expertise. The Project Management Unit will be established by the Implementing Agency to support the PRC and execute the tasks identified in the mission statement of the PRC. **Table 4** summarises the responsibilities, and **Annex 5** provides a fuller statement, as well as criteria for selection of the Project Regional Centre.

Table 4: Summary responsibilities of the Project Regional Centre

- | |
|--|
| <ul style="list-style-type: none">• Act as a focal point to coordinate the Project activities implemented in and by the participating countries• Monitor DCPs and forward data to NHSS that do not have direct access to satellite data• Manage a regional database and associated functions (data dissemination etc.).• Provide all services (training, on-going assistance and advice etc) which are not provided under other contracts• Foster regional technical and scientific cooperation in the fields of water resources assessment, monitoring and management• Provide a forum for exchange of expertise and knowledge |
|--|

D.1.5 Supervising Agency

The Supervising Agency (SA) will supervise and facilitate Project implementation and provide technical and scientific backstopping (**Table 5**). WMO as the custodian of the WHYCOS will act as Supervising Agency, providing critical technical service to guide the SADC Water Sector on the implementation of the Project, ensuring that the Project takes maximum benefits from lessons learned in implementing other HYCOS projects and ensuring its linkage with on-going or planned HYCOS components and with the global WHYCOS programme. As such, WMO shall sit in the Project Steering Committee and provide technical assistance where and when required.

Table 5: Summary responsibilities of the Supervising Agency

- | |
|---|
| <ul style="list-style-type: none">• Take a lead role in seeking Project funding• Supervise and facilitate Project implementation• Support the Implementing Agency• Support the preparation and evaluation of tenders for equipment and services• Provide the link with the meteorological community (NMS and EUMETSAT) to facilitate the use of GMS satellite and exchange of data through the GTS and Internet• Monitor, supervise and support the Project, through regular missions and participation in the Project Steering Committee meetings |
|---|

E. PROJECT IMPLEMENTATION

E.1 Project start-up

The Project will be implemented in close collaboration with the NHSs of the 14 SADC Member States, the SADC WSCU and the Project Regional Centre. It will provide field equipment for the collection and transmission of data, office equipment for data reception and for database development and management and training of staff of the NHSs in modern hydrological practices. It will also provide the services of national and international experts to implement the Project activities. The Project will be launched with an initial Stage 1 dedicated to detailed Project design and preparatory work and will commence with the recruitment of the Project manager. The tasks to be carried under the Project will be measured against verifiable indicators. The means of verification are summarized in the logical framework given in **Annex 4**.

E.2 Input requirements

The Project is estimated to cost USD 4.5 million over a period of four years. The annual distribution of costs will be based on the implementation plan to be developed during Stage1. The detailed cost estimates are given in budget proposal presented in **Annex 7**.

The major items of expenditure are as follows (US\$). Personnel costs have been included in the different component as required.

Project component	US\$	% of total cost
Initial Coordination meeting	122 000	2.7
Procurement (equipment)	730 000	16.2
Stations installation, field programme	870 200	19.3
Data base development	523 800	11.6
Development of Hydrological applications	346 800	7.7
Training	440 200	9.8
Support to PRC and PMU	442 000	9.8
Support to countries (including field transport)	480 000	10.7
SADC/WSCU coordination costs	125 000	2.8
WMO support costs	300 000	6.7
End of Project evaluation	20 000	0.4
Contingencies	100 000	2.2
Total USD	4 500 000	100.0

E.3 Project monitoring, reporting and evaluation

The Project will be monitored principally by the Supervising Agency, drawing on monthly reports provided by the Project Manager and the Project Regional Centre. Six-monthly reports will be prepared by the Supervising Agency, for transmittal to the Regional Steering Committee (which includes representation from funding agency). All reports will cover technical, financial, and administrative matters, using performance indicators to be developed and agreed during Stage 1 of the Project. This reporting also should include particular reference to exceptions (i.e. failures to achieve planned results), changing circumstances that present threats or risks to the Project, and measures taken or proposed in response. The reports should be suitable for distribution to partners and key stakeholders, and therefore should be of more than simply administrative interest. Project progress and achievements will be evaluated by the Regional Steering Committee, during annual review meetings.

An independent evaluation will be carried out two months prior to the end of the Project. For this purpose, a consultant will be appointed for a period of one month. He/She will visit the PRC and some of the participating countries and will report to the Regional Steering Committee and to the Cooperating Partner.

Performance indicators

The Logical Framework (**Annex 4**) includes a list of verifiable indicators of achievement, and the associated means of verification. As far as possible, acceptable levels of the indicators will need to be quantified, so that achievement can be compared against predefined standards. Some indicators (e.g. the acceptability of a QA programme) will require judgement by WMO, the Cooperating Partner and the Regional Steering Committee. Normally, achievement of results will be verified by reports to the Regional Steering Committee or files maintained for quality assurance purposes by output providers. In some cases, a less formal approach to verification will be necessary, via interviews with NHS Directors or stakeholders.

F. KEY ASSUMPTIONS

The Project design is based on a number of assumptions which include the following:

1. The WMO Geostationary Meteorological Satellite and Global Telecommunication System continue to be accessible to the Project;
2. The Implementing Agency is able to maintain awareness of events and changing circumstances that have an impact on the Project;
3. The Implementing Agency will be able to establish effective working relations with the participating country governments, NHSs, and other stakeholders;
4. It will be possible to arrange payment of NHSs for disbursements and services that they provide under the Project;
5. NHS Directors will be willing to take responsibility for the Project's routine tasks, and will be able to make available the staff-time required;
6. Participating country governments and their departments/ministries will agree to their NHSs taking responsibility for the routine Project components;
7. NHS staff who are trained by the Project will be retained by their Service, or it will be possible to train replacements in time for them to take responsibility for Project tasks.

G. RISKS

The technical and financial risks are generally ranked as of low to medium importance, and there should be little difficulty in managing them. The key issues involving risks and expected mitigating strategies are listed below as follows:

Risk 1: Lack of cooperation between the various NHSs in the SADC Region, the Project Regional Centre and the SADC Water Sector Coordination Unit in the Project design and implementation;

Mitigating Strategy: The NHSs and the Project Regional Centre have demonstrated under SADC-HYCOS Pilot Phase the desire to work cooperatively. In addition, the SADC WSCU provides the regional mechanism and focus for the Project. Any issues with respect to the cooperation can be managed through the SADC WSCU and a continuation of the open and participatory approach that has been developed during Phase I of SADC-HYCOS;

Risk 2: NHSs staff and the staff resources of the SADC WSCU may be overburdened and have limited time to participate in the Project design and implementation due to other commitments and bilateral projects;

Mitigating Strategy: The Project directly involves the senior officials of the Department of Water Affairs of each participating country, who are aware of staff commitments and other on-going and potential projects. However, the SADC Water Sector Coordination Unit will require some technical assistance and support for on-going Project coordination, especially from the Supervising Agency;

Risk 3: NHSs may require some additional technical support for the installation and servicing of the monitoring equipment to meet the data quality requirements;

Mitigating Strategy: The Project, upon completion of the network review and planning activity, will identify deficiencies in NHSs capacity and develop a technical assistance and capacity strengthening activity that will appropriately address the technical shortfall. In addition, the Project will develop a standard design for the monitoring system, as well as standard training modules will be developed and tested, as required;

Risk 4: Funds available for procurement of new, replacement and damaged equipment due to vandalism or natural disasters such as floods may not be timely or sufficient;

Mitigating Strategy: The Project will work with the NHSs and the PRC to ensure an adequate stock of equipment spares and replacement instruments are purchased through the Project;

Risk 5: Overlap, duplication and divergent bilateral projects may confuse the development and implementation of the Project activities;

Mitigating Strategy: The existence of the SADC Water Sector Coordination Unit minimizes the potential for overlap, duplication or divergence projects. The Unit has a strong and recognized mandate to coordinate the water sector activities in the region and has established good working relations through an open dialogue with the Cooperating Partners in the region. In addition, meetings with several of the Cooperating Partners during the elaboration phase resulted in a greater awareness of the SADC-HYCOS Project and a commitment by the Cooperating Partners to coordinate funding initiatives;

Risk 6: Resistance by the NHSs to share access to information;

Mitigating Strategy: This issue has been raised by the members of the HYCOS Steering Committee and the Regional Water Resources Technical Committee. A

general understanding of the issue is apparent and the need for a data sharing and dissemination protocol has been identified. The Project will assist the NHSs through the SADC Water Sector Coordination Unit develop a data sharing protocol for the data and information available through the SADC-HYCOS system. It is expected that water information for other sites and networks (such as FRIEND) will be made available under the data sharing protocol.

H. SUSTAINABILITY

Experience in many developing countries indicates that it is impossible to assure the long-term sustainability of a development project. In the water resources sector, many projects have been implemented but have had little or no lasting effect. A range of reasons can be identified, including the frequent loss of key staff, the higher priority placed by governments on other areas of expenditure, government restructuring, inadequate provision for ongoing operation and maintenance, and so forth. The risk assessment in Section G above attempts to identify and address these reasons for lack of sustainability. Several NHSs are likely to benefit from current public sector institutional strengthening initiatives, and the Project will need itself to complement these.

Fundamentally, projects are more likely to be maintained if they clearly meet a need of which the government is acutely aware, and the benefits of post-project expenditure clearly exceed the costs and the benefits of other possible expenditures. The needs analysis has been used to design a project that targets clearly identifiable needs, and needs that have significant financial implications. A benefit-cost analysis has not been carried out because the data simply are not available, but numerous such analyses of hydrological information indicate benefit-cost ratios commonly in the order of 6:1 or better. Such figures carry little weight with decision makers in developing countries, however, who are much more concerned about immediate social and economic problems that are so obvious that benefit/cost ratios are not needed to demonstrate them.

Several similar or related projects recently have been initiated in the region. This indicates that governments are increasingly aware of the importance of water-related issues, particularly in the context of such extreme events as floods and droughts. It also suggests that an integrative project like this one has a place, by bringing greater efficiency through adopting a regional rather than national approach.

A key thrust of the Project is to maximize participation and technical capacity in the participating country NMSs and supporting regional organizations, so that they are willing and able to continue water data collection and archiving after project funding terminates. Without this, data collection is likely to decline in many of the partner countries at the end of the Project, and the available data series will still be too short for hydrological analysis. The likelihood of post-project sustainability varies considerably among the countries of the sub-region. The Project is conceived and designed to maximize the likelihood of sustainability in all participating countries, but it cannot realistically be guaranteed. Some countries will be able to stand alone; others will require ongoing assistance. The regional bodies will have a crucial role to play, in either case.

To assure sustainability beyond the end of the Project, the equipment (including observing stations, analytical procedures, and computer systems) must be handed over to partner countries as a "going concern". It is important that the technology that is selected is appropriate to The Southern African circumstances, including the likely skills of NHS staff during the design life of the equipment.

SUMMARY OF SADC WATER SECTOR PROJECTS

**Confirmed/Reaffirmed Cooperating Partners/Potential Responsible Bodies,
with regard to expression of interest for the 31 Respective Round Table
Priority Projects on Integrated Water Resource Development and Management
(as of 4 May 2000)**

Project Concept Note (PCN)	Interested Cooperating Partner(s)	Potential Responsible Bodies
PCN1. Guidelines for Review and Formulation of National Water Legislation	<ul style="list-style-type: none"> • World Bank • GEF • UK • USA • FAO • Germany • UNDP • UNEP 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water • SADC-WSCU[▲]
PCN2. Regional Guidelines for Dam Safety Legislation and Procedures	<ul style="list-style-type: none"> • World Bank • GEF • AfDB • NORAD 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN3. Capacity Building for Joint Integrated Basin Management	<ul style="list-style-type: none"> • USA • Italy • UNDP • UNEP 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN4. Consultative Forums on Water Issues	<ul style="list-style-type: none"> • GEF • World Bank • USA • UK • UNDP • NORAD 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN5. Development of a Programme on Water Supply and Sanitation for the SADC	<ul style="list-style-type: none"> • Sweden • UK • Belgium 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN6. Groundwater Management Programme for SADC Region	<ul style="list-style-type: none"> • GEF • World Bank • Sweden • France • UNEP 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN7. WSCU capacity building	<ul style="list-style-type: none"> • GEF • AfDB • World Bank • FAO • UK • Belgium • Germany • UNDP 	<ul style="list-style-type: none"> • Government of Lesotho
PCN8. Support for the Implementation of the SADC Protocol on Shared Watercourses	<ul style="list-style-type: none"> • World Bank • GEF • USA • UK • Italy • FAO • Germany • UNEP 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water

Summary of SADC Water Sector Projects (continued)

Project Concept Note (PCN)	Interested Cooperating Partner(s)	Potential Responsible Bodies
PCN9. Guidelines for national Water policy and Review on member States	<ul style="list-style-type: none"> • World Bank • GEF • USA • UK • FAO • UNDP • UNEP 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN10. Support Development of National Water Sector Policies/Strategies in Selected member States	<ul style="list-style-type: none"> • AfDB • UNDP • NORAD 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN11. Formulation of a Regional Water Sector Policy and Strategy	<ul style="list-style-type: none"> • World Bank • GEF • AfDB • UK • Germany • UNDP • NORAD 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water • SADC WSCU*
PCN12. Economic Accounting of Water Use	<ul style="list-style-type: none"> • USA • UK • Belgium 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN13. Study for Expanding Private Sector Participation in Water and Sanitation Services	<ul style="list-style-type: none"> • UK • Belgium 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN14. Assessment of Surface Water Resources	<ul style="list-style-type: none"> • Water Research Commission of RSA • USA 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN15. Expansion of SADC-HYCOS	<ul style="list-style-type: none"> • CIDA • AfDB • USA • EU 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN16. Regional Project to Control Infestation of Aquatic Weeds	<ul style="list-style-type: none"> • Sweden • GEF • World Bank 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN17. Training in Surveying, Mapping and Geographic Information Systems	<ul style="list-style-type: none"> • USA • FAO 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN18. Upgrade and Modernize Water Resources Monitoring System for Malawi/Nyasa	<ul style="list-style-type: none"> • Sweden • NDF/WB 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water of Malawi, Mozambique and Tanzania • SADC WSCU*
PCN19. Rehabilitation of Joint Monitoring Systems between Angola and Namibia		<ul style="list-style-type: none"> • National Government Ministries and Departments of Water of Angola and Namibia
PCN20. Awareness Building for Decision makers	<ul style="list-style-type: none"> • UK • USA • UNDP • NORAD 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water

Summary of SADC Water Sector Projects (continued)

Project Concept Note (PCN)	Interested Cooperating Partner(s)	Potential Responsible Bodies
PCN21. Involving the Media in Water Issues	<ul style="list-style-type: none"> • UK • GEF • World Bank • NORAD 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN22. Human Resources Development Programme	<ul style="list-style-type: none"> • UNESCO • USA • UNDP • Belgium 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN23. WaterNet	<ul style="list-style-type: none"> • UNESCO • USA • Netherlands* • UNDP 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN24. Promotion of Stakeholder Participation in Water Resources Management	<ul style="list-style-type: none"> • USA • World Bank • GEF • UK • UNDP 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN25. Feasibility Study for Creating a Fund to Support NGO and CBO Participation in Water Resources Management Issues	<ul style="list-style-type: none"> • World Bank • GEF • USA • UK 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water • SADC WSCU*
PCN26. Programme on Means to Empower Women in Water	<ul style="list-style-type: none"> • Sweden • UK • UNDP 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water
PCN27. Control and Development of Lake Malawi/Nyasa and Shire River	<ul style="list-style-type: none"> • AfDB • FAO • NDF/WB 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water of Malawi, Mozambique and Tanzania
PCN28. Study of the Navigability of the Zambezi and Shire Rivers		<ul style="list-style-type: none"> • National Government Ministries and Departments of Water of Malawi, Mozambique, Zambia and Zimbabwe
PCN29. Stabilization of the Course of the Songwe River	<ul style="list-style-type: none"> • NDF/WB 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water of Malawi and Tanzania
PCN30. Pre-feasibility Study of Future Developments and Management Options on the Lower Orange River	<ul style="list-style-type: none"> • France • Germany 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water of Namibia and South Africa
PCN31. Integrated Basin Management Plan for the Okavango River	<ul style="list-style-type: none"> • Sweden • USA • AfDB • GEF 	<ul style="list-style-type: none"> • National Government Ministries and Departments of Water of Angola, Botswana and Namibia

^ *In all projects the lead Responsible Body is the SADC-WSCU*

* Cooperating Partners that have already committed funds on specific interventions during initial consultations but are yet to respond to the request for expression of interest on the RSAP as a whole.

SUMMARY OF PROJECTS LINKED TO THE SADC-HYCOS PCN 15

Project Concept Note (PCN)	Linkage
PCN1. Guidelines for Review and Formulation of National Water Legislation	• Indirect
PCN2. Regional Guidelines for Dam Safety Legislation and Procedures	• Indirect
PCN4. Consultative Forums on Water Issues	• Indirect
PCN5. Development of a Programme on Water Supply and Sanitation for the SADC	• Direct
PCN8. Support for the Implementation of the SADC Protocol on Shared Watercourses	• Direct
PCN9. Guidelines for national Water policy and Review on member States	• Direct
PCN10. Support Development of National Water Sector Policies/Strategies in selected Member States	• Direct
PCN11. Formulation of a Regional Water Sector Policy and Strategy	• Direct
PCN12. Economic Accounting of Water Use	• Direct
PCN13. Study for Expanding Private Sector Participation in Water and Sanitation Services	• Indirect
PCN14. Assessment of Surface Water Resources	• Direct
PCN16. Regional Project to Control Infestation of Aquatic Weeds	• Direct
PCN17. Training in Surveying, Mapping and Geographic Information Systems	• Direct
PCN18. Upgrade and Modernize Water Resources Monitoring System for Malawi/Nyasa	• Direct (may encompass)
PCN19. Rehabilitation of Joint Monitoring Systems between Angola and Namibia	• Direct (may encompass)
PCN20. Awareness Building for Decision makers	• Indirect
PCN21. Involving the Media in Water Issues	• Indirect
PCN22. Human Resources Development Programme	• Indirect
PCN23. WaterNet	• Direct
PCN24. Promotion of Stakeholder Participation in Water Resources Management	• Indirect
PCN26. Programme on Means to Empower Women in Water	• Indirect
PCN27. Control and Development of Lake Malawi/Nyasa and Shire River	• Direct
PCN28. Study of the Navigability of the Zambezi and Shire Rivers	• Direct
PCN29. Stabilization of the Course of the Songwe River	• Direct
PCN30. Pre-feasibility Study of Future Developments and Management Options on the Lower Orange River	• Direct
PCN31. Integrated Basin Management Plan for the Okavango River	• Direct

Country	WMO id	Station
Angola	66163	Bengo @ Cabiri
	66308	Catumbela @ Biopio
	66205	Cuanza @ Cambambe
	66242	Queve @ Cachoeiras Da Bingo
	66285	Luena @ Luena
	66485	Cunene @ Xangongo
Botswana	68025	Okavango @ Mohembo
	68150	Limpopo @ Buffel's Drift
	68238	Notwane @ Gabarone Dam
	68044	Nata @ Nata Old Bridge
Lesotho	68451	Malibatatso @ Kao
	68453	Senqu @ Mokhotlong
	68455	Makhaleng @ Qaba
	68457	S/Phuthiatsana @ Masianokeng
	68458	
Malawi	67694	Shire @ Liwonde
	67431	Lake Malawi @ Monkey Bay
	67492	Lake Malawi @ Chilumba
	67422	Songwe @ Mwandenga
	67794	Ruo @ Sandama
	67698	Lake Malawi @ Nkhata Bay
Mozambique	67328	Limpopo @ Combomune
	67292	Zambeze @ Marromeu
	67296	Pungoe @ Beu Maria (Fronteria)
	67350	Maputo @ Madubula 1
	67305	Save @ Vila Franca de Save
	67260	Zambeze @ Tete

Country	WMO id	Station
Namibia	68017	Zambezi @ Katima Mulilo
	68021	Chobe @ Ngoma Gate
	68022	Kwando @ Kongola
	68023	Fish @ Ai-Ais
	68309	Okavango @ Rundu
Swaziland	68390	Great Usuthu @ Siphofaneni
	68393	Great Usuthu @ Bhunya
	68397	Balck Umbeluzi @ Croydon Bridge
	68398	Ngwavuma @ Lubuli
Tanzania	63840	Ruvu @ Morogoro Bdg
	63867	Wami @ Mandra
	63868	Ruhuhu @ Masigira
	63884	Pangani @ Korogwe
	63949	Great Ruaha @ Msembe
Zambia	67530	Zambezi @ Chavuma Pump St.
	67635	Zambezi @ Lukulu Mission
	67636	Zambezi @ Nana's Farm
	67649	Kafue @ Kafue Hook Bridge
	67670	Kabompo @ Watopa Pontoon
	67742	Luangua @ Luangwa Bridge
Zimbabwe	67766	Mazowe Camp @ Old Mazowe Bridge
	67772	Manyami @ Nyakapupu
	67988	Mzingwane @ Doddieburn
	67993	Nuanetsi @ Malapati Bridge
	67996	Save @ Save Gorge

RCP STATIONS PIANNEN FOR INCI LISION IN PHASE I OF SADR.

Stage 1: Detailed project design and preparatory work

Tasks	Verification indicator	Means of verification	Assumptions
1.1 Survey of needs for field and office equipment, hydrological products, siting of stations and training of personnel	Results of survey	Country visits and interviews with directors of NHSs	
1.1 Hydrological data collection network design. Detailed field survey for determining the configuration of each site and recommending specifications of the equipment to best meet the needs.	Proposal for network design / enhancement	Proposal of network design endorsed by the Project Steering Committee	
1.3 Development of an implementation plan including performance indicators and ToR for mid-term and end of project review	Implementation plan	Circulate for endorsement by the Directors of the NHSs	
1.4 Organization of a regional stakeholders meeting to approve the implementation plan, to agree on the location of the Project Regional Centre and to commit national counterpart staff.	Accurate report of the meeting	Signed individual agreement between each participating country and the SADC Water Sector Coordination Unit.	

LOGICAL FRAMEWORK

Stage 2: Project implementation

Tasks	Verification indicator	Means of verification	Assumptions
Component 1: Improvement of the network of hydrological observing stations			
2.1.1 Mapping of the station locations giving the exact coordinates and regional distribution of both real-time and non real-time stations	Station location maps on national and regional scales	Circulate to Directors of NHSS	In addition to stations established under the project, the network will include stations which will provide historical data to the database.
2.1.2 Procurement and delivery of equipment to upgrade 50 real-time and 50 non-real-time reporting stations	Equipment supplied	Contact with supplier and NHSS	
2.1.3 Installation of equipment and operationalize stations	Number of stations installed/upgraded and are fully operational	Country inspection visits	
2.1.4 Establish data transmission and reception procedures. This requires the review of existing procedures and their revision in the light of recent technological developments, particularly the internet.	Availability of documented procedures agreed by all stakeholders	Interviews with the NHSS and the Project Regional Centre	
2.1.5 Training of staff in the installation, maintenance and operation of equipment	Number of training sessions organized and number of staff trained	Contact with NHSS	

Logical Framework (continued)

Tasks	Verification indicator	Means of verification	Assumptions
Component 2: Further development of the regional and national water resource information system			
2.2.1 Review of database structure and the database management system and re-design as appropriate to meet the assessed needs	Fully operational regional and national databases	Country visits and meeting with staff of NHSs	Countries will agree to provide historical data in addition to real-time data
2.2.2 Upgrade the computer hardware at each NHS and install data management software	Up-graded computer systems	Country visits and meeting with staff of NHSs	
2.2.3 Review regional database and develop protocols for data exchange between the NHSs and the RC	Agreements on data supply	Copies to be provided to the supervising and/or executing agency	Countries will agree to provide historical data in addition to real-time data
2.2.4 Develop an introduce procedures for data quality assurance and archiving of data	Documented and agreed procedures	Periodic evaluation of the procedures	
2.2.5 Transfer existing data onto the regional and new national databases	Expanded regional and national databases	Country visits	Countries will agree to provide historical data in addition to real-time data
2.2.6 Develop standard procedures for data analysis and data presentation	Standard procedures for use by all participating countries	Evaluation of published data summaries	
2.2.7 Training of staff in the use and maintenance of the database management system. Most training will be on-the-job at each NHS preceded with a two weeks regional course.	Number of staff trained for each Service and level of performance	Interviews with trainers and Directors of national Services.	Staff to be trained will have an appropriate educational background.

Logical Framework (continued)

Tasks	Verification indicator	Means of verification	Assumptions
Component 3: Identification and development of hydrological products of regional interests			
2.3.1 Survey the needs for hydrological products in the SADC sub-region	Results of survey	Circulate for endorsement by the Directors of the NHSs	
2.3.2 Arrange for the transfer and adaptation of tools and products developed by other HYCOS projects	Useful set of tools for data presentation and information products for decision-making	Response of the water resource user community	
2.3.3 Provide staff training in the use of new tools and products	Clearly demonstrated ability by staff to develop information products	Satisfaction by the user community	Staff to be trained will have an appropriate educational background.
Component 4: Training and awareness building			
2.4.1 In addition to the training provided under components 1, 2 and 3 above, provide further training relevant in accordance to assessed needs	Improved performance of staff in the activities carried by the NHSs and quality of outputs	Review outputs of the NHSs	
2.4.2 Promote awareness activities for the general public, water agencies and decision-makers	Number of workshops held, press releases and information brochures produced on the role and services of NHSs	Interviews with water agencies, decision-makers and a cross section of the population	

Logical Framework (continued)

DRAFT TERMS OF REFERENCE FOR THE PROJECT REGIONAL CENTRE (PRC)

The Project Regional Centre (PRC) is the structure of the Implementing Agency specifically dedicated to the Project. It will act as a focal point to coordinate Project activities implemented in and by the participating countries, foster regional cooperation in the fields of water resources assessment, monitoring and management, and provide a forum for exchange of expertise. The PRC will work in close collaboration with personnel assigned to the Project by the participating National Hydrological Services during the active implementation phase of the Project. The Project Management Unit established by the Implementing Agency will support the PRC and execute many of the tasks identified in the mission statement of the PRC on its behalf and under its control.

In particular, The PRC will:

1. In consultation with the participating countries, prepare a proposal for the consolidation / development of the hydrological stations network, based on the needs of regional integrated water management, including both real-time and non-real-time stations.
2. Cooperate in the preparation of the implementation plan for SADC-HYCOS;
3. Make, in cooperation with WMO, the necessary arrangements for the inclusion of SADC-HYCOS DCPs in the METEOSAT DCS;
4. Organize, in cooperation with the supplier of the equipment, training courses on DCP installation, operation and maintenance;
5. Support, as required, the participating countries in the installation and maintenance of the DCPs;
6. Monitor, on a daily basis, the functioning of the network and notify, as appropriate, NHSs of any problems;
7. Coordinate the development and implementation of a regional operational database for the data (raw and validated) collected through the SADC-HYCOS network. NHSs shall validate raw data and enter them in the regional database according to procedures to be agreed upon by the participating countries;
8. Disseminate, as required, in (near) real-time time the raw data received from DCPs to participating countries without direct access to satellite data (through DRS, GTS or Internet)
9. Coordinate the development and the implementation of a regional system for dissemination of data and information (especially through Internet) between the participating NHSs;
10. Organize, in agreement with the participating countries, the dissemination at international level of data and information originating from SADC-HYCOS network;
11. Develop and implement survey on a regular basis, training needs and appropriate training programmes. Particular attention should be given to such areas as:
 - Use of Internet and World Wide Web
 - Data quality and consistency control
 - Data processing (primary and secondary)
 - Preparation of hydrological product of national and regional interest

Criteria for the evaluation of the candidatures submitted by the countries to host the PRC:

Premises

An estimated 100 m² of office space is required for:

- Offices for Project staff;
- Room for data reception and archiving;
- Meeting room;
- Training room equipped with PCs, printers, etc;
- Storehouse.

Support services

- Direct telephone/fax line for the Project;
- Internet access (e-mail, ftp, and WWW);
- Availability of peripherals (plotter, digitizer, streamer, etc).

Specialized services

- Access to real-time satellite data;
- Access to other non-hydrological databases (meteorological, climatological, environmental, socio-economical, etc.);
- Personnel experienced in the field of telecommunication networks and databases management;

Institutional framework

- Institutional and administrative arrangements proposed (running cost, secondment of personnel, etc),
- Official government commitment to host the Centre.

Support personnel

- One Senior hydrologist or water resources engineer to act as Project coordinator
- One field hydrologist/electronic instrument expert
- One electronic database expert
- One Administrative Assistant

JOB DESCRIPTIONS OF THE PROFESSIONALS OF THE PROJECT MANAGEMENT UNIT

➤ **Project Manager**

The Project Manager has to be a water resources expert, holding an advanced university degree in hydrology or in a relevant connected scientific field. He/she should be familiar with hydrological cycle observation systems and information systems on water resources. Further, he/she must be well acquainted with the concept and practice of integrated water management issues at transboundary river basin scale. Knowledge of the organisation and operation of National Hydrological Agencies is a requirement. The expert should be familiar with conventional and modern equipment and techniques for hydrological data collection, including up-to-date knowledge on remote data transmission. Sound knowledge and experience in hydrological data processing, hydrological database design and operation, and information systems featuring data and information dissemination through the Internet are prerequisites.

The Project Manager should have the experience and ability to turn hydrological data into information for hydrological applications and water resources management. These applications include water resources assessment at river basin scale, reservoir systems modelling and operation, drought operating strategies, flood frequency estimation, flood routing, warning and forecasting. Knowledge of and experience in hydrological modelling is recommended.

The Project manager should have sound experience in technical and financial management and reporting (experience of reporting on international development projects is recommended). He/she should have a proven ability in managing large technical projects of a complex nature and in fostering regional cooperation.

Knowledge of the institutional and technical specifications of the WHYCOS programme and HYCOS regional projects, as well as familiarity with the water resources management issues in Southern Africa is highly recommended.

The expert should have a minimum of fifteen years experience.

➤ **Field Hydrologist**

The field Hydrologist is responsible for the coordination of the measurements and of data collection in the field and for the primary processing of the data collected. He/she will be the everyday counterpart from the regional component of the Project to the National Hydrological Services.

He/she must have a sound experience in the operation of a National Hydrological Service and the organisation of its duties, in the practise of hydrological measurements on large rivers and on the installation, use and maintenance of the instruments used in hydrology. Sound practical knowledge on the operation of electronic sensors, digital data loggers and transmissions vectors (satellite, cellular telephone, VHF, etc.) is required.

The expert should have experience in the processing of information leading up to the operation of a national database. Past experience in using specialised software for that purpose (such as HYDATA, HYDROM, HYMOS, HYDSYS, WISKI and similar databases or information systems) is required.

The expert should have excellent planning and organisational skills. This is required for organising training sessions on hydrological practises, in preparing guidelines and standards for the operation of a regional network for in operational hydrology. In

depth knowledge and experience in the calibration of stable river sections, various types of gauging structures and reservoir spillways would be a recommendation.

The expert should have a minimum of ten years experience..

➤ **Electronic Data Processing Expert**

The Electronic Data Processing Expert is a specialist for designing, documenting and operating information systems for the environment having a strong water resources component.

He/she must have hands-on experience in networking (TCP/IP, FTP and HTTP) and using major commercial relational databases (i.e. Oracle, Access, SQL Server). The applicant must also be familiar with database administration of the above-mentioned databases. Extensive experience in an object orientated programming language (like C++ or Dephi) will be needed to decode CREX messages and populating the RDB. The EDP expert will be expected to develop dynamic web applications using databases and more recent available web page development technologies (ASP, ISAPI, CGI, HTML and DHTML). Knowledge of maintaining and setting up a web based server using Microsoft Internet Information Server is also of cardinal importance. Experience in hydrology will also be an advantage, as the EDP Expert will be expected to converse with hydrologists and design/develop packages that will process the hydrological data in the National Hydrological services.

He/she shall have pedagogic capacity in organising training sessions on data base operation and in preparing user and maintenance guides for the operators of the regional database at the Regional Centre of the Project and in the National Hydrological Services.

The expert should have a minimum of five years experience.

THE BUDGET PROPOSAL

Activities/Tasks to be carried out -inputs required-	Estimated cost in USD	Responsibility / type of input
STAGE 1		
Task 1.1: Survey of needs <ul style="list-style-type: none"> • Project manager (2 man-months) • Mission travel – visits to participating countries 	24,000 36,000	Project Management Unit
Sub-total	60,000	
Task 1.2: Network design survey. Proposal for consolidation / enhancement <ul style="list-style-type: none"> • 14 country visits <ul style="list-style-type: none"> • Hydrologist (6 man-months) • air tickets • Per diem • Local support • Contingencies 	48,000 14,000 20,000 10,000 8,000	
Sub-total	100,000	
Task 1.3: Development of an implementation plan: <ul style="list-style-type: none"> • Project manager (one man-month) 		Project Management Unit
Sub-total	12,000	
Task 1.4: Organization of a regional stakeholders meeting: <ul style="list-style-type: none"> • Project manager (3 man-months) • Travel and DSA for 30 participants • Communications and supplies 	36,000 64,000 10,000	Project Management Unit PRC NHSS
Sub-total	110,000	
STAGE 2		
Task 2.1.1: Mapping of station locations Preparation, printing and distribution of maps giving location of SADC-HYCOS stations, both real-time and non-real-time <ul style="list-style-type: none"> • Hydrologist (2 man-month) 		Project Management Unit
Sub-total:	16,000	
Task 2.1.2: Procurement and delivery of field equipment <ul style="list-style-type: none"> • 50 DCPs with sensors and peripherals • 50 Water Level Recorders with peripherals • Spare parts 	500,000 200,000 30,000	Equipment supply
Sub-total:	730,000	
Task 2.1.3: Installation of equipment and operationalize stations: <ul style="list-style-type: none"> • Support to countries for civil construction works • Technical support- hydrologist (12 man-months) • Travel and DSA 	300,000 96,000 60,000	Project Management Unit PRC NHSS
Sub-total:	456,000	

Budget Proposal (continued)

Activities/Tasks to be carried out -inputs required-	Estimated cost in USD	Responsibility / type of input
Task 2.1.4: Establish data transmission-reception procedures <ul style="list-style-type: none"> • EDP expert (1 man-month) Sub-total	8,000	Project Management Unit PRC
Task 2.1.5: Training in installation and maintenance of equipment. <ul style="list-style-type: none"> • Travel and DSA for 15 trainees – one week session with external support by RC and the equipment supplier Sub-total	50,000	PRC NHSs
Task 2.2.1: Review database structure and database management system and redesign as required <ul style="list-style-type: none"> • EDP expert (2 man-month) Sub-total	16,000	Project Management Unit PRC
Task 2.2.2 Upgrade computer hardware and data management software <ul style="list-style-type: none"> • Procurement of computer hardware and software for the RC and NHSs • Technical support to upgrade system and provide training. EDP Expert (5 man month) • Mission travel and DSA Sub-total	75,000 40,000 65,000 180,000	Project Management Unit PRC + Equipment supply
Task 2.2.3: Develop data exchange protocols <ul style="list-style-type: none"> • EDP expert (0.5 man-month) Sub-total	4,000	Project Management Unit PRC
Task 2.2.4 Develop data quality assurance and archiving procedures <ul style="list-style-type: none"> • Hydrologist (0.5 man-month) Sub-total	4,000	Project Management Unit PRC
Task 2.2.5 Transfer existing data to new data bases at the NHSs and the RC <ul style="list-style-type: none"> • EDP expert (1.5 man-month) Sub-total	12,000	PRC Project Management Unit
Task 2.2.6 Develop standard procedures for data analysis and data presentation <ul style="list-style-type: none"> • Task of the Project manager (budgeted in PM staff time) Sub-total	-	Project Management Unit
Task 2.2.7: Training in installation and maintenance of equipment. <ul style="list-style-type: none"> • Travel and DSA for 15 trainees – one week session with external support and RC Sub-total	50,000	Training
Task 2.3.1 Survey needs for hydrological products <ul style="list-style-type: none"> • Task of the Project manager (budgeted in PM staff time) Sub-total	-	PRC Project Management Unit

Budget Proposal (continued)

Activities/Tasks to be carried out -inputs required-	Estimated cost in USD	Responsibility / type of input
Task 2.3.2 Transfer and adaptation of tools and products <ul style="list-style-type: none"> • Task of the Project manager (budgeted in PM staff time) Sub-total	-	Project Management Unit PRC
Task 2.3.3 Staff training in use of new tools and products Sub-total	50,000	PRC Project Management Unit NHSS
Task 2.4.1 Additional staff training based on assessed needs Sub-total	40,000	PRC Project Management Unit NHSS
Task 2.4.2 Promotion of public awareness activities Sub-total	35,000	Project Management Unit PRC
Project staff: (Full time staff) <ul style="list-style-type: none"> • Project manager (Stage 2) - 42 man-months • Hydrologist (15 man-months budgeted in Activities - 27 man-months here) • EDP expert (10 man-months budgeted in Activities - 26 man-months here) • Administrative Assistant – 36 man-months • Mission travel • Communication and office supplies Sub-total	504,000 216,000 208,000 72,000 100,000 32,000 1,132,000	
Support to SADC Water Sector Coordination Unit <ul style="list-style-type: none"> • One meeting with the participation of Ministers of water (14), Senior Officials (14) and the Water Resources Technical Committee (14). Travel and per-diem • Four one-day extension of the 4 Steering Committee meetings (1 per year). Participation of 14 representatives of Member States and 5 representatives of SADC/WSCU • 4 participation of the SADC/WSCU Coordinator to the meeting of the WIAG (1 trip to Europe/year) Sub-total	97,000 12,000 16,000 125,000	
Support to the Project Management Unit (PMU) <ul style="list-style-type: none"> • Office equipment- Computers • Two 4-wheel drive pick-up • Vehicle operation and maintenance Sub-total	20 000 50 000 40 000 110,000	
Support to the National Hydrological Services of participating countries <ul style="list-style-type: none"> • Field transport (one 4-wheel drive / 12 countries) • Vehicle operation and maintenance (42 months) • Secondment of National experts to the PRC (1 person per country per year for 0.5 month, to be repeated during 3 years) Sub-total	300,000 120,000 60,000 480,000	

Budget Proposal (continued)

Activities/Tasks to be carried out -inputs required-	Estimated cost in USD	Responsibility / type of input
Imprest Fund: To cover the support activities carried out by the Project Regional Centre <ul style="list-style-type: none"> • Support to project activities (installation of equipment, maintenance and operation of network, staff training) • Spares and tools • Travel and DSA Sub-total	180,000 20,000 100,000 300,000	Managed by the PRC under the supervision of the Implementing Agency
Project evaluation <ul style="list-style-type: none"> • Four weeks mission to the RC and some of the participating countries • Preparation of report Sub-total	15,000 5,000 20,000	External end-of-Project evaluation
TOTAL	4,100,000	
Supervising Agency <ul style="list-style-type: none"> • WMO's support Sub-total	300,000	The responsibility of WMO
TOTAL	4,400,000	
Contingencies	100 000	
TOTAL COST OF THE PROJECT	4,500,000	