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APPLICATION FORM FOR JAPAN'S DEVELOPMENT STUDY PROGRAM

Date of entry: August 2003

Applicant: The Government of the United Republic of Tanzania

1. Project Digest

(1) Project Title:

The Study on Groundwater Resources Development and Management
in the Internal Drainage Basin

(2) Location:

The study area is situated in the northern central portion of Tanzania
(One of nine major catchment basins of Tanzania).

The major towns in the Basin --Shinyanga and Singida-- are located about 985 km
(16-hour ride) and 790km (10-hour ride) respectively from Dar es Salaam.

See attached location map (Annex 1. Boundaries of Regions and River Basins).

(3) Implementing Agency:

- Name of Agency:

Division of Water Resources Assessment and Exploration (DWRAE), Ministry of
Water and Livestock Development (MoWLD)

- Number of Staff of the Agency:

The Division has 170 staff, namely 110 staff at headquarters and 60 assigned
specialists at the regional water consultancy units ((Hydrologist, Hydrogeologist,
Geophysicist, Water quality Analyst, Water Supply Engineer, Mechanics,
Electrician, Surveyor, etc.).

See attached organizational chart (Annex 2. Organization Chart of the MoWLD)

- Budget allocated to the Agency:

USD 5.77million for FY 2003/2004

(Development Fund: USD4.69 mill., Recurrent Budget: USD 1.07 mill.)

(4) Justification of the Project

- Present conditions of the sector:

The water supply service coverage in Tanzania remains at low level, apparently averaging 50% in the rural area and 73% in the urban area. The actual service coverage varies by place ranging from 20 to 70% in the rural area and 50 to 90% depending considerably upon availability of water resources development.

Nine (9) of the twenty-one (21) regions fall on semi-arid area while the other three (3) are on drought-prone area. Groundwater is used as a source of water supply in all the regions while it is the sole stable source in the semi-arid regions. Number and distribution of the water wells, however, are inadequate, and moreover, quality of groundwater is poor and not potable in some of the areas with high content of hazardous ion especially of fluoride giving causes of ill health.

- Sectoral development policy of the national/local government:

- Development of safe and stable water resources for water supply as much as possible utilizing most available water resources in the area depending on characteristics of geography, meteorology, hydrology and hydrogeology
- Increase of water supply service coverage by acceleration of new water supply facilities construction, and by better maintenance of existing supply facilities
- Encouragement of users' participation in planning, construction, operation and maintenance of the water schemes to make the project sustainable. Private sectors' participation in operation of the scheme is also encouraged
- Smooth implementation of revised National Water Policy by the proper institutional arrangement, well arrangement of legislations, capacity building of varieties of stakeholders in the sector

- Problems to be solved in the sector:

- Low level water supply service coverage especially in rural area
- Inadequate development of water sources for water supply
- Poor quality of water in some areas
- Slow-tempo reaction against alteration of National Water Policy

- Outline of the project:

- Assessment of water resources development potential by area in the basin, putting emphasis on groundwater resources development especially for water supply

purpose and small-scale irrigation

- Identification of the highly contaminated area by fluoride, which is supposed to be closely correlated with geological composition and/or structure
- Conduct of detailed geological and hydrogeological survey to prepare the hydrogeological map of the basin in order to make clear above-mentioned assessment/identification, and also to make clear the flow mechanism of groundwater in the basin, including groundwater outflow to the adjoining basin such as Makutupola basin (Makutupola basin has the well field which produces more than 35,000m³/day as water supply source for Dodoma Town, the capital city of Tanzania)
- Construction of test borehole wells to confirm the geological composition and water production as well as to establish the groundwater monitoring system
- Establishment of network for meteorological and hydrological observation by rehabilitation and renewal of the stations in order to facilitate proper water resources management in the basin
- Establishment of water quality test laboratory ^{Equipment} in the basin management office covering qualitative test item on fluorine
- Construction of pilot water supply schemes by use of some of productive test wells as supply sources for training programs on operation and maintenance of the water supply schemes 無償で提供
方法は、管理
に任せよう
- Studies on potential of agricultural development for small-farm holders by use of groundwater as irrigation source
- Technical assistance for establishment of methodology how to manage water resources in the Internal Drainage Basin

Purpose (short-term objective) of the Project:

- Firm establishment of the methodology for water resources development and management in the peculiar catchment basin
- Determination of water resources development potential by area in the basin putting emphasis on groundwater development, and identification of the fluoride contaminated area in order to facilitate certain water resources development plans in the future
- Establishment of the water resources allotment plan to different sectors

Goal (Long-term objective) of the Project:

- Provision of adequate quantity and safe drinking water to towns and villages

inside the basin, thereby increase of water supply coverage in the concerned regions is attained, and the development of socio-economy in the area will have been accelerated

- Irrigation during dry season becomes possible in addition to that in rainy season, thereby increase of agricultural products in this area will have been accomplished contributing much for economical development of the concerned area

- Prospective beneficiaries:

More than 3 million people residing in the basin are to be directly/indirectly benefited through implementation of the projects to be planned in the future referring to this study results, and more or less 100,000 people are to be directly benefited by implementation of the project to be planned under this study program.

- The Project's priority in the National Development Plan / Public Investment Program:

Water is one of 5 sectors (Health, Education, Water, Road and Agriculture) being accorded highest priority in the National Development Plan

(5) Desirable time of the commencement of the Project:

Commencement of the study program is most preferably from October 2004, because the basin management office will have been well arranged by August or September 2004. (The Basin Officer has been appointed in July 2003, but the office space is not yet prepared. The request of budgetary measure for full activity of the basin management is under preparation, which is to be submitted by March 2004.

(6) Expected funding source and/or assistance for the Project:

Funding is expected from Japan International Cooperation Agency (JICA) and World Bank, with the most expectation from JICA, because comprehensive technical assistance is necessary in this special basin, not only of financial assistance.

(7) Other relevant Projects:

The basin-wise water resources management projects are actively going on in the 2 basins of 'Pangani River' and 'Rufiji River', under financial assistance from the World Bank (Soft loan mostly for procurement of equipment and materials).

With regard to the water supply related projects, followings are the on-going ones, of which many of the projects have encountered, or will presumably encounter the problems of high fluoride content in groundwater:

- Project for Drinking Water Supply in the Central Plateau Area under Grant Aid Program from the Government of Japan, most of the area falling on Internal Drainage Basin
- Rural Water Supply and Sanitation Project in Shinyanga Region under financial assistance from the Government of Netherlands, one part of the area falling on Internal Drainage Basin
- Rural Water Supply and Sanitation Project covering 3 districts of Mpwapwa (Dodoma Region), Kilosa (Morogoro R.) and Rufiji (Coast R.) under financial assistance from the World Bank (The project area is expected to be expanded to 12 districts in 7 regions of Tabora, Singida, Dodoma, Manyara, Tanga, Morogoro and Coast from 2004, some falling on Internal Drainage Basin.)
- Many of NGO assisted small scale rural water schemes, predominated by religious NGO schemes in the country, and WATERAID schemes by utilizing Belgian Survival Fund and in the regions of Kagera, Tabora and Dodoma, some falling on Internal Drainage Basin
- Rehabilitation programs for rural water and small town water schemes conducted by district councils by use of fund allocated by the central government (2 to 6 schemes a year in each of 101 districts)
- Water Sector Reform Program accompanied by pilot rural water supply schemes for O/M training purpose in Kilimanjaro and Arusha regions, and establishment of database for rural water supply, under financial and technical assistance from GTZ (German Corporation for Technical Cooperation)

The recently completed projects are as follows:

- HESAWA Project (Health, Sanitation and Water) covering 3 regions of Kagera, Mwanza and Mara under financial assistance from SIDA (1984-2001)
- Water Supply Projects covering 3 regions of Ruvuma, Mbeya and Iringa under financial and technical assistance from DANIDA (1978-2000)
- Rural Water Supply Project in Kigoma region under financial and technical assistance from NORAD (1985-19998)

2. Terms of Reference of the proposed Study

(1) Necessity/Justification of the Study:

The basin-wise water resources development and management is one of the major concerns for economical development of Tanzania by proper allotment of water resources to the different sectors. However, only 2 basin offices have been firmly established and in operation of management activities with staff assignment, vehicles and equipment procurement and with annual budgetary measures, out of 9 catchment basins in the country. The 5 other basin offices have been established, however, activities are limited to the preparatory work such as coordination with other sectors and dissemination of water related law/regulations to the inhabitants, due to shortage in finances.

The Internal Drainage Basin, the target basin for the development study, is the peculiar basin; There exist many rivers, but there are no perennial rivers in the basin, and no outflow to the sea. The rivers flow into lakes of Eyasi, Manyara, Natron, etc.; and swampy areas, but most of surface water flows disappear before reaching these lakes/swamps, some by evaporation and largely by penetration into subsurface to become groundwater, thereby none of large-scale agricultural development nor hydropower generation is expected in the basin. Consequently, groundwater development is particularly essential as a sole stable source for water supply both for towns and rural areas, and for irrigation purpose especially during dry season.

Another special attention should be paid to this basin, that is, high content of fluoride in groundwater at many places affecting smooth conduct of water supply projects. (Many of the water supply projects have encountered the fluoride problems, and have been forced to modify the initial project planning.)

Identification of fluoride-contaminated area is, therefore, an urgent requirement.

(2) Necessity/Justification of the Japanese Technical Cooperation:

Most of the sites of on-going rural water supply project in the Central Plateau Area under Japan's financial assistance fall on the Internal Drainage Basin. The Project is one of the most outstanding ones that have experienced the vast modification in project planning due to the fluoride problem. The experiments on removal of fluoride is, therefore, going on side-by-side the construction of the water supply facilities in the project area. The study program covering entire basin may be a good field to make use of the results of above-mentioned experiments, or the field for consideration on which is more practical, defluoridation or water transmission from fluoride-free sources.

This is the major reason why the request of the Study is to be submitted to the Government of Japan.

Another reason for necessity of Japan's assistance follows:

It has been learned from some of the Japan's training program experienced staff of the Water Resources Division that Japan has quite high technology in management in groundwater development and/or conservation, and JICA has extended technical assistances to many of the countries on basin-wise water resources development and management, unfortunately not for Tanzania yet. Since major concern in the Internal Drainage Basin is groundwater, the Ministry has decided to submit the request of the development study to the Government of Japan, without hesitation.

(3) Objectives of the Study:

- Assessment of groundwater development potential in the basin in order to develop the sources for water supply and irrigation purposes in the Internal Drainage Basin, and for adjoining catchment area especially of Maktupora Basin
- Identification of the highly contaminated areas in the basin in relation with geological composition in order to facilitate smooth implementation of the water supply project in the future
- Technology transfer to the counterpart personnel who should be assigned as the staff of the basin management office of the Internal Drainage Basin, on management of water resources

(4) Area to be covered by the Study:

The study area --Internal Drainage Basin-- is one of the nine catchment basins of Tanzania, occupying about 17% of the country at the northern central portion.

The total area approximates 159,600km²; covering parts of 7 regions, that is, Northern end of Kilimanjaro, most part of Arusha and Manyara, Northern part of Dodoma, Northern half of Singida, North-eastern part of Tabora and south-eastern part of Shinyanga region.

The Maktupora basin, which has the well field as the major source for water supply to the capital city Dodoma, is bounded on the Internal Drainage Basin.

(5) Scope of the Study:

- a) Assessment of water resources development potential in the basin putting emphasis on groundwater, and identification of the fluoride-prone areas by conduct of detailed hydrogeological survey covering entire area of the basin,

The hydrogeological survey shall include:

- Remote sensing approach to analyze lineament structure
 - Geological field reconnaissance and geophysical survey
 - 30~40 test drillings for confirmation of above survey results as well as to establish groundwater monitoring network
 - Hydrological data assessment, and rehabilitation of existing hydrological and meteorological observation stations for establishment of proper observation network
 - Water sampling and quality analysis including qualitative analysis on fluorine
 - Database construction on hydrological, hydrogeological and water quality, with development of data assessment
 - Compilation of hydrogeological map of the basin at a scale of 1/500,000
- b) Socio-economic survey and environmental survey for establishment of development plans for water supply and small-scale irrigation, including following survey items and activities:
- Survey on water supply service coverage by district in the basin
 - Household economy survey sampling 2~3 villages each from 19 districts
 - Construction of 3 types of pilot water supply scheme in selected 3 villages, and hold training programs on operation and maintenance of the supply scheme
 - Land use survey by means of remote sensing technique and field reconnaissance
 - Social survey, and compilation of social infrastructure map at a scale of 1/500,000
- c) Examination on mode of removal/treatment of fluoride by close cooperation with the on-going experiments in the Central Plateau Area under Japan's Grant Aid, especially on methodology how to make practical use of the treatment system
- d) On-the-job training to the counterpart personnel through above-mentioned surveys and activities during the course of the study program
- e) Procurement of following equipment materials to facilitate the above survey activities:
- 3 sets of sensors for meteorological station equipped with data logger
 - 30 sets of sensor with data logger for monitoring of water level (10 for surface water and 20 for ground water)
 - 2 sets of geophysical survey equipment (Magnetometric and electric resistivity)

- 1 set of water quality test kits for establishment of W/Q laboratory at the basin management office
- 5 sets of GPS
- 4 sets of lap-top computer for data assessment
- 2 sets each of 4WD wagon and pick-up truck

f) Financing for following construction works and hiring of local consultants

- Test well drilling
- Construction of the pilot water supply schemes
- Household economy survey and workshops on O/M of water schemes to be conducted by the local consultants
- Installation works of weather stations, river gauging stations and groundwater monitoring stations
- Renovation of basin management office especially for water quality laboratory

(6) Study Schedule:

The period required for the study program is at least 24 months

(7) Expected Major Outputs of the Study:

- Hydrogeological map showing groundwater resource development potential by area and identified fluoride contaminated areas (Hydrological observation network and location of existing wells will also be incorporated)
- Hydrological observation network and data assessment system
- Groundwater monitoring network and data assessment system
- Water quality test laboratory ready for service
- Rural water supply development plan by district
- Trained personnel for water resources development/management

(8) Possibility to be implemented / Expected funding resources:

The Ministry of Water and Livestock Development has started preparation of the study program on such activities as appointing basin officer, mobilization of staff from regional water consultancy units and from Ministry of Agriculture and Food, securing office space, budgetary measure, etc., therefore, it is very sure that the study program being implemented, provided that technical and funding assistances become available.

The Ministry will cover all of the office operation cost, personnel expenses and

allowances for counterpart staff during execution of the study program in 2 years, approximating USD=160,000

The financial assistance for conduct of the study, approximating USD 4.9 million is expected from the Government of Japan.

(9) Request of the Study to other donor agencies:

The MoWLD made a request of assistance to the World Bank for implementation of Water Resources Management Program covering 9 basins (Entire area of the country) in 1995, however, their assistance has been extended to 2 basins of Pangani River and Rufiji River. The Ministry is under negotiation with the World Bank for further assistance at least to cover 2 more basins out of 3 basins of Lake Victoria, Ruvu/Wami Rivers and Lake Nyasa, where the basin offices have been established. No other request has been made to the donor countries or international agencies.

(10) Other relevant information:

The fluoride-prone area are found in many places not only in the Internal Drainage Basin, in such regions of Mwanza, Mara, Iringa, Mbeya and Rukwa

No special countermeasures have been taken so far, therefore, one of the output from this study program -- how to cope with fluoride problem-- is a matter of hoped-for in Tanzania.

3. Facilities and information for the Study

(1) Assignment of counterpart personnel of the implementing agency for the Study:

The counterpart personnel for the Study shall be mobilized from the regional water consultancy units (RWCUs) of concerned regions, the Ministry of Agriculture and Food (MoAF) and the concerned District Councils, in addition to the permanent staff to be attached to the Basin Management Office to make up the counterpart study team, in order to facilitate the smooth conduct of the study, and also for an effective technology transfer from the Japanese team during the course of the study program. The team formation and the specialty of each of the team members shall be corresponding to that of JICA study team totaling 11~14 members as follows:

- Team leader (Basin Officer)
- Hydrogeologist / Assistant Team Leader (One selected Hydrogeologist to be assigned as permanent staff of the Basin Office, and other 1~2 hydrogeologists

- mobilized from RWCU occasionally join)
- Hydrologist (One selected hydrologist to be assigned as permanent staff of the Basin Office, and other 1-2 hydrologist mobilized from RWCU occasionally join)
- Geophysicist (Mobilized from RWCU)
- Water Supply Engineer (Mobilized from RWCU)
- Water Quality Analyst (Mobilized from RWCU)
- Land use surveyor (Mobilized from MoAF)
- Irrigation Engineer (Mobilized from MoAF)
- Sociologist and/or socio-economist (Mobilized from the District Council of the target districts for water supply pilot schemes)
- Civil engineer and Technicians (1-3 staff of the Basin Office)

(2) Available data, information, documents, maps, etc. related to the Study:

Followings are available in Tanzania:

- More than 200 points of the climatic/hydrometric observation stations are distributed in the basin, however nearly 40% of them are not operational, since beginning of 1980s, and assessment of data has not been properly done, regardless of accumulation of raw data. (See attached summary table of gauging stations presented in Annex 4)
- Assessed data on meteorology is available at 3 points in and around the basin (Singida, Dodoma and Arusha), that are under service by meteorological department of the Ministry of Communication and Transportation (MoCT).
- The geological map at a scale of 1:1,000,000 covering entire area of Tanzania is available at Geology Department (GD) of the Ministry of Energy and Mineral (MoEM) in Dodoma.
- The geological maps of 1:125,000 covering the area concerned are also available at GD of MoEM, some not yet surveyed and/or published, though. (See index map of 1:125,000 geological map given in Annex 5.)
- The hydrogeological map (1:1,500,000) covering entire area of the mainland of Tanzania, prepared under the project of Sab-Saharan Africa Hydrological Assessment (SADCC COUNTRIES), is kept in the Division of Water Resources Assessment and Exploitation.
- The topographic maps of 1:50,000 scale are available at map sales office of the Ministry of Land and Human Settlement in Dar es Salaam, some sold-out with no plan for re-printing, but the photo-copied maps may be available to cover the study area, except 8 sheets around Singida area. (See attached index map of

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1/50,000 top-map given in Annex 6.)

(3) Information on the security condition in the Study Area:

Entire Study Area is stable and peaceful.

4. Undertaking of the Government of Tanzania

In order to facilitate the smooth and efficient conduct of the Study, the Government of Tanzania shall take necessary measures:

- 1) to secure the safety of the Study Team,
- 2) to permit the members of the Study Team to enter, leave and sojourn in Tanzania in connection with their assignment therein, and exempt them from foreign registration requirements and consular fees,
- 3) to exempt the Study Team taxes, duties and any other charges on equipment, machinery and other materials brought into and out of Tanzania for the conduct of the Study,
- 4) to exempt the Study Team from income tax and charges of any kind imposed on or in connection with the implementation of the Study,
- 5) to provide necessary facilities to the Study Team for remittances as well as utilization of the funds introduced in Tanzania from Japan in connection with the implementation of the Study,
- 6) to secure permission for entry into private properties or restricted areas for the conduct of the Study,
- 7) to secure permission for the Study Team to take all data, documents and necessary materials related to the Study out of Tanzania to Japan, and,
- 8) to provide medical services as needed. Its expenses will be chargeable to the members of the Study Team.

6. Claims

The Government of Tanzania shall bear claims, if any arises against member(s) of the Japanese Study Team resulting from, occurring in the course of or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part

of the member of the Study Team.

7. Counterpart Agency and Coordination

The Water Resources Division of the Ministry of Water and Livestock Development shall act as counterpart agency to the Japanese Study Team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth conduct of the Study.

The Government of Tanzania assures that the matters referred to in this form will be ensured for the smooth conduct of the Development Study by the Japanese Study Team.

Signed: _____

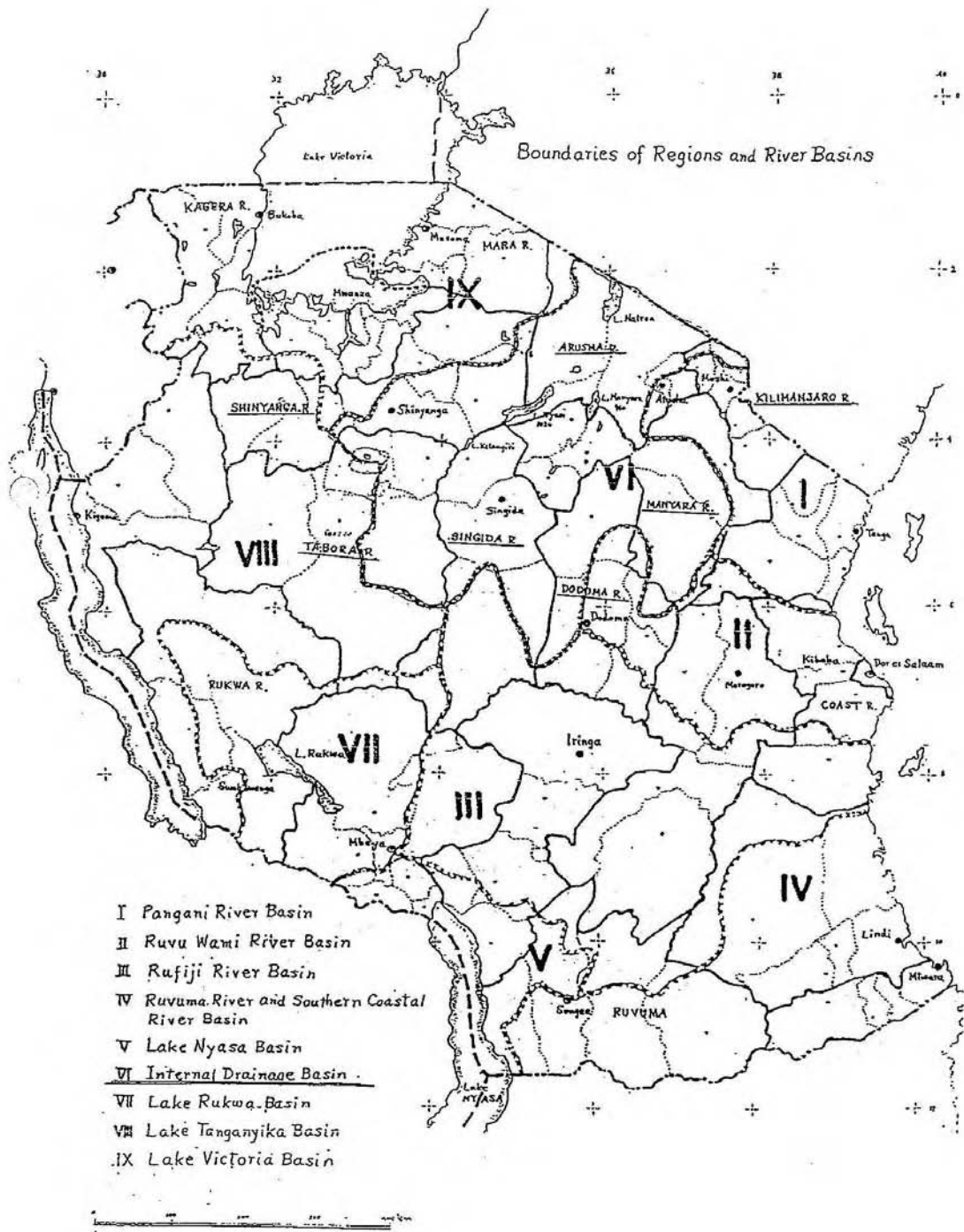
Title: _____

On behalf of the Government of Tanzania

Date: _____

ANNEX

- Annex 1. Location map of the Study Area
- Annex 2. River system of the Internal Drainage Basin
- Annex 3. Organization Chart of the implementing Agency
- Annex 4. Summary table for Water Resources Monitoring Network
- Annex 5. Available geological map (1:125,000) in the area
- Annex 6. Available topographic map (1:50,000) in the area
- Annex 7. List of boreholes in the Study Area drilled by DDCA
- Annex 8. Reference cost of meteorological/gauging station



ORGANIZATION STRUCTURE
 MINISTRY OF WATER AND LIVESTOCK DEVELOPMENT
 As of August 2003

