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DEPARTMENT OF HYDROLOGY  
MANAGEMENT SUPPORT PROGRAM

NOVEMBER 1991

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DEPARTMENT OF HYDROLOGY  
MANAGEMENT SUPPORT PROGRAM

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LIST OF ABBREVIATIONS

|        |  |
|--------|--|
| ACR    | - Australian Catholic Relief   |
| AFFHC  | - Australian Freedom From Hunger Campaign                              |
| AFSC   | - American Friends Service Committee                                   |
| AICF   | - Action International Contre la Faim                                  |
| CIDSE  | - Cooperation Internationale pour le Developpement<br>et la Solidarite |
| CWS    | - Church World Service   |
| DOH    | - Department of Hydrology  |
| FHI    | - Food for the Hungry International                                    |
| GRET   | - Group de Recherche et d'Echanges Technologiques                      |
| HAB    | - Hydrology Advisory Board   |
| HPA    | - Hydrology Program Adviser  |
| JANGO  | - Joint Australian Non Governmental Organizations<br>Office            |
| JVC    | - Japan International Volunteer Center                                 |
| LWS    | - Lutheran World Service   |
| MCC    | - Mennonite Central Committee  |
| MOA    | - Ministry of Agriculture  |
| NGO    | - Non-Governmental Organization  |
| O & M  | - Operation and Maintenance  |
| OXFAM  | - Oxford Committee for Famine Relief                                   |
| PADEK  | - Partnership for Development in Kampuchea                             |
| SAWA   | - Stichting Adviesbureau Waterbeheer                                   |
| TOR    | - Terms of Reference   |
| UNICEF | - United Nations Children's Fund                                       |
| USSR   | - Union of Socialist Soviet Republics                                  |
| VSO    | - Voluntary Service Overseas   |

### ACKNOWLEDGEMENTS

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The assistance provided by the management officials of the Ministry of Agriculture and Department of Hydrology is acknowledged with gratitude. The suggestions and comments of Mr. So Khun, vice Minister of the Ministry of Agriculture, Mr. Suos Kong, Director of the Department of Hydrology, and Mr. Kong Thai Bunthan, vice Director of the Planning Department, were very much appreciated. The frank discussions and valuable information given by all the Heads and staff of DOH offices were very helpful in completing this report.

The different NGO representatives and experts who shared with us their valuable experiences are sincerely acknowledged.

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## EXECUTIVE SUMMARY

**Background.** The present NGO assistance to DOH are usually isolated and mostly project oriented support programs in the form of either material resources, technical assistance or both. These are channelled directly to the Central or Provincial or District levels. While there are positive aspects of these current support strategies, major deficiencies, particularly in strengthening overall capability of the DOH in managing the water resources development in Cambodia were identified. Among these are: the minimal contribution to the Central DOH in management improvement; overall planning in water resources development was left unattended; coordination and communication link between Central and Provincial DOH were not strengthened.

To improve these current support strategies, it was recognized that there is a need to consolidate individual assistance toward a common objective in strengthening DOH capacity in both technical and administrative aspects. A formulation mission was mobilized to develop the program document and formulate the corresponding management structure.

**Identified Areas for Improvement.** The following areas were recognized by both the NGOs and DOH where management support program is needed:

1. Project development - need to strengthen processes and procedures in project identification, feasibility study, selection, and design.
2. Project implementation and construction - need to improve implementation planning, construction methods, quality control, and monitoring and evaluation.
3. Operation and maintenance of irrigation and rural water supply systems - need to delineate the roles of Central, Provincial, and District DOH; formulate policies and implementation procedures for guidance of various levels; formulate policies and strategies for farmers participation.
4. Beneficiaries involvement - need to formulate policies and strategies for participatory approach in water resources development; prepare guidelines and manuals for organizing water users and farmers; develop and document processes in organizing and strengthening beneficiaries for them to be able to participate in O&M.



Department of Hydrology. A **Hydrology Program Adviser (HPA)** will be provided to assist the HAB in the formulation of policy advice and recommendations for improvement of management structure and procedures. The mechanism to assist DOH in installing recommended systems and procedures will be provided through the **Administrative Officer (AO)**.

Other components of the Program are the support **operating fund, transport and office equipment, and training fund for counterpart staff**. These components were estimated to cost about US\$590,000 in 3 years including the remuneration of the HPA and AO.

**Organizational Adjustments.** It is expected that some organizational adjustments will be necessary to successfully implement the Program.

**For the Funding Agencies:**

- Membership to the HAB and to play an active role in all the HAB's advice formulation to DOH concerning the areas of intervention;
- Consolidating resources with other funding agencies in respect to the requirements of this Program;
- Allowing HAB to refocus work plans and activities of individually deployed experts according to the objectives and targets of the Program; and
- Adjustments to the reporting system to conform with the Program requirements.

**For the DOH and MOA:**

- Membership to the HAB and to play an active role in formulating advice concerning the Program;
- Initiate processes of consolidating functions of various offices within the DOH as may be recommended by the HAB and HPA and as is practically allowable within the authorities of the MOA and DOH;
- Inclusion of additional and new functions of some offices within the DOH as may be recommended by the HAB and HPA; and
- Present to HAB for concurrence any assistance offered to DOH outside the Program.

5. Data base in water resources - need to improve present system of collecting, compiling, preserving, and disseminating hydrological and meteorological data; strengthen O&M of hydro-meteorological stations; need to establish reliable data bank.
6. Workshop management - need to improve procedures in preventive maintenance, workshop operation, spare parts management, and capability in repair of equipment.
7. Administration, finance and organization - need to improve office procedures to eliminate bottlenecks in processing documents, stock inventory system, procurement processes, accounting system, human resources development, personnel management, and alignment of some functions in some offices.
8. Water resources development program - need to assist DOH in formulating an overall development program for the management of the water resources in Cambodia.
9. Training and field exposure of DOH staff - need to train and expand staff exposure on their field of assignment to strengthen their confidence and competence.

**Basis of Program Formulation.** The formulation of the program was based on the recognized need by the NGOs to pool individual assistance to further enhance DOH capability to support development in the water resources sector and the recognized important role of DOH in putting an overall direction in the sector. The formulation was also premised on the presence of experts individually deployed by the NGO through their regular assistance program to DOH and the identified areas at DOH that need improvement.

**Program Objectives.** The DOH Management Support Program was formulated to take advantage of the individual experts currently deployed or about to be deployed in the various offices of the DOH. The objective of the Program is to provide a coordinating mechanism to the present individual support of the NGOs to assist DOH develop and install policies, strategies and procedural improvements in order to strengthen its technical and administrative capacity in managing the water resources development in Cambodia. It also aims to maximize the impact of current individual NGO assistance to substantially increase Central DOH capacity to provide technical assistance and training programs to Provincial and District DOH.

**Program Components.** A coordination mechanism will be provided by the program through the **Hydrology Advisory Board (HAB)** which will be composed of representatives from cooperating NGOs, the Ministry of Agriculture, and the

**Expected Outputs From the Program.** The Program will be instrumental in accomplishing the following:

- Maximized use of NGO assistance particularly the experts deployed in various offices of the DOH;
- Manuals of procedures in both administrative and technical matters;
- Training of DOH personnel at Central, Provincial, and District levels;
- More effective use of human, material, and equipment resources;
- Stronger communication links among Central, Provincial, and District DOH;
- Establishment of a more reliable data bank as support for water resources planning and development;
- Policy and strategy for O&M and beneficiary participation;
- Defined O&M program at all levels;
- Nation-wide water resources development direction, particularly in irrigation and rural water supply.

## 1. INTRODUCTION

### 1.1. Background for this initiative

The Department of Hydrology (DOH) has been receiving substantial assistances from a number of NGOs since 1980. At present there are some 20 NGOs supporting the DOH in a number of ways at either the Central or Provincial level. The support takes the form of either material resources contribution or technical assistance aimed at improving the organizational as well as engineering capacity in the Department. In either form, the assistance is mostly uncoordinated and is not oriented on a common goal. This leads to a situation where donor NGOs formulate assistance programs without benefit of lessons learned from experiences of other NGOs. In effect assistance programs were formulated based on what the NGO could provide singly and on their established relationship with the Department. The NGO assistances were directed to bridging current resources gaps with some corresponding management intervention to build-up technical capacities of DOH personnel. This approach did not result to a sufficient capacity improvement of the Department as a more lasting contribution to the water resources development processes in the country particularly in the O&M of completed irrigation and rural water supply projects.

Recognizing the general deficiencies of these assistances and the basic need of consolidating the somewhat scattered individual NGO interventions, those assisting the DOH came together to discuss and make recommendations on how the current deficiencies could be corrected. Initially, an assessment of the DOH's management capacity and technical and financial capabilities was undertaken jointly by CIDSE and AFFHC in December 1990. The assessment revealed a number of areas which need urgent attention to strengthen the DOH as an institution responsible for water resources development. These areas are technical inadequacies, general lack of involvement of beneficiaries, need for streamlining procedures in financial and administrative matters, and improvement in personnel management.

Based on this study and their individual experiences, AFFHC, CIDSE, CWS and OXFAM started discussions and commonly agreed that current NGO interventions should address all these areas in a comprehensive approach and refocus their efforts towards a common objective in order to attain a substantial improvement in management capacities of DOH and in utilizing effectively the resources of both the DOH and NGOs. Thus, a common understanding was reached that these issues could be handled through a well coordinated "Joint NGO Support Program" to the Central DOH to provide a meaningful response to the requirements of water resources development in Cambodia, and in order to formulate such a program, outside expertise was considered necessary.

## 1.2 Tasks of the formulation mission

To prepare the program document and validate the areas of intervention a formulation mission was fielded from 8 October to 11 November 1991. The major tasks of the mission were as follows:

1. Prepare a JOINT NGO SUPPORT PROGRAM to the DOH addressed at the Central level to strengthen technical and managerial capacities.
2. Validate the areas of intervention through consultations with the DOH and concerned NGO.
3. Identify needed experts and define their corresponding tasks.
4. Formulate a program management structure defining the relationships among NGOs, DOH, experts, and Program Management Team.
5. Define the job descriptions and professional profile of a Program Adviser as overall coordinator of experts assigned by the NGO and as generalist adviser to both DOH and NGO in policy formulation and procedural improvement.
6. Prepare the program implementation schedule and cost estimates.

For a complete copy of the Terms Of Reference of this formulation mission we refer to Annex A-1

## 1.3 The study team

The formulation mission was composed of:

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## 2. BACKGROUND

### 2.1 THE MINISTRY OF AGRICULTURE

The Ministry of Agriculture (MOA) in Cambodia consists of 8 technical and 5 administrative Departments. Besides that it is responsible for the Agricultural University Cham Kar Daung and the Agricultural College Prek Leap. The Minister has delegated responsibilities to 6 Vice Ministers of which one is the senior Vice Minister. All of the vice Ministers are in charge of a number of Departments. For instance the Vice Minister in charge of the Hydrology Department is also responsible for the Organization Department, and agricultural education, Cham Kar Daung and Prek Leap.

For the organigramme of the MOA we refer to annex A-2.

### 2.2 THE DEPARTMENT OF HYDROLOGY

The Department of Hydrology (DOH) is responsible for Water Resources Development in Cambodia. Their main activities include:

- Establish and maintain a network of stations to collect climatological and hydro-meteorological data; elaborate and preserve these data and make them available for use by any other government services or institutes; weather and flood forecasting
- Identification, study, design, construction, operation and maintenance of irrigation projects, and other water control activities like dams, flood control etc.
- Rural water supply program; well drilling.

The Central DOH is also responsible for technical assessment of projects proposed by the provincial Hydrology offices before they are submitted to the MOA and on request of the provincial agricultural service DOH provides technical assistance to projects, proposed and implemented by provincial authorities.

#### 2.2.1 Organization and Staffing

##### Organization

The Department is headed by a Director assisted by two vice Directors, one for administrative matters and one for

technical matters. The Department is divided in 8 offices, 4 administrative and 4 technical offices.

For the organigramme of the DOH we refer to annex A-3.

A brief description of the present responsibilities of the different offices is given below:

- **Administration office**

This office acts as a secretariat to the Department. It is responsible for all internal and inter-ministerial communication and filing of all documents, the department library and for internal security and defence.

- **Organization office**

The role of this office is to assist the Department in organization and management, personnel (administration, evaluation, recruitment, retirement and social security), propaganda, instruction, training programs and salary scale.

- **Planning and statistics office**

The duty of this office is to inspect all office budget request, present them to the management level and prepare a compilation of all budget request to present to the Ministerial Department of Planning. For approved budgets they monitor actual expenditure on materials and finance against approved budgets and report to the Ministry on progress of projects. They are also responsible for co-ordination of support from the international organizations

- **Accounting and Finance office**

They are responsible for release of approved budgets by the Ministry of Finance and keeping accounts which show income and expenditure in allocated budgets. Furthermore they are responsible for purchase and management of spare parts, equipment and materials.

- **Design office**

This office is responsible for research, study, survey, design and budgeting for all water-resources development projects undertaken by the Department.

- **Construction office**

The role of this office is to implement all projects

designed by the design office. It is responsible for maintenance and repair of all heavy equipment and vehicles. It also has a small pre-fabrication unit which produces culverts.

- **Water-management office**

This office is responsible for operation and maintenance of all irrigation infrastructure in Cambodia, intervention in emergency situations, installation, operation and reparation of pumps, and for the rural water supply program; drilling of wells.

- **Hydro-meteorological office**

Their role is to install and maintain a network of hydro-meteorological stations (hydrology and climatology), collection, elaboration, conservation and dissemination of data, international exchange, forecasting for weather and floods.

The technical offices; Design, Construction, Water-management and Hydro-meteorology, work with provincial authorities, although responsibilities and working relations are not yet clearly defined, resulting in numerous communication problems.

The present organization is based on the Departmental direction no: 990 The specification of duties and the organizational structure of offices in the DOH, dated October 1989.<sup>1</sup> With the changes in the past few years it seems that this direction is not so appropriate anymore and that it would need reviewing to respond to the changing demands and environment in the Water Resources Development sector.

### Staffing

The Department at present has approximately 730 staff. The educational background of the staff and how they are distributed over the different offices is shown in annex A-4

On reconstitution in 1979, only 5 of the original pre-war staff remained, 3 engineers and 2 controllers. These were occupied in the first years in training up the new staff which increased rapidly from 187 in 1980 to 504 by 1985, to 730 at present.

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<sup>1</sup> For the full text of this direction see annex 5.2.2. of the joint AFFHC/CIDSE "Appraisal of management systems and resources in the Department of Hydrology" December 1990



A small number of the engineers (6) and the technicians (4) have been trained in the Soviet Union and former Eastern Europe. At the same time a considerable number of staff received in-country training at different institutes. It seems however that because of the lack of an overall human resources development plan and frequent transfer of personnel, the Department was not always able to utilize this trained staff to its potential. Also the present working environment: - unclear responsibilities, - limited resources, funds and materials, - low incentives, is not encouraging or motivating for the staff to take any initiatives.

### 2.2.2 Tasks and Performances

The tasks and responsibilities of the Department could be summarized as follows:

- hydrology & meteorology network O & M, data collection, preservation, compilation, elaboration, and dissemination;
- project development: - identification, - feasibility study, - selection, - design;
- project implementation and construction:
  - implementation planning, - construction methods,
  - quality control, - monitoring and evaluation;
- operation and maintenance of irrigation infrastructure;
- farmers participation in irrigation development and rural water supply programs;
- workshop management: - equipment preventive maintenance, - workshop operation, - spare parts management;
- administration, finance and organization: - stock inventory, - procurement, - procedures, - accounting system, - human resources development, - personnel management.

Comparing the tasks and responsibilities of the DOH to the resources they have available and keeping in mind that only a decade ago the DOH started with virtually nothing we can understand the mediocre performances. The ill defined working relations with provincial and district level Hydrology, and other Departments in the MOA, specifically the Agronomy Department make their task even more difficult.

Annex A-5 gives an indication of the constraints and difficulties faced by the different offices in trying to implement their duties and initially suggested interventions.

Annex A-6 gives an idea of the equipment resources of the DOH.

### 2.2.3 Areas of Concern and management issues

In relation to the functioning of the Hydrology Department and derived from discussions with the different offices and at the different levels we can determine four areas of concern:

- technical,
- involvement of beneficiaries,
- financial, planning, policy,
- organization, administration and personnel.

Within these areas of concern we identified a number of issues which are essential for the adequate functioning of an Institute like the DOH. Ideally, in an overall Plan of Support to the Department all these issues should be addressed.

#### Technical

- Poor availability of Hydrological and Climatological data
- No catchment wide planning
- No beneficiaries orientated approach in activities of DOH
- No multi-disciplinary approach in project identification and development
- No design standards for irrigation infrastructure
- Lack of monitoring / supervising construction activities, no quality control

#### Community involvement

- Lack of policy, procedures and structure to involve

beneficiaries in project planning, implementation, operation and maintenance

- No procedures or structure to provide technical and organizational support to Province and District Agricultural Services, organizations and/or associations
- Insufficient feed back of field experiences to Provincial and Central level and hence slow development of beneficiary oriented approaches in planning, policy development etc.
- Unclear role of lower authorities and beneficiaries in operation and maintenance of completed projects

#### **Finance, Planning, Policy**

- Inadequate accounting systems to allow monitoring of project expenditure against progress
- Uncoordinated planning and implementation of programs, lack of needs assessments in most areas
- Lack of standards, criteria, procedures in project identification, selection, monitoring and evaluation
- Slow policy development because of poor communication links to receive feedback from field level experiences
- Lack of overall Water Resources Development Plan, inadequate collection and elaboration of data relevant to support the development of a WRD Plan and policy.

#### **Organization, Administration and Personnel**

- Lack of communication links between DOH and provincial and district level
- Ill defined tasks in some areas, lack of job descriptions and no delegation of responsibilities
- Inappropriate or lacking administrative procedures for timely and efficient implementation or service between offices or to other levels
- Lack of overall Human Resources Development plan, uncoordinated training, counterparts
- Poor International contacts, networking

## 2.3 The Water Resources Sector - Situation and Outlook

### 2.3.1 Water Resources Data Base

Planning for water resources development projects require long and uninterrupted record of meteorological and hydrological data. Feasibility study of large or medium scale irrigation project or storage dam or flood control structure would need long series of streamflow, rainfall, and other meteorological records. Design of bridges, roads, and other infrastructures would likewise require hydrologic and climatological parameters derived from long records. Even planning for agricultural production would need extensive hydrological and climatological data. The availability or non-availability of these information would determine whether a good plan could be formulated or not. The usefulness of a reliable and up-to-date data base in hydrology and meteorology is not only related to water resources projects but also in other sectors such as agriculture, urban development, public works, and transportation.

While the importance of collecting these water resources data base has been recognized in Cambodia, political constraints and financial and trained manpower limitations resulted to very scanty and discontinuous data series of both hydrology and meteorology.

Collection of meteorological and hydrological data must have started in Cambodia in the early twentieth century as rainfall records dating back to 1901 have been used in the study of Prek Thnot project. In 1960 when the Mekong Committee began to compile hydro-meteorological records, there were six operational stations along the Mekong river mainstream and two on the Tonle Sap river. By 1970 there were seven mainstream and seven tributary operating gauging stations in Cambodia. Because of security problems the number of operational stations started to decrease until in 1975, the network was completely abandoned. All the gauge installations were effectively destroyed during the 1975 to 1979 period due to lack of maintenance and pilferage.

Through the assistance of USSR and Vietnam the government of Cambodia started rehabilitating and re-establishing the country's hydro-meteorological stations in 1979. Thirteen river gauging stations and ten meteorological stations were re-established through this support. Also some 132 rainfall gauging stations were installed.

In 1987 the AFFHC began a program of material and technical support for the rehabilitation of the hydrologic stations. By August 1991 this support has

installed/rehabilitated six staff gauges all along the mainstream of Mekong river. Initial discharge measurements were also conducted in one of the stations (Stung Treng) which served as on-the-job training for observers and technicians. A second phase of this program (October 1991 to October 1994) has been prepared by the Mekong Secretariat to increase the river gauging stations to 19. A third and final phase of the program (up to 1997) will bring the number of stations to 30. Through the Mekong Committee sufficient number of hydro-meteorological stations along the mainstream and tributaries of the Mekong river will be established and initially operated and maintained.

At present only manual staff gauges of the river gauging stations are operational and 17 of the rainfall stations are still working. Two of the meteorological stations are completely out of order. The remaining eight stations submit incomplete set of data irregularly with 3-5 stations giving some data 80 percent of the time. The station at Pochentong, for instance, which is sitting right next to the Hydro-meteorology Office has only two instruments working properly out of the 17 types of instruments installed in the station. Thus, from this station only rainfall and evaporation data are gathered. The sad state of the different instruments in Pochentong Station could be the same condition of the instruments in stations outside Phnom Penh.

Collection, compilation, preservation, and dissemination of hydrological and meteorological data have many problems. Among the most important ones are as follows:

- Lack of maintenance of instruments due to limited resources and low level of personnel skill;
- Lack of direct control of the Central DQH on station observers resulting to undetermined quality of collected data and irregular data submission. Frequent changes of deployed observers without appropriate orientation training of the new observer is a common practice;
- Insufficient technical capacity of personnel in the Hydro-meteorology Office;
- Inadequate system of data preservation, compilation, and dissemination; and
- Inefficient radio communication between Central and field level.

The support program initiated by AFFHC in 1987 and the continuing assistance formulated by the Mekong Secretariat up to 1997 would provide a good network for the hydrology data base component on the Mekong river basin within Cambodia. The meteorology stations in other important sites would however be left behind if outside assistance would not

become available. If these two components could be integrated in the current programs, as some of the stations are really located in the same area, there would be a brighter prospect of establishing a more complete water resources data base.

### 2.3.2 Irrigation Development

The Department of Hydrology in its present form, situated inside the Ministry of Agriculture dates from 1979, and the Department was formally constituted in May 1980. During the reign of Prince Sihanouk prior to 1970, irrigation activities formed part of the Rural Construction Department (Department du Genie Rural) within the Ministry of Agriculture.

Historically Cambodia has a long tradition of watercontrol in both large scale structures particularly dating from the Angkor Wat period (13th century), and in the smaller scale as practiced amongst the farmers. Under French influence certain large scale schemes were undertaken, mainly in Battambang. During the 1960s the Mekong committee assisted in the design of several large projects which however except for the Prek Thnot scheme never got under way.

During the Pol Pot regime (1975-79) watercontrol was one of the main tasks the population was forced to work on. The system of canals and ponds in Angkor Wat is believed to have inspired the construction of the enormous system of canals, dikes and dams, resembling a chessboard-like design of rice-fields in one hectare blocks following the coordinate lines shown on topographical maps, all without proper design or survey and at great cost of human life. The legacy of these works<sup>2</sup> is one of the greatest challenges facing the DOH today.

The recent severe damage to Cambodian infrastructure (irrigation and roads) which occurred after heavy rainfall in August is mainly due to the disruption of the original water-management and environmental conditions caused by the construction activities during the Pol Pot regime.<sup>3</sup>

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<sup>2</sup> See "Kampuchea: undoing the legacy of Pol Pot's water control system" by Bert Pijpers, 1989 TROCAIRE/CIDSE

<sup>3</sup>"the main damage was caused by the dam burst and the subsequent flood wave, rather than just a heavy deluge of rainwater draining of the mountains. It is evident that the man-made structures built throughout the river basin have effected the natural drainage, channeling and retention of water down the

Since 1979 the Hydrology sector in Cambodia has received assistance from two sources: the USSR and Vietnam, and the NGO community. The assistance from the USSR seems to have mainly been in the form of heavy equipment, the annual provision of construction materials and the assignment of experts, particularly in the area of Hydro-meteorology and well drilling. The Vietnamese seem to have provided considerable technical assistance in the survey and design phase of projects, whilst both countries have been providing training opportunities for the Cambodians.

The NGO assistance since 1979 was in the early period mainly in the form of heavy equipment. From the mid-1980s onwards it increasingly took the form of NGO involvement in the design and construction of specific projects with the provision of technical assistance and some construction materials, the provision of pumps, and the provision of direct technical support to the Department of Hydrology itself. The different NGOs working in the Hydrology sector have adopted different approaches, depending on the development of their relationship with the Department and the type of assistance they were best able to provide. Whilst before all NGOs were working through central DOH now some only work at provincial level, channeling imported materials through DOH, some work at the central DOH only and some at both levels.

In the NGOs experiences working in the Hydrology sector it has now become clear to both the NGOs and the DOH that the importance of O & M (Operation and Maintenance) in all the DOH activities has always been underestimated. It is evident that any future assistance to DOH should focus on O & M aspects or at least incorporate it in the program.

The Government of Cambodia has in its Strategy Document (1991-1995) set a target in the highest priority area of agriculture to increase new irrigation development so as to increase rice production. This target has been set at 10,000 ha per year of new irrigation development and has been determined as that required to move towards self-sufficiency and to keep up with population increase. Due to severe budgetary constraints in 1990 and 1991 construction activities in the DOH have almost come to a complete standstill at present.\* There is at present a clear understanding within the Ministry of Planning, the MOA and

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valleys. The majority of these structures were built during the Pol Pot regime" M.C. Oxley, Flood Assessment in Takeo and Kampot province, October 1991

\* See Annex A-7 for an overview of the budgetary situation of the DOH from 1989 - 1991.

the DOH that this target will be difficult to achieve without external assistance. With the recent signing of the peace agreement and the expectation of outside funding coming available soon the Government of Cambodia is now putting forward the larger scale projects which were started in the 60s for international assistance.

In the recent reappraisal study of the Prek Thnot multipurpose project, it was also observed that the present capacity of the DOH only permits slow development of such projects, which should therefore be supported by proportionately a great number of expatriate staff, and that comparatively a lot of attention should be given to the institutionalization of farmer participation.

Based on these experiences the central DOH should consider seriously on refocussing its functions from direct project implementation to delivering support services to provincial and district levels, and delegate actual construction, implementation and O & M functions to provincial and district levels. The support services would include:

- training of provincial and district engineers and technicians
- Institutionalization of farmer participation
- establishing construction and O & M guidelines for field level guidance
- monitoring and evaluation of construction progress and operational condition of irrigation projects
- allocating both own resources and from different funding agencies
- co-ordination with provinces to establish yearly programs
- Catchment wide planning of water resources development

The DOH will evidently require assistance in adjusting the present organization to move to such an approach in the Irrigation Development Sector.

### 2.3.3 Drinking Water Supply

One of the most serious problems of Cambodia is the limited access of its population to safe drinking water despite its considerable water resources potential from both surface water and groundwater sources. As of 1987, for instance, only about 13 percent of the total population has



access to sufficient quantities of "safe drinking water"<sup>2</sup> (UNICEF 1990). While this is a significant improvement on the 1985 situation when only about 1 percent of the rural population had access to safe drinking water, the 1987 situation in Cambodia is far below the 1983 situation in Asia/Pacific region and Africa where respectively some 29 and 44 percent of the population in 1983 had been served by water supply projects. (World Bank 1987)

At present there are two Ministries implementing the rural drinking water program. The Ministry of Health implements the Potable Water Program which is supported by UNICEF and the DOH of the MOA implements the Rural Water Supply Program jointly supported by OXFAM and LWS. Before April 1989, the OXFAM program was implemented through the Department of Roads and Bridges of the Ministry of Transport and Communication while the DOH was supported by JVC and LWS. The UNICEF support has drilled more than 3,500 wells with about 84 percent success and rehabilitated some 990 wells with about 98 percent success since 1983. The UNICEF assistance has also installed some 3,500 hand pumps as of October 1991. The OXFAM support to the Ministry of Transportation and Communication drilled some 450 bore holes between 1982 and 1989. Starting in 1990 the OXFAM program was expanded such that by September 1991 it covers 4 provinces (Takeo, Prey Veng, Battambang, and Svay Rieng) with 2 technical advisers, this time through the DOH of the MOA. The support of the JVC and LWS accomplished some 250 bore holes between 1984 and 1989.

The assistance of the funding agencies on drinking water program has seen substantial expansion until 1991. The program expansion seems to be supported by these agencies and the amount of support will likely expand even more. For instance, the UNICEF has now covered 11 provinces against its 1981 coverage of only 2 provinces. The OXFAM coverage also expanded in 1990 to include 2 more provinces. These external supports, on the other hand, are largely dependent on the overall program of the national government in general and of the two involved Ministries in particular. Due to uncertain funding sources and limited technical capacity in planning and programming a national program for rural drinking water is yet to be formulated. Currently, the UNICEF is analyzing survey data in 11 provinces to establish bench-mark of the actual situation and to formulate a UNICEF Potable Water Program up to year 2000. This would more or less provide a national target and

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<sup>2</sup> Safe drinking water was defined conservatively in the report as water from either new or rehabilitated drilled or dug wells which is available throughout the year and has an acceptable smell and taste for drinking and other household purposes.

could initiate a more accelerated thrust in respect to provision of drinking water supply to rural areas.

Notwithstanding all these support to the rural drinking water program, Cambodia still needs to accelerate its program to be able to catch up with the requirements of increasing population and higher demands for this public service. Based on the 1989 population estimate of 8.44 million and annual growth rate of 2.8 percent, the government needs to construct nearly 1,000 more wells yearly to provide safe drinking water to its additional citizens of close to 250,000 annually. The present capacity of all the assistance in this sector could hardly meet the requirements of this additional population alone. It is obvious that current limitations on personnel skills and material resources will continue to hamper development and the national goal of providing safe water to all Cambodians by year 2000 will remain a dream unless massive outside development assistance will be obtained.

This assessment did not include the contribution of the private sector as there is no information available about this. It is assumed however that this would be minimal and confined only to relatively affluent areas where residents could afford the services of private drillers.

Another area of concern in the drinking water supply program is the current situation in the O & M of completed wells and pumps. According to the observations of the OXFAM Water Supply Program Advisor, there is a need to support the establishment of a sensible O & M for completed systems. Due to lack of maintenance, for instance, some 50 percent of constructed wells may be rendered useless within 5 years after completion. Some wells become in-operational a few months after construction. It was pointed out that pump models being used be reviewed and pumps with relatively easier and simpler maintenance requirements be used so that villagers could easily be trained to take over for more sustainable O & M. It was also suggested that the provincial DOH should play a major role in both the construction and O & M of rural drinking water supply facilities. In this arrangement, there is need to clearly define the role of the Central DOH as support to the Provincial and District levels. The responsibility of the Central DOH could be on:

- consolidating provincial plans for a nationwide program,
- establishing construction and O & M standards for field level guidance,
- monitoring and evaluation of construction progress and operational condition of wells on each province,
- training provincial engineers and technicians,
- allocating resources from different funding

- agencies, and
- coordinating with funding agencies to establish yearly programs.

The outlook of the Drinking Water Supply is not very bright. The present programs while the only available assistance in the sector are not sufficient to cater to the needs of present population. A national data bank on Rural Water Supply should be established and a Nation wide development plan be drawn to provide an overall direction. The plan could be a good starting point in inviting more agencies for assistance. It would also provide priority areas as guide to funding agencies. The plan should also formulate a system of O & M for completed projects supported by strong policy implementation.

#### 2.4 Need for the Program

Water resource is one of the most important resources in the country. Management and development of this resource would be dependent on available and reasonably accurate data base; skillful planners; efficient project implementors; knowledgeable O & M personnel and users; sound policy support; and sufficient capital investments. The Cambodian Government has mandated the DOH of the MOA to take the responsibility in the development and management of the water resources of the country. The Department must therefore be equipped with the necessary technical and administrative capability to carry out this important mandate.

Based on present assessment there are many inter-related areas that are needed to be improved in the Department. The Department needs a lot of assistance both in terms of technical strengthening and administrative procedures streamlining to be able to institute sustainable O & M for completed water resources projects such as irrigation and drinking water supply. The integrated and well coordinated approach proposed in this Program would provide the Department, or at least to be aware of it, the required management tools, policies, strategies, procedures, and personnel skill in order to perform its important roles in managing the country's water resources. This Program is important not only to the DOH but also to other government and private agencies and to the whole country in general as water is part of the daily needs of the whole population. The Program is definitely needed if more efficient planning and utilization of the water resources in support to the food production and other government programs are sought.

The need for this integrated support program is felt to be equally important to the Provincial level DOH. While through this Program there would be some exposure that could

be made by means of the training courses this is not sufficient to upgrade the existing provincial capacity to the required level of expertise. The Central DQH would remain to play a vital role in initially assisting and building technical capacities in the provincial level. Again the management and technical strengthening that would be provided by the Program to the Central DQH would sufficiently equip them to undertake the task of strengthening the Provincial / District levels.

### 3. THE PROGRAM

#### 3.1 Objective and Scope

The objective of the program is to strengthen the technical and administrative capability of the Central DOH as the main government agency responsible for water resources development in Cambodia. The program is expected to provide a coordinating mechanism to the present individual support of NGOs, to assist the DOH to develop and install policies, strategies and procedural improvements in various areas identified in Section 2.2.3. At the end of the intervention period, it is projected that the DOH should have functional and more efficient procedures on:

- involving beneficiaries;
- operation and maintenance;
- project design and development;
- construction implementation and management;
- workshop management;
- monitoring and evaluation;
- organization structure;
- personnel development program;
- data base storage and retrieval system.
- department-wide planning and strategy formulation;
- financial management and accounting system;
- procurement and stock inventory

In effect, it is expected that the DOH improved capacity would enable it to handle higher investments in water resources development including O & M of completed projects through its increased technical assistance and improved communication links to provincial and district levels.

It is also the aim of the program to install a mechanism by which the individual support of the NGOs could be consolidated to achieve a concerted effort in improving the central DOH to make it more responsive to the delivery of support services to Provincial / district levels and farmers. The mechanism will be instrumental in strengthening the Prov./Distr. DOH capacity in project design, implementation, construction management, O & M, and involvement of beneficiaries through appropriate training programs initiated and developed by central level DOH. It is expected that the program could establish an environment whereby the individual assistance of the NGOs could be maximized without substantial additional funding requirements.

#### 3.2 Program Description

In general there are three elements in the program, namely, the DOH, the individual assistances from NGOs, and the coordinating mechanism to be introduced by the program. In the formulation of this program it was assumed that the individual assistances from NGOs to

the DOH were part of the regular NGO program and are now in place or will proceed even if this program was not conceived.

### 3.2.1 Concept

The program is premised on two important aspects. The first one which is considered the most important element is the recognition of the different NGOs of the importance of pooling resources into a single package of support program directed to further enhance development in the water resources sector. While the individual assistance of the NGOs in this sector is scattered and difficult to assess, the total resources that were contributed by all the NGOs is definitely a substantial sum. Yet, the sector did not receive a significant attention in preparing the Central level implementing agency a development thrust that would improve its technical and administrative capacity to plan and manage nation wide development of water resources, support the lower level DOH through technical assistance and training programs and to handle larger investments for accelerated development.

The second aspect is the recognition of the significant role the Central DOH will play in putting an overall development and investment direction in the sector and in mobilizing higher investment levels. While multi-year intervention programs had been formulated and implemented, these were mostly directed to specific project. Although efforts were made to strengthen the central DOH, the past environment was not so conclusive to major organizational changes leaving many areas unaddressed. Present situations, however, are now more receptive as the DOH officials are more open to changes and recognize the importance of introducing new systems and procedures.

Considering these premises and capitalizing on the currently deployed and about to be deployed area specialists by the NGOs and the "principle of ripple effect" in development, the Support Program was formulated. The program will basically introduce the necessary coordination mechanism such that the various experts could work together to assist the Central DOH in improving its technical and administrative capacity. It is expected that the level of expertise attained by Central DOH through the program will eventually trickle down to the Provincial and District levels. As the Central level personnel are developed they would then provide the technical support and training needed by the lower levels. The process that would evolve is expected to develop a mutually beneficial linkage between the Central and field level DOH. Also, with enhanced capacity, the Central DOH will be equipped with the facility to carry on the development activities even after the NGO support is terminated.

### 3.2.2 Management Support Program Components

The program will provide the following:

Program Advisory Group. The Program Advisory Group (PAG) will

be the overall program implementing and monitoring unit. It is composed of representatives of the co-operating NGOs, DOH and MOA.

Hydrology Program Adviser. The program adviser has the catalyst role in this program. He will relate to the experts, NGOs and DOH. He will synthesize the experiences of the different experts individually fielded by the NGOs to assist the DOH on specific areas of concern particularly in the formulation of policy advices and improvement of management structure and procedures. He will serve as a generalist adviser to DOH and NGOs in strengthening both technical and administrative capabilities of the Department in undertaking water resources development projects and establishing O & M practices with farmers participation.

The **Hydrology Program Adviser** will serve for 3 year and will in addition to his regular work directly support the Planning and Statistics Office in reorienting its functions toward a macro-level plan formulation and monitoring and evaluation; guide the Office in gathering data and information needed in formulating the overall program of the DOH; assist in establishing an appropriate Monitoring & Evaluation system to provide an overall picture of the Department's activities, outputs, and performances against targets; train the Planning Staff in performing the new office tasks.

Administrative Officer. The Administrative Officer and his staff will act as the program secretariat and will assist the DOH in installing recommended and approved office procedures. He will maintain close working relationship with the Administrative units (administration, finance, and organization offices) of the DOH to provide expert assistance in streamlining office operation. He will also assist the Program Adviser in formulating policy recommendations particularly in the areas of financial management, organization structure, procurement and warehousing, and administrative issues.

The **Administrative Officer** will serve for 3 years and will be responsible for the following on top of his secretarial function to the Program: assist DOH in installing approved procedures in administration, finance and organization offices to strengthen the support of this group to the technical units; develop manuals of procedures for key activities such as accounting systems, recording and bookkeeping, stock inventory, procurement, release and delivery of materials, spare parts and funds to project sites; train counterparts assigned to his area of concern.

Operating Fund. The present financial situation of the DOH does not allow it to support the operation requirement of the program. The NGOs are expected to finance the operating expenses in running the program. This would include the remuneration of the Program Adviser and the Administrative Officer, the office operation requirements, and other related expenses that may be needed such as

field visits of Program Adviser and Administrative Officer.

Transport and Office Equipment. The program will provide for the procurement of transport vehicles and office equipment required in implementing the activities of the program. These are presently not available in the DOH.

Training for Counterpart Staff. To immediately install the various procedural changes and new technology, short training courses will be conducted during the program implementation. This will take the form of weekly seminars or one-two day training courses or field trips to project sites to strengthen theoretical knowledge.

Detailed job description of the Hydrology Program Adviser and the Administrative Officer are presented in annex A-8.

### 3.2.3 Team of Area Specialists.

A comprehensive management support program, to be effective in improving the DOH performance should cover all areas identified in section 2.2.3. These experts are expected to transfer technology through training their counterparts and exposing them to practical on-the-job experiential learning process. In the end of the intervention period a core group of staff capable of undertaking the various tasks of DOH and training co-workers would have been full developed.

Initially there are eleven specialists identified to carry out the proposed intervention. These experts will be fielded to the different DOH offices as follows:

|                         |   |   |
|-------------------------|---|---|
| Hydrometeorology Office | a | Hydrologist                             |
|                         | b | Meteorologist                           |
| Water Management Office | c | Irrigation O & M Engineer               |
|                         | d | Community Organizer                     |
|                         | e | Rural Water Supply Specialist           |
|                         | f | Workshop Management and Organization    |
| Design Office           | g | Irrigation Engineer (Planning & Design) |
|                         | h | Laboratory Specialist                   |
| Construction Office     | i | Construction Engineer                   |
|                         | j | Heavy Equipment Workshop Adviser        |



Organization Office

k

Organization and HRD Adviser

In the course of the formulation of this Support Program, additional Area Specialists were identified on top of what the regular NGO program would provide. These positions will be supported through this program or solicited from other interested NGOs. The Area Specialists, while may be directly or indirectly provided through this program, are very vital components of this Support Program. As explained in the concept of the program, they are one of the compelling reasons why this program was thought of. Their corresponding fields and direct contributions in attaining the overall objective of this program will be explained in the succeeding sections.

Seven of these experts are now included in the regular program of cooperating NGOs. To complete the team, sponsors for the meteorologist, Irrigation O & M engineer, Irrigation design and planning, and the construction engineer should be solicited.

a. The Hydrologist will serve for 3 years and will be responsible for the following: rehabilitation of old hydro-meteorological (the measurement and interpretation of river height and discharge) stations; establishment of new stations; improve operation and maintenance practices to ensure reliable data provision; regular measurement of riverflow/discharge, sediment and water quality sampling; develop expertise of all level DOH staff through appropriate training and on the job instruction; in co-operation with the meteorologist develop manual of procedures on data preservation, compilation, elaboration and dissemination; prepare proposal for developing centralized data bank system for a meaningful assistance in water resources planning and development.

b. The Meteorologist will serve for 3 years and will be responsible for the following: assess existing network of stations and formulate rehabilitation plan for a number of meteorological stations appropriate with the DOH resources for more effective O & M; review data collection as affected by observers' deployment and recommend more appropriate arrangements to ensure accuracy of collected data; develop manuals on data collection, field record compilation, instrument maintenance and system of data submission to Central DOH; develop training programs and motivational schemes for observers and other provincial/district personnel; in co-operation with the hydrologist develop manual of procedures on data preservation, compilation, elaboration and dissemination; prepare proposal for developing centralized data bank system for a meaningful assistance in water resources planning and development. Also, the Meteorologist will encourage DOH personnel in retrieving and compiling the meteorological data collected before the war in as many stations as possible and prepare guidelines in using these to assess quality of

present-day data from existing station.

c. The **Irrigation O & M Engineer** will serve for 3 years initially and will be responsible for the following: review present O & M practices in irrigation systems with emphasis on delineating roles of Central, Provincial, and District DOH; assess present linkages of DOH with other Government Departments dealing on agricultural production like the Department of Agronomy and recommend strategies to promote co-ordination; identify existing linkages and formulate strategies and approaches to improve present situation; develop guidelines and manuals of procedures in O & M of irrigation systems and pilot test these in selected provinces in coordination or jointly with the Community Organizer; develop and conduct training programs for O & M personnel; and formulate and recommend O & M policies for adoption by the government.

d. The **Community Organizer** will serve for 3 years and will be responsible for the following: review current schemes of farmers participation in various projects of funding agencies; develop guidelines and manuals of procedures in farmers organization, roles of different DOH levels and farmers in O & M, and in strengthening farmers capacity in agricultural production and irrigation system O & M; pilot test the procedures, in coordination or jointly with the Irrigation O & M Engineer, in selected provinces; develop training programs for farmers and DOH personnel; assess the need of organizing and developing a core of in-house trainers for farmers organization; and formulate and recommend policies on farmers participation for adoption by the government.

f. The **Rural Water Supply Specialist** will serve for 2 years initially and will be responsible for the following: review existing government policies and programs in developing rural water supply (RWS) and formulate approaches and procedures in developing centralized data bank on RWS; assist government in formulating an overall program delineating the roles of various ministries and levels of government hierarchy; review existing policies and practices in O & M of completed RWS projects; develop O & M manuals taking into consideration the roles of Central, Provincial, and District authorities and community involvement; review existing feedback mechanism from field level to central and recommend improvements; and assess consolidating the RWS program under one of the existing government ministries.

g. The **Workshop Management and Organization Specialist** will serve for 3 years and will be responsible for the following: assess overall capacity of DOH in workshop management and equipment repair including available tools and repair instruments; formulate manuals and procedures in spare parts procurement and warehousing, preventive maintenance, equipment deployment and corresponding monitoring and evaluation; develop training programs for workshop personnel particularly in the area of preventive maintenance of pumps, vehicles and heavy equipment; prepare proposals and coordinate with NGOs for funding urgent requirements; review organization and assess feasibility of consolidating the workshop

responsibility, that is, construction equipment, pumps, and drilling rigs under one outfit within the Department to allow co-sharing of resources between the separately run construction workshop and water management workshop.

h. **The Irrigation Engineer (Planning & Design)** will serve for 3 years and will be responsible for the following: review present processes in project selection and develop set of criteria based on technical, socio-economic, and political factors; develop procedures in conducting feasibility studies for small, medium and large projects; assist the DOH in training and developing a core of multi-disciplinary group for project studies; develop design manuals for standard structures and other irrigation facilities; formulate and conduct training programs for different technical staff such as survey group, project study group, design engineers, and soils laboratory; assist the DOH in establishing project pipeline for both rehabilitation and new projects.

i. **The Laboratory Specialist** will serve for 2 year initially and will be responsible for the following: review and improve existing guidelines and procedures for soil testing; improve existing guidelines and procedures for field work; assist the soil laboratory staff in interpreting and elaborating test results; train the soils laboratory staff in properly using and maintaining test equipment and apparatus; formulate training programs for the laboratory personnel; in coordination with Design and Construction Offices set up laboratory capability in supporting DOH in establishing construction quality control unit for earthworks and concrete works; in coordination with the Rural Water Supply specialist assess feasibility of expanding laboratory facilities to include water quality testing.

j. **The Construction Engineer** will serve for 3 years initially and will be responsible for the following: review current construction practices and develop appropriate construction guidelines and manuals for earthwork and concrete works giving major emphasis on quality control; formulate strategies and approaches in institutionalizing quality control procedures in the DOH delineating roles of Design, Construction and Laboratory groups in cooperation with the respective offices; train DOH construction personnel in appropriate construction methods and in monitoring and evaluating work progress; design suitable monitoring and evaluation system for project implementation and train involved personnel.

k. **The Heavy Equipment Workshop Adviser** whose assignment is dependent on approval of proposed construction of a new heavy equipment workshop at Tuk Kla and availability of funds therefore. will serve for 2 years and will be responsible for the following: assist DOH in setting up and equipping the new workshop of heavy equipment; prepare appropriate layout and recommend tools and repair instruments; examine the broken down equipment and advise on their worthiness for repair; assess capacity and skills of workshop staff and organize appropriate training courses; design simple maintenance manuals; prepare workshop operation guidelines addressing environmental aspects.

1. The Organization and HRD Adviser will serve for 3 years and will be responsible for the following: review and improve current job descriptions of DOH personnel; conduct training needs assessment and in coordination with various experts develop an overall HRD program; identify in- and out-country training programs and prepare proposals for NGO support; determine appropriateness of developing in-house trainers in certain areas of training needs; in collaboration with other experts review the DOH organization and recommend appropriate structure to minimize coordination problems.

In areas where an expert is envisioned to work for 2 years, it is presumed that the required DOH expertise should have been installed in that period. Evaluation at the end of the second year would assess whether continuation is necessary.

The job descriptions of the experts are presented in detail in annex A-9

### 3.3 Inputs From The DOH

While there is a general scarcity of resources in the DOH, the following could be provided without additional budgetary outlay:

Office Space and Furnitures. As it is important that the Hydrology Program Adviser (HPA) work closely with the DOH Director and Vice-Directors and the Administrative Officer with the Heads of Administration, Finance, and Organization Offices, their office space with corresponding standard furnitures will be provided at the DOH Headquarters at Phnom Penh. The office size should be sufficiently large to accommodate the support staff to the Program Administrative Unit.

Counterparts to HPA and Admin Officer. Full time counterparts who are senior staff will be assigned by the DOH to the HPA and Administrative Officer.

Support Staff for Admin Unit. Full time support staff from the existing personnel of Central DOH will be assigned to the Program Administrative Unit. This will comprise of one Secretary, one computer encoder, two drivers and one translator/interpreter. During the Program implementation this staff will be housed in the same office space provided to the Program.

Data and Documents. The DOH will make available all data and documents reasonably required for the Program implementation and different studies being conducted by the various experts. The DOH will also provide assurances that reasonable support will be provided in collecting additional information from the field and other government instrumentalities as may be reasonably required by the Program.

Working Permits and Other Entry Documents for Expatriates.

The DOH will provide assistance in obtaining working permits and in accomplishing other government requirements for expatriates, and will also facilitate securing in-country travel permits and laissez passez for team members.

Counterparts for area specialists. The DOH will ensure that the area specialists working in the different offices will have full time and competent staff in their teams to maximize the transfer of skills and knowledge to those offices

### 3.4 Cost and Financing Scheme

Table 3.1 presents the cost estimates for the program in three years. This is based on the requirements of the HPA, the AO and the administrative unit only. This does not include the budget requirements of the area specialists assigned to the various DOH offices. It is expected that both personnel and operating costs of these experts are born by the NGO directly sponsoring them.

Assumptions on cost estimates are given in detail in annex A-10.

Table 3.1 Yearly Cost Estimates in US\$

| PARTICULAR                                | YEAR 1   | YEAR 2   | YEAR 3   | TOTAL                |
|---|----------|----------|----------|----------------------|
| <b>A. PERSONAL COSTS:</b>                 |          |          |          |                      |
| 1. Salary                                 | 84,000.  | 84,000.  | 84,000.  | 252,000.             |
| 2. Accomodation                           | 24,000.  | 24,000.  | 24,000.  | 72,000.              |
| 3. Insurance                              | 4,000.   | 4,000.   | 4,000.   | 12,000.              |
| 4. Rest & Recreation                      | 4,000.   | 4,000.   | 4,000.   | 12,000.              |
| 5. Recruitment                            | 5,000.   | -        | -        | 5,000.               |
| 6. Sea/Air Freight                        | 5,000.   | -        | -        | 5,000.               |
| 7. Inward Travel                          | 10,000.  | -        | -        | 10,000.              |
| 8. Repatriation                           | -        | -        | 10,000.  | 10,000.              |
| 9. Sea/Air Freight                        | -        | -        | 5,000.   | 5,000.               |
| 10. Home Leave                            | -        | 20,000.  | -        | 20,000.              |
| Sub-Total                                 | 136,000. | 136,000. | 131,000. | 403,000.             |
| <b>B. OPERATING COST:</b>                 |          |          |          |                      |
| 1. Vehicle operation                      | 7,000.   | 7,000.   | 7,000.   | 21,000.              |
| 2. Office Supplies                        | 3,000.   | 3,000.   | 3,000.   | 9,000.               |
| 3. Communication                          | 2,000.   | 2,000.   | 2,000.   | 6,000.               |
| 4. Training Fund:                         |          |          |          |                      |
| a. Counterpart of HPA                     | -        | 10,000.  | -        | 10,000.              |
| b. Counterpart of AD                      | -        | 15,000.  | -        | 15,000.              |
| c. Language Training                      | 5,000.   | 5,000.   | -        | 10,000.              |
| d. In-country Training<br>& Workshop      | 2,500.   | 7,500.   | 5,000.   | 15,000.              |
| Sub-Total                                 | 19,500.  | 49,500.  | 17,000.  | 86,000.              |
| <b>C. VEHICLES AND OFFICE EQUIPMENT:</b>  |          |          |          |                      |
| 1. 4 WD vehicle for HPA                   | 23,000.  | -        | -        | 23,000.              |
| 2. 2 WD vehicle for Admin.<br>Unit        | 12,000.  | -        | -        | 12,000.              |
| 3. Motorcycle for Admin.<br>Unit          | 1,200.   | -        | -        | 1,200.               |
| 4. Computer, 3 sets                       | 9,000.   | -        | -        | 9,000.               |
| 5. Photocopier                            | 4,000.   | -        | -        | 4,000.               |
| 6. Miscellaneous                          | 3,000.   | -        | -        | 3,000.               |
| Sub-Total                                 | 52,200.  | -        | -        | 52,200.              |
| <b>D. REVIEW AND EVALUATION MISSION</b>   |          |          |          |                      |
| 1. Estimated costs for<br>outside experts | -        | 20,000.  | -        | 20,000.              |
| <b>TOTAL</b>                              | 210,200. | 203,000. | 148,000. | 561,200.             |
| <b>CONTINGENCIES (5%)</b>                 |          |          |          | 28,800.              |
| <b>GRAND TOTAL</b>                        |          |          |          | <u>US\$ 590,000.</u> |

The cost estimate was based on the assumption that both the HPA and the Administrative Officer would come to Cambodia with their families. Also the salary rate was based on international rates to be more competitive in order to attract well experienced candidates. These are, however, maximum estimates and actual salary rates would depend on the qualifications of the selected applicant and the subject to negotiations during the recruitment process.

Financing for the Programme would be contributions from cooperating agencies/NGOs. It is proposed that each participating NGO contribute equally to the basic funding requirements of the Programme. This would distribute the load equally and the cooperating NGOs would have equal sense of responsibility in the successful implementation of the Programme. When the budgetary requirements are beyond the NGO capacity external sources may be tapped for possible funding contributions. Due to the present financial constraints of the DOH, their input to the programme was limited to the immediately available resources at hand such as office space, counterparts to the HPA and Administrative Officer and staff for the administrative unit.

When costed against prevailing office rental rates and remuneration of government employees, the DOH inputs would cost about US\$ 50,000. in three years. While this is only a small percentage of the total cost, this does not include the time devoted to the Programme of senior officials like the Vice-Minister and the Director. Besides the prevailing salary rates of government employees are unrealistically low making the estimates probably too low compared to the actual value of the contribution.

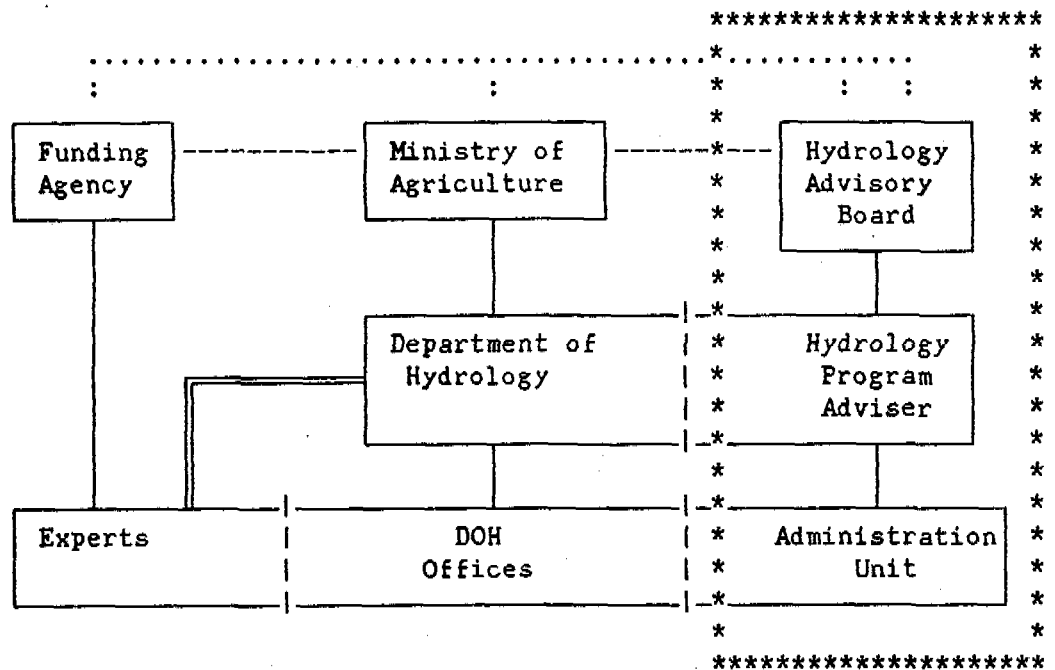
4. PROGRAM IMPLEMENTATION

4.1 Executing Agencies

The principal executing unit for the program would be the Hydrology Advisory Board (HAB) which is composed of representatives from cooperating NGOs, Ministry of Agriculture and Department of Hydrology. The HAB will be supported by the Hydrology Program Adviser (HPA) who will be recruited by the HAB to take responsibility in ensuring that the various works related to attaining the objectives of the Program are undertaken.

4.2 Program Management

4.2.1 The Program Management Structure



Legend:

- ..... Assistance provision
- \_\_\_\_\_ Administrative supervision and control
- Coordination and technical assistance
- ==== Technical supervision and control

\*\*\*\*\* Hydrology Support Program

Figure 4.1. Proposed Management Structure



Figure 4.1 presents the proposed management structure for the implementation of the program. While the program execution will be the responsibility of the HAB, the HPA will be the resource person of the program who will relate to experts, the HAB and the DOH. As proposed in the diagram the HPA and the HAB would be the mechanism that would introduce the desired cooperation and coordination among the different experts individually fielded by the NGOs to consolidate the effort into a single package of support program to develop the Central DOH.

#### 4.2.2 Composition of the HAB (Hydrology Advisory Board)

The HAB will consist of the following:

- Vice Minister of MOA responsible for DOH
- Head International Relations of MOA
- Director of DOH
- Representatives of all funding agencies (NGO)

The HPA will sit in all meetings of the HAB as resource person only.

#### 4.2.3 Roles of HAB, DOH, HPA and Admin Unit

The HAB will initially discuss and agree on the Terms of Reference (TOR) of the Hydrology Program Adviser. They will be responsible for the recruitment of the HPA. During the program implementation the HAB will be responsible for the following:

- Assess whether the general direction of the program is in accordance with the original objectives of the Hydrology Support Program
- Discuss and advise on necessity of short consultancy services to support the overall program
- Discuss and agree on TOR of experts to be assigned to the HSP
- Regularly review progress and constraints of the support program in the different areas
- Discuss and advise on policy issues with regard to Water Resources Development (WRD) sector to MOA and DOH
- Discuss and advise on organizational matters

required to ensure an efficient implementation of the program

- Discuss and advise on areas of concern in the DOH which are not addressed in the present coverage of the program, and contact alternative funding sources
- Monitor and evaluate activities of the HPA

The DOH will actively participate in the deliberations of the HAB and in installing new systems and procedures and will have the following responsibilities:

- Provide counterparts to HPA, Administration Officer and other experts. Transfer or frequent change of counterparts should be avoided to ensure continuity of rapport of experts and counterparts.
- Motivate NGOs assisting DOH to support the program and /or coordinate actively with HAB and HPA.
- Make known to HAB and HPA the programs and activities of other NGO within the DOH.
- Make assurances that counterparts and other DOH personnel are permitted to attend training programs approved by HAB.
- Establish policy to make assurances that trained personnel remain serving the DOH after their return from in or out-country training courses.

The HPA will be the generalist adviser for both the HAB and DOH, and will have specific responsibilities as follows:

- Identify areas of concern in DOH, discuss with HAB and DOH and formulate proposals to address these areas
- Provide HAB with regular updates on the developments in the water resources development sector
- Advise and discuss with DOH officials on organizational, procedural, institutional and administrative issues to improve the structure of DOH
- Discuss and advise the DOH on establishing relations with the provincial and district level hydrology offices

- Formulate and discuss policy advice for discussions with DOH, MOA, and HAB
- Monitor and review activities of experts working in the different areas
- Present regular reports on progress and constraints in the implementation of the HSP to the HAB
- Advise the HAB on general direction of support in the water resources development sector
- Prepare proposals for required short consultancies to strengthen the program in the water resources development sector.

The **Administrative Unit** will provide support to the overall program and will be specifically responsible for the following:

- Provide secretarial support to the HPA and HAB
- Assist DOH administrative units in installing recommended and approved changes for improvement of office procedures
- Assist the HPA and other experts in developing manuals for key administrative activities such as accounting systems, recording and bookkeeping, stock inventory, procurement and other support services to the technical group
- Organize meetings and maintain records of meeting minutes of HAB and HPA with other experts
- Assist all experts in organizing in-country travel permits and laissez passez
- Provide translation services to the program particularly in producing guidelines and manuals in Khmer.

#### 4.2.4 Relations Between/Among the Different Parties

##### \* **Between Experts and Funding Agency**

The responsibilities of experts to the funding agency are as follows:

- Preparation of work plans consistent with program objectives
- Preparation of annual budget and corresponding monitoring and accounting
- Implementation of activities in accordance to TOR agreed between HAB and funding agency
- Submission of reports on progress of activities and accomplishments

The responsibilities of the funding agency to the experts are:

- Administrative support to expert such as visa, accommodation, insurance, etc.
- Monitoring and evaluation of activities according the TOR agreed by HAB and consistent with the overall program objectives
- Advise expert on work refocussing based on recommendations of HPA and HAB to ensure alignment of activities to overall program objectives.

\* **Between Experts and HPA**

The responsibilities of the experts to the HPA are:

- Report to and discuss work plans as agreed by the funding agency
- Discuss with and advise HPA on policy and organizational matters in his/her area of concern
- Discuss with and advise HPA on procedural improvements in his/her area of concern
- Provide HPA with regular reports on activities and budget situation
- Make necessary adjustments to work plan as advised by HPA and approved by HAB
- Attend regular and special meetings organized by HPA.

The responsibilities of the HPA to experts are:

- Support experts in preparing annual and long term work plans

- Monitor, evaluate and advise on experts activities to be in accordance with program objectives
- Organize meetings with all experts to discuss issues of general importance and work related issues
- Synthesize experiences of experts into policy and organizational advises to strengthen DOH
- Support experts in identifying and formulating proposals in their respective areas of concern
- Assist experts in establishing communication links with other offices in DOH.

\* **Between the Experts and DOH**

The responsibilities of the experts are:

- Provide mechanisms to transfer technology to counterparts and other DOH personnel through on the job experiential learning process.
- Establish communication links between different offices to facilitate coordination of activities
- Assist the respective offices in the preparation of annual work plans and required budgets.
- Play a catalyst role in organizing sectoral meetings to facilitate exchange of experiences with other levels of government services and other agencies
- Consult with DOH Vice Directors and Director on matters that need immediate attention in relation to implementation of work plans and additional areas of concern.

The responsibilities of the DOH are:

- Support experts in implementing work plans through the provision of counterparts and other requirements that are within the means of the DOH
- Provide access to data and documents needed in the work of the experts
- Allow experts reasonable access to high DOH management officials like the Director and Vice Directors

\* **Between the HPA and DOH**

The responsibilities of the HPA are:

- Provide mechanisms to transfer technology to counterparts and other DOH personnel through on the job experiential learning process.
- Provide recommendations on improving office policies and procedures on irrigation O&M, project formulation, farmers involvement, administrative and organizational issues, etc.
- Identify areas of concerns which are not addressed in the current program and formulate proposals to address these concerns
- Provide policy advice on issues relevant in increasing DOH capacity in handling bigger investment levels in water resources development
- Discuss and advise on establishing relations with the provincial and district level hydrology offices

The responsibilities of the DOH are:

- Support HPA in implementing work plans through the provision of counterparts and other requirements that are within the means of the DOH
- Provide access to data and documents needed in the work of the HPA
- Allow HPA reasonable access to high DOH management officials like the Director and Vice Directors. A regular weekly or once in two weeks with the Director and Vice Directors would be desirable.

#### 4.3 Implementation Schedule

The program is proposed for 3 years implementation initially with evaluation by the end of the second year. Current developments suggest that the program may start during the first quarter of 1992 with most of the experts being fielded during that period. It is essential that the HPA be made available within this period.

#### 4.4 Program Monitoring and Evaluation

The monitoring and evaluation of the program implementation will be the responsibility of the HAB through monthly progress briefings of the HPA. Monthly meetings of the HAB will be organized by the HPA for the presentation of accomplishments and discussion of constraints and issues relevant to the program implementation. The monthly briefings would include the individual accomplishments of the different experts and the consolidated program outputs including those of the HPA and Administrative unit.

The HPA will also prepare and submit quarterly progress reports to the HAB. The contents of the quarterly report will include, among other things:

- comparison of the targeted and actual program outputs;
- the current and cumulative expenditures on the program;
- the current major activities of each expert and the work plan for the following quarter;
- the main problems encountered and the prospective solutions for the problems.

These reports will be submitted to the HAB by the end of the quarter to which they relate.

An annual report will be prepared by the HPA and submitted to the HAB by the end of the year. The annual report will include the accomplishments compared to targets and the proceeding years work plan, and target and budget adjustments when necessary. The HAB will make an annual evaluation of the overall accomplishments of the program relating this to the overall improvements in the operation of the DOH.

At the end of the second year an evaluation of the program will be conducted by a team, whose membership would include outside expertise, appointed by the HAB. This evaluation will be undertaken to review the impact of the program in the following area:

- strengthening the DOH in terms of its technical and administrative capability in performing its tasks as the government agency responsible in water resources development in the country;
- improvement in the O&M of irrigation systems;
- institutionalization of participation of beneficiaries in water resources development;
- establishment of a national data base in support

- to the water resources planning and development;
- improvement in the O&M of construction equipment and vehicles;
- streamlining of the administrative, financial, and organizational systems within the DOH; and
- establishment of the technical and administrative linkage between the Central DOH and its field level counterparts.

This evaluation will be the basis for reorienting and refocussing the overall program objectives and targets.

#### 4.5 Organization Adjustments

In the implementation of this Program there are adjustments that should be made both by the funding agencies and the DOH. These organization adjustments should be considered important pre-requisite to program implementation and must be agreed in principle prior to program execution.

##### 4.5.1 Funding Agencies

The major adjustments of funding agencies are the following:

- Membership to the Hydrology Advisory Board and play an active role in all the HAB's advise formulation to DOH concerning the program interventions;
- Consolidating resources with other funding agencies in respect to the requirements of this program;
- Allowing HAB to refocus work plans and activities of individually deployed experts according to the objectives and targets of the overall Program.
- Adjustment to the reporting system conforming with Hydrology Program requirements.

##### 4.5.2 Department of Hydrology/Ministry of Agriculture

The major adjustments of DOH/MOA are the following:

- Membership to the Hydrology Advisory Board and play an active role in implementing all the HAB's



advice concerning the program;

- Initiate processes of consolidating functions of various offices within the DOH as may be recommended by the HAB and HPA and as is practically allowable within the authorities of the MOA and the DOH;
- Inclusion of additional and new functions of some offices within the DOH as may be recommended by the HAB and HPA;
- Present to HAB for concurrence any assistance offered to DOH outside the program;

## 5. PROGRAM JUSTIFICATION

### 5.1 Benefits and Beneficiaries

The benefits that would accrue from the program are the various training components that would be formulated and conducted and the manuals of procedures that would guide the different offices of the DOH in performing their tasks. The areas covered by this undertaking are:

- o project development - identification, feasibility study, selection, and design;
- o project implementation and construction - implementation planning, construction methods, quality control, and monitoring and evaluation;
- o operation and maintenance of irrigation systems;
- o farmers participation in irrigation and rural water supply development;
- o hydro-meteorology - station O&M, data collection, preservation, compilation, elaboration, and dissemination;
- o workshop management - equipment preventive maintenance, workshop operation, spare parts management; and
- o administration, finance and organization - stock inventory, procurement, accounting system, human resources development, personnel management.

In general, the Government of Cambodia will benefit from the program as the Department of Hydrology becomes more efficient and effective in its roles in water resources development. As the DOH personnel gain more experience and confidence as a result of this comprehensive intervention to strengthen the DOH, better organized development in the water resources sector would be realized as a support to the food production and drinking water supply goals of the Government. Also it is expected that better O&M of completed irrigation and rural water supply systems would be implemented saving the government from expensive and frequent rehabilitation of these systems. Further benefits could be gained by the government by the expected positive impact of this program on more active participation of water users and farmers in minimizing wasteful construction errors and instituting more sustainable O&M.

The direct beneficiaries on this program are the personnel and staff of the Central DOH. As of November 1991 there are 732 DOH personnel. The overall improvement in DOH administrative procedures will give positive impact on the performance of all DOH personnel as a result of improved working environment and coordination among Offices. The program would directly benefit some 77 engineers working in the technical offices and some 144 medium level staff working in both the administration and technical offices. All of these engineers and technicians would gain access to training either through their direct contacts with their expatriate counterparts or through formal training courses made available by the program. The mechanics and technicians in the workshops would also benefit

directly from the training courses and manuals that would be produced. In general, the personnel would be more efficient as they would have a clearer understanding of their respective roles and responsibilities towards attaining the overall mission of the DOH. As higher level of work understanding is attained the personnel would be more initiative and productive.

The Provincial and District level DOH staff would also benefit directly from the program since relevant training courses will be offered to them as well. The particular areas where many training opportunities will be given to the Provincial and District levels are in irrigation system O&M, beneficiaries involvement, hydro-meteorology, project planning, and monitoring and evaluation. Through the program it is expected that the Central DOH would be able to start a direct technical assistance to the Provincial and District level staff especially in project formulation and feasibility study. Through this improved linkage, it could also be expected that the Central DOH would be assisting the field levels in building up pipeline of projects and in securing financial support to their projects.

The farmers would be the ultimate target beneficiaries of this program. As higher awareness of the importance of involving the users in water resources development, the farmers would be given more access to participate in the decision-making process in determining appropriate technology for their development. Consultations on project planning, implementation, and construction would provide opportunities to farmers to have a say in the development rather than just accepting the project decision from higher authorities in the government.

## 5.2 Impact on Water Users

The roles of the water users in both irrigation and rural water supply systems are not yet fully appreciated in Cambodia. While there are some recent attempts to involve the farmers in irrigation development, these are premised in motivating the farmers to contribute labor during project implementation rather than in organizing and developing the farmers for them to be able to improve their economic well-being through sustained irrigation services and easier access to support services in agricultural production. The present concept of involving the farmers in irrigation development would be improved and appropriate policy changes would be adopted. Like in other countries where farmers participation is more advanced than what it is now in Cambodia, these policy changes are envisioned to be pro-farmers and would result to farmers enhanced capacity to carry out system O&M.

The program through these policy changes in participatory approach and through the manuals of farmers organization processes would eventually contribute to the well-being of the irrigation water users. As the farmers organization is developed into viable water users association, their production capability will be improved resulting to better yields and better economic conditions. Through

the association, better farming profitability could also be attained contributing to higher income levels and paying capacity to support O&M of the irrigation system.

### 5.3 Impact on the DOH

The DOH will receive a well coordinated technical assistance covering most of the tasks of the Department at Central level. The direct impact of the program to the Department would be the development of the skills of its staff in all offices. The streamlining of office procedures would result to improved support to various technical activities of the DOH resulting to more efficient and effective project planning and implementation. It is also foreseen that the O&M of completed projects would be handled more orderly as specific responsibilities of various DOH levels would have been delineated and the farmers direct involvement from project inception to completion would have established the appropriate environment for their roles in O&M.

As the department capabilities are developed and improved procedures implemented, the Central DOH would then be capable of supporting the Provincial and District levels which would create a mutually beneficial link between Central and Field DOH. The linkage that would be developed would enable the Central DOH to undertake more project studies to build up pipeline of projects for presentation to potential donors for financial support. The DOH would also be able to present to the government overall nationwide short and long term development plans to meet goals in food sufficiency and targets in other areas of water resources development. Through improved data collection, compilation, elaboration, and dissemination the DOH would be able to support other government agencies in planning and implementing projects related to or requiring water resources data. In general, the DOH would be provided the necessary management tools and technical capability to take full responsibility in performing its mandate.

### 5.4 Program Risks

The major risks in achieving the projected benefits are:

- delays in program implementation resulting in delayed benefits;
- slow and inadequate reactions from DOH to implement recommended improvements in procedures;
- inability of DOH to institute organizational changes due to limitation on delegated authorities;
- inadequate responses from experts to align work plans to program objectives;
- inability of funding agencies to respond quickly on additional requirements to carry out activities on additional concerns identified during program implementation.

Program components and implementation arrangements are designed to minimize the above mentioned risks. To avoid program delays, all funding agencies who are basically the program proponents are fully represented in the PAG which is the implementing arm of the program. Provision of an expanded role on the program administrative unit to assist the DOH in installing changes for improvement of office procedures will adequately support DOH reactions. The proposed program management arrangements are designed to provide necessary mechanism to enable both experts and funding agencies to respond promptly on program requirements. With the MOA represented in the PAG appropriate representation to higher government authorities would enable negotiation of sufficient expansion of delegated authorities for DOH/MOA to institute recommended changes.

The program review and evaluation at the end of the second year would provide additional safeguards to minimize negative effects of the above mentioned risks.

## 6. CONCLUSIONS AND RECOMMENDATIONS

The consultations with the various Offices of the Department of Hydrology (DOH) and concerned NGOs arrived at the following conclusions:

1. Water resources development in Cambodia needs national direction and comprehensive planning and programming.
2. The DOH mandated to manage the water resources of the country is the logical government agency that could provide the needed national management plan for water resources in Cambodia.
3. The DOH needs technical capability, streamlined office procedures, and knowledgeable personnel in order to respond to the above mandate.
4. Previous assessments and present validation reveal many areas of concerns and management issues that would need strengthening through comprehensive intervention so that the DOH could possess the qualities required for its mandate. These are as follows:
  - Technical inadequacies in project identification, preparation, selection, design; project implementation and construction; quality control; project monitoring and evaluation;
  - Technical and administrative inadequacies in O&M of irrigation systems - need to delineate roles of Central, Provincial and District DOH; formulation of policy and procedures;
  - Unappreciated involvement of beneficiaries - need to establish processes in organizing users association; need to delineate roles of Central, Provincial, and District DOH; formulation of policy and procedures;
  - Inadequacies in workshop management - need to establish guidelines and procedures in preventive maintenance, workshop operation, spare parts management; need to streamline office procedures to strengthen support to project construction;
  - Inadequacies in administration and organization - need to streamline procedures in stock inventory, procurement; need to establish an overall human resource development program; need to improve personnel management; need to define and install communication linkages among Central, Provincial and District levels;
  - Inadequacies in financial management - need to improve accounting systems, record keeping, fund releases

monitoring and evaluation;

- Deficiencies in Hydro-meteorology - need to strengthen O&M of stations, data collection, preservation, compilation, and dissemination; need to delineate roles of Central and Provincial DOH; need to establish quality control in data collection.
5. There is a need for a comprehensive approach in strengthening the management capacity and technical capability of the DOH. Many NGOs has already recognized this need.
  6. **A comprehensive and meaningful Support Program** could be effected by pooling current NGO assistance to DOH.
  7. **A coordinating mechanism is necessary** to consolidate the individual NGO assistance to DOH to provide general direction and coordinated effort in strengthening the DOH.

The observed deficiencies and inadequacies in the management and technical capacities of the DOH seems insurmountable as all areas of responsibilities have major difficulties. While to improve the performances of the DOH is a gigantic task, the officials are quite open to changes and recognize the importance of starting to introduce new systems and procedures as early as possible. This attitude and desire of the management level is very encouraging and will definitely contribute in attainment of higher performance standards.

#### Where to Start

The District DOH is apparently very attractive because it is small and changes might be readily absorbed. Any improvement, however, might remain confined to this level and in order to attain a country-wide development, each and every district should be given equal attention. As of 1989, there are 1,492 districts. This would require an enormous manpower and operating cost. In addition, the management and control of the intervention for uniformity would be almost impossible. The district DOH therefore, should remain recipient of NGO project type assistance and comprehensive management assistance, such as proposed in this program be reserved for higher levels.

The Provincial DOH is again attractive as many of the NGOs are now directly dealing at this level. But, like the District level, any improvement in technical and management capability would tend to remain in the directly benefitted province and would hardly spread out to other provinces. To cover all provinces on the other hand would require an enormous amount of capital and manpower as there are 19 provinces as of 1989. Besides, there are inaccessible provinces even at present. Uniformity of assistance and standardization of procedures would also be difficult to ensure. Thus, the Provincial DOH like the district DOH should remain recipient

of project type assistance rather than of a comprehensive management assistance such as proposed in this program.

The Central DOH is the only logical starting point for a comprehensive assistance in strengthening technical and management capability in water resources planning and development. The Central DOH has the institutional mandate, offers a manageable environment for the implementation of a coordinated support program, has institutional authority to assist provincial and district DOH in activities related to water resources, and has ready access to international support agencies that makes it a good choice. Additionally, there are a number of on-going technical assistance at Central DOH which could be incorporated in the Program. The capability gains that would be obtained by Central DOH would benefit the central government and eventually the lower levels and farmers. Thus the Central DOH is the appropriate recipient of the Program.

Based on this analysis and the presented justifications, the Program is recommended for implementation at the Central level. To immediately benefit from the experts presently deployed by individual NGOs and facilitate the desired improvement taking place, the following activities should be undertaken:

1. Organize the Program Advisory Group through the initially interested NGOs.
2. Through the PAG start soliciting funding commitments for the various requirements of the Program and get assurances for the full support of the Ministry of Agriculture and Department of Hydrology for the Program implementation.
3. DOH should start designating counterparts for the various experts particularly the HPA and the Administrative Officer. The designated counterpart should be assigned on a continuous basis for the whole duration of the Program.
4. The DOH should initiate required organization adjustments to set-up the environment for efficient start-up of the Program. These adjustments are the delegation of responsibilities to lower management levels and consolidation of functions of some offices. The present responsibilities of the Planning and Statistics Office, for instance, should be reduced to make way for their more important roles in planning. Their administrative functions may be delegated to the Administration Office and some of their monitoring functions may be delegated to Construction Office.
5. As salary rates of employees are unrealistically low, their work motivation and performance efficiency are correspondingly low. Many of them are basically working only on a "part time basis" to be able to get other income generating activities outside DOH. Should this situation persist, the objectives of the Program will be negatively affected. It is therefore imperative for DOH to start exploring possibilities of



augmenting employees salaries through income generated by DOH. The extent by which this alternative additional incentives to employees could be provided within the bounds of existing government rules and regulations must be studied and presented to higher authorities. Strategies to generate income should also be laid out. Possibilities may be explored on the following:

- a. Equipment and vehicles rental
  - b. Laboratory fee for tests and analysis
  - c. Survey and mapping services
  - d. Architecture and design services
  - e. Well drilling and pump installation for private homes and housing developments.
6. Central DOH should initiate formulation of strategies on how to establish linkages with provincial and district DOH without disrupting their present roles and semi-autonomous system of project implementation. Starting point could be the establishment of a simple information flow to and from the provincial offices on a regular basis. The key is to make the provincial DOH get used to the presence of the Central DOH.
  7. Stronger coordination with the Department of Agronomy and other agencies dealing with agricultural production should be initiated. An initial activity that could start such coordination is the presentation of DOH programs to these agencies and delineating possible areas of cooperation. This might open other opportunities for other coordination areas.
  8. Recruit the Hydrology Program Adviser and the Administrative Officer for immediate deployment.
  9. Convene the different NGOs with current assistance programs to the DOH to present the proposed support program for their possible adoption and support commitments.
  10. The Central DOH should start redirecting its functions in providing technical services and training to provincial and district DOH.

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LIST OF PERSONS MET DURING THE MISSION

Ministry of Agriculture

Mr. So Khun, vice Minister  
Mr. Kong Thai Bunthan, vice Dir. Planning Dep.  
Mr. Ngourn Sin, Director Organization Dep.

Department of Hydrology

Mr. Suos Kong, Director  
Mr. Ly Channa, vice Director

|                          |   |
|--------------------------|---|
| Hydro-meteorology Office | Mr. Bin Boren<br>Mr. Tiep Chhiv Ngourn                                  |
| Watermanagement Office   | Mr. Hun Kim Hak<br>Mr. Khieuv Nan<br>Mr. Veng Sakhon<br>Mr. Doung Sarin |
| Design Office            | Mr. Te Auv Kim<br>Mr. Bun Hean<br>Ms. Mom Thany                         |
| Construction Office      | Mr. Sok Chan<br>Mr. Se Samott<br>Mr. Chan Um Heng                       |
| Planning Office          | Mr. Tan Leap<br>Mr. Heng Meng Hak                                       |
| Finance Office           | Mr. Chung Sem Im<br>Mr. Nhim Lay  |
| Administration Office    | Mr. Ok Chealy<br>Mr. Chan Hak   |
| Organization Office      | Mr. So Noeuv<br>Mr. Yang Sem  |

Non Governmental and International Organisations

|       |                                   |
|-------|-----------------------------------|
| ACR   | Richard Brown<br>Charles Gerber   |
| ADRA  | C.H. Tidwell                      |
| AFFHC | Peter Goss                        |
| AFSC  | Steve Stroester<br>Jens Tang      |
| AICF  | Patrick Seyller<br>Frank St Simon |

|          |   |
|----------|---|
| CIDSE    | Brian Veal<br>Clodagh O'Brian<br>Henk van der Wal       |
| CONCERN  | Marcus Oxley<br>Dara Johnston                           |
| CWS      | Peter La Ramee<br>Ingrid Haas                           |
| FHI      | Tim Grayling  |
| GRET     | Pierre Thevenot   |
| JANGO    | Paula Brinkley  |
| MCC      | Mike Roberts<br>Carl Wirzba                             |
| OXFAM    | Tonie Nooyens<br>Murray Wilson<br>Hans van Kampen       |
| PADEK    | Hans Moorlag  |
| UNDP/UNV | Jill Zarchin<br>Koaru Okada<br>Valerie Cliff            |
| UNICEF   | Bernard Gilbert<br>Waldemar Pickardt<br>Cesar E Yniguez |
| VSO      | Anne Harmer   |
| WFP      | Bruce Howell  |

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## HYDROLOGY SUPPORT PROGRAMME

### *Terms of Reference for a Formulation Mission*

#### Background of the proposal.

The Department of Hydrology (CHD), under the Ministry of Agriculture (MDA) is responsible for Water Resources Development in Cambodia. Their main activities include: study, design, construction, operation and maintenance of irrigation projects, collection and elaboration of climatological and hydrological data, well drilling and flood control. The Central Department of Hydrology also provides technical assistance to similar projects, proposed and implemented by provincial authorities, through the Provincial Agricultural Services (PAS).

During the past decade, several NGOs have been supporting the CHD in enabling them to carry out its tasks. At first this was mainly material and equipment support. Later, support included more technical assistance to implement programmes after which it became clear that the implementing capacity of the CHD was overestimated. For the last few years the CHD also received general training and institutional development support from a few NGOs.

With some irrigation projects nearing completion, and from experiences from other ongoing activities, it has become clear that the Operation and Maintenance (O & M) aspect of all the Department's activities has also been overestimated and scheme O & M neglected. Post construction activities require additional and ongoing inputs from the CHD which have never been foreseen and which the present budget situation does not allow.

Based on these experiences, several studies and appraisals conducted with the CHD, the present budgetary constraints and the increased openness of Department and Ministry, discussions and co-ordination between NGOs involved with CHD have intensified, leading to the common understanding that these issues can only be tackled in an overall, well co-ordinated programme of support to CHD. This programme should be geared to equipping the CHD with a structure and the skills to respond to the demands of O & M.

#### Objectives of the programme.

Operation and Maintenance activities, in the broad sense, are an essential component of the Department's

responsibilities. They determine whether a project will be sustainable, whether projects benefits are realised to their potential, thus whether investments are justified. In relation to O & M at least four different components can be identified:

- technical,
- involvement of beneficiaries,
- financial, administrative, procedural,
- organisation and personnel.

In a comprehensive approach, all these aspects should be addressed. All components are related to each other, tackling one or two will not resolve O & M problems. To ensure the viability of such a support programme there should be clear links to project identification and Design Sections in the Department so that feed back from experiences in the field can be incorporated in future projects. Also essential in such a support programme is the link to policy making level in the Department and the Ministry so that policies can be developed based on field experiences.

The Support Programme should address the abovementioned issues and in co-operation with the Department and Ministry work out strategies, procedures and approaches to Water-Resources Management which are appropriate for the situation in Cambodia and in consistent with present development approaches.

### Outline of the Proposal

In the present situation in Cambodia, almost all foreign aid is channeled through central level government. Limited human and financial resources at central level, which are almost non-existent at lower levels, make it inevitable that any support programme starts at central level. The present centrally-planned economy is not able to facilitate support in an other way.

It is however encouraging to see that at policy making level in the Department and the Ministry the awareness is evident, they are open for change and activities of NGOs addressing O & M issues receive full support.

A support programme should assist central level in the development of policies to ensure: clear procedures for supply of spare parts, preparation of guidelines and manuals, ensure availability of technical support to all levels, look after the interests of the Water Users Communities. Such programme using the experiences of working in and with a few provinces / districts will have a nation wide impact.

In discussions amongst several NGOs and based on priorities made clear by the Authorities, the following positions have evolved:

- \* Community Development Expert  
To investigate / advocate / formalize the involvement of water users / beneficiaries in identification, design and implementation of projects in O & M activities.
- \* Irrigation Operation and Maintenance Expert  
To develop guidelines / manuals / procedures for the Operation and Maintenance of Irrigation Infrastructure.
- \* Rural Water Supply Sectoral Specialist  
To assist in the identification and implementation of rural water supply programmes, and coordination with other relevant offices and Institutes
- \* Workshop Management Expert  
To improve organisation / management / procedures, and co-ordinate training for all workshops within the Department, with special focuss on the pump workshop.
- \* Heavy Equipment Workshop Technical Adviser  
To assist in the setting up and equipping of a new HE Workshop, and develop guidelines and manuals to improve O & M practices.
- \* Hydro-meteorological Expert  
To advise and conduct training in the installation, O & M of Hydromet equipment, and the collection, elaboration and distribution of Hydromet data.
- \* Irrigation Engineer  
To introduce a multi-disciplinary approach in project identification and feasibility studies, including the field experiences of the other experts.
- \* Human Resources Development Expert  
To expand and maintain contacts with relevant institutes in the region, and develop an overall HRD plan for the Department.
- \* Programme Co-ordinator  
To co-ordinate activities of all experts, liaise with government and funding agencies, and have overall programme responsibility.

The technical experts will be assigned to different offices while the programme co-ordinator should work across offices and at the Departments management level. The technical experts should, besides the work in their sector, also advocate increased communication and co-operation between



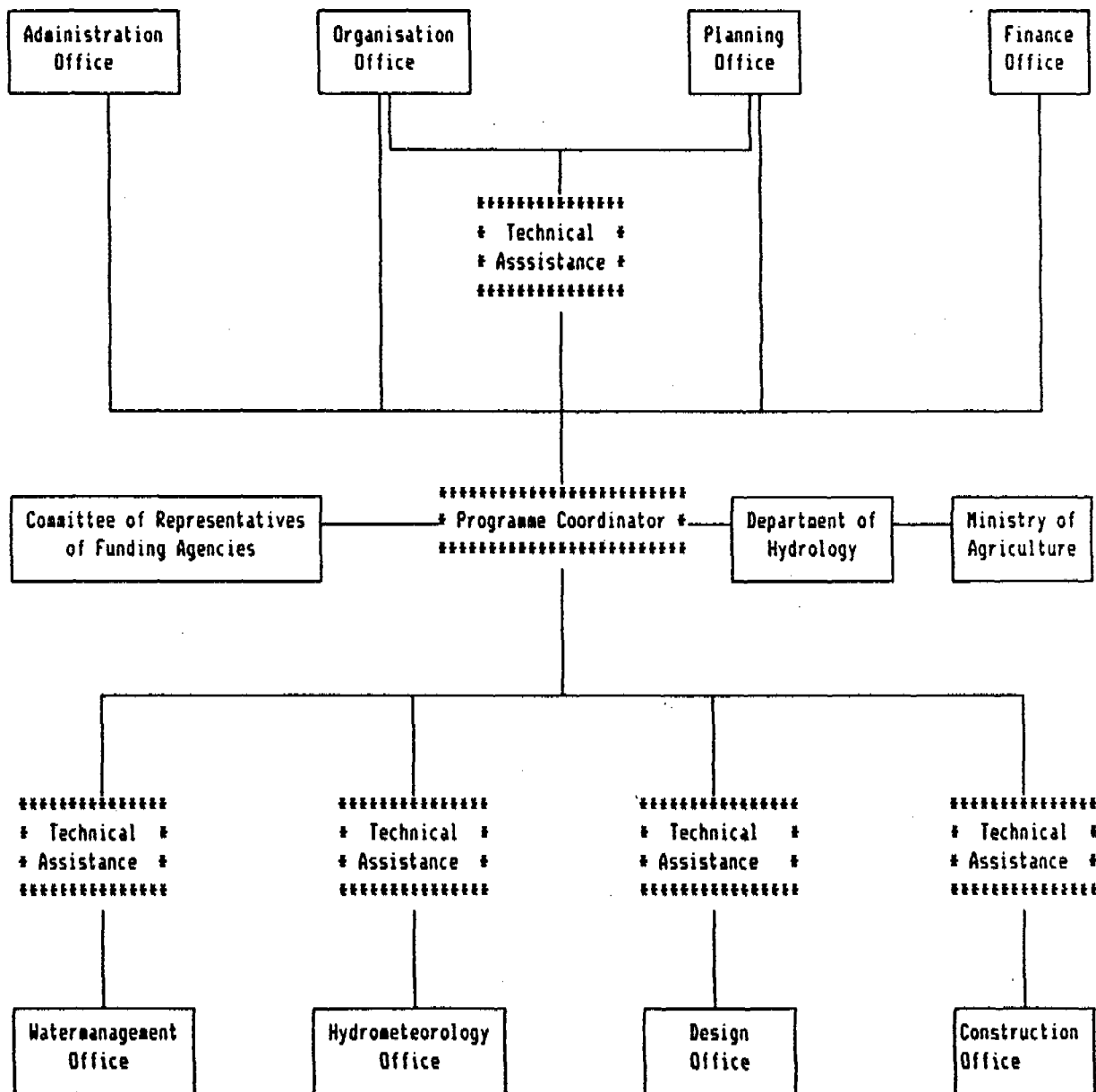
different offices. The programme co-ordinators task will be to take up issues related to the non technical offices in the Department, policy issues, ratification of procedures and guidelines.

#### PROGRAMME MANAGEMENT STRUCTURE

The role of the funding agencies is seen as a monitoring one, in which the representatives of those agencies meet every two or three months with the programme coordinator. The programme coordinator will have full responsibility for programme management, administration, finance and liaison with the government. Technical staff assigned to the programme will only be responsible to the programme coordinator.

# HYDROLOGY SUPPORT PROGRAMME

## PROPOSED MANAGEMENT STRUCTURE



## Tasks of a Formulation Mission

### A. Preparation of a draft project document

Based on the objectives and basic outline formulated in previous chapters, the mission is expected

- to prepare the draft of a project proposal and related project budget for a multi-year, technical support program to the Ministry of Agriculture and specifically to the Department of Hydrology.  
This program should fit the character and the needs of the participating agencies and address the needs of their related programs in the sector of irrigation and drinking water.  
The project document has to be prepared according to the attached format and has to be ready by the end of the mission.
- to consult with the concerned agencies while preparing the draft document, as well as to consult with other resource persons and the concerned government agencies.
- to verify during these consultations the feasibility of the objectives and basic outline for the program and to formulate recommendations and/or alternatives if necessary.

### B. Preparation of a program management structure

Based on the draft proposal, the mission is expected

- to prepare a programme management structure in which the relations between and responsibilities of the members of the executing project team are clearly defined, as well as the relations between the financing partners, as well as between the executing project team and the financing partners.
- to elaborate the relationship between the project team and the Department of Hydrology, and to identify a national director for the project at a strategically located level within the Ministry of Agriculture (Department of Hydrology)  
The management structure should allow for maximum independence of the project team with as little reference to the individual agencies as possible, and a clear reporting structure to a supervisory body constituted by the participating agencies (including the government).

### C. Preparation of job descriptions

As part of the project proposal, the mission has to draft the job descriptions and the professional profile required for the personnel involved in the project.

Details about the mission

The mission will consist of

- an external consultant
- Mr Seng Lo, Program Officer for AFFHC in Cambodia
- Mr Joop Schaap, Irrigation Specialist of CIDSE working in the Department of Hydrology (to be confirmed)
- A representative of the Ministry of Agriculture, Department of Hydrology

A lead agency will be pointed out to support the mission with the necessary logistics and guidance.

The mission will last for 3 weeks at the end of which the agencies will be presented with the first draft for discussion among agencies and with the government. An additional week can be spent on finalizing the draft. The venue of the mission is Phnom Penh.

The mission will take place in August, September 1991.

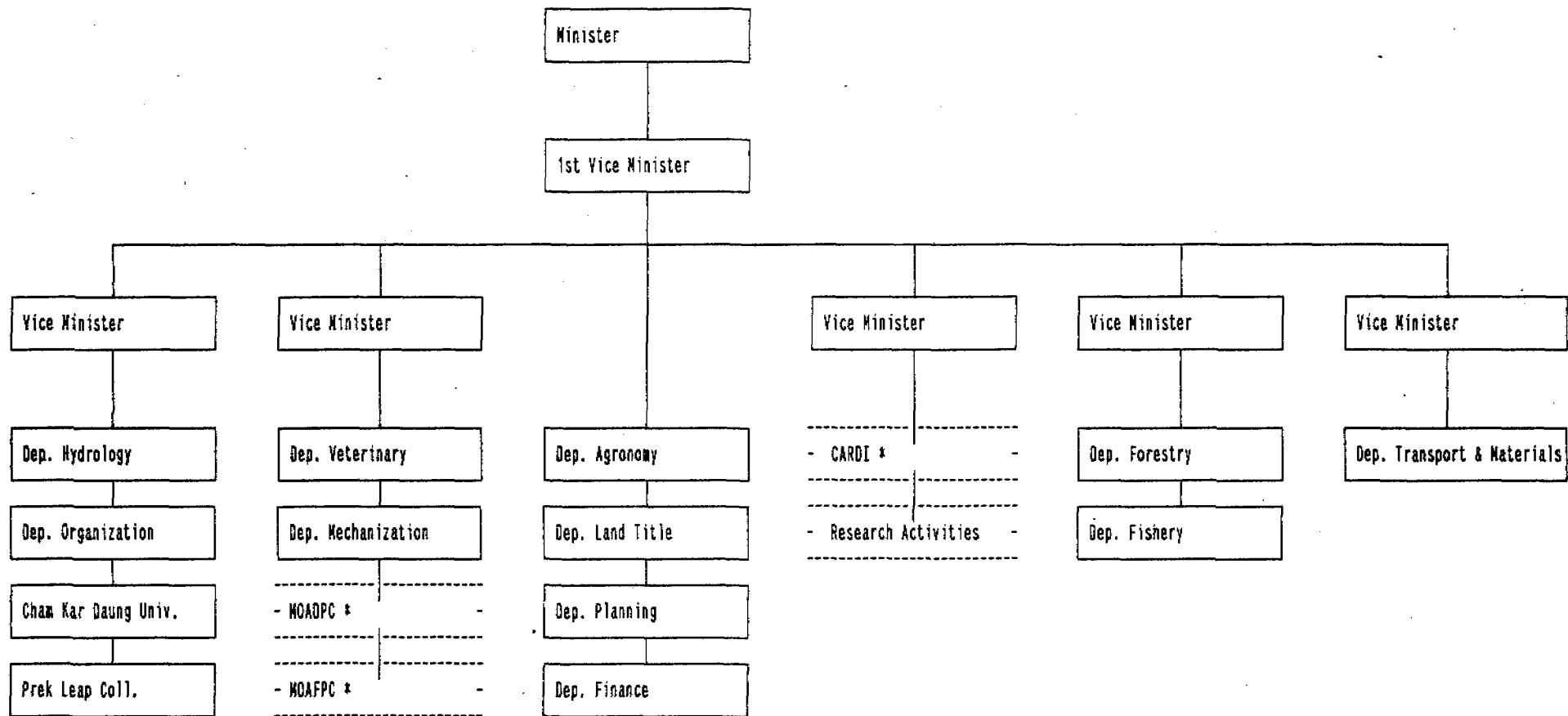
Qualifications of the external consultant

Water resources management engineer with experience in third world countries, in the fields of

- rural drinking water and irrigation
- technical institutional development
- human resources development
- cooperation with central governments in the area of water resources development
- project preparation and proposal writing

ORGANIGRAMME

MINISTRY OF AGRICULTURE



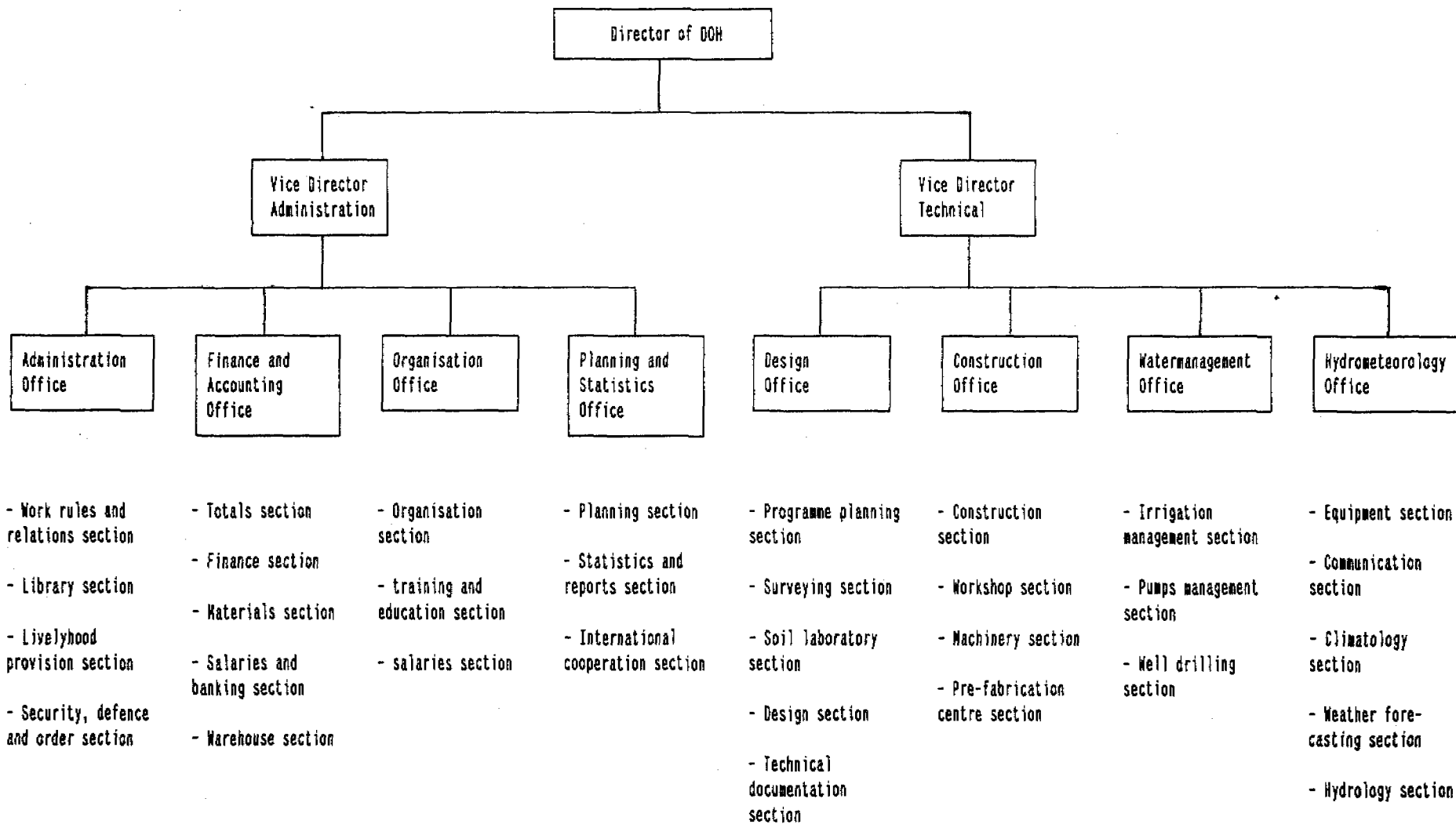
\* CARDI = Cambodia Agriculture Research Development Institute

\* MOADPC = Ministry Of Agriculture Displaced Persons Committee

\* MOAFPC = Ministry Of Agriculture Flood Person Committee

# ORGANIGRAMME

DEPARTMENT OF HYDROLOGY



## EDUCATION BACKGROUND OF DOH STAFF

| OFFICE                     | ENGINEERS<br>LEVEL | TECHNICIANS<br>LEVEL | VOCATIONAL<br>LEVEL | OTHER<br>STAFF | TOTAL<br>STAFF |
|----------------------------|--------------------|----------------------|---------------------|----------------|----------------|
| Management level           | 01                 | 01                   | -                   | 01             | 03             |
| Administration             | -                  | -                    | -                   | 25             | 25             |
| Organization               | -                  | -                    | 01                  | 06             | 07             |
| Planning and<br>Statistics | 02                 | -                    | 01                  | 09             | 12             |
| Accounting and<br>Finance  | -                  | 04                   | 01                  | 29             | 34             |
| Design                     | 22                 | 31                   | 08                  | 37             | 98             |
| Construction               | 34                 | 67                   | 39                  | 232            | 372            |
| Watermanagement            | 15                 | 15                   | 06                  | 49             | 85             |
| Hydro-meteorology          | 03                 | 26                   | 15                  | 52             | 96             |
|                            | ===                | ===                  | ===                 | ===            | ===            |
|                            | 77                 | 144                  | 71                  | 440            | 732            |

## ASSESSMENT AND SUGGESTED INTERVENTION

Constraints and Difficulties:Suggested Intervention:**HYDROMETEOROLOGY OFFICE**

1. Non-functional instruments in meteorological stations due to lack of funding and other resources.

Assess the present network of stations to formulate a rehabilitation plan for a minimum number of stations to allow more effective operation and maintenance of the network. Review also the number and type of instruments in each station to effect simple data collection and maintenance procedures. In coordination with NGOs develop/formulate financing scheme for rehabilitation.

2. Lack of quality control on data collection.

Review deployment of observers and set up incentive schemes to motivate them. Develop training programs for observers and other provincial/district personnel. Develop manuals on data collection, field record compilation, instrument maintenance and data formats for submission to Central DOH.

3. Lack of systematic data preservation, compilation, elaboration and dissemination.

Develop manuals of procedures, dissemination strategies and system for data preservation. Formulate and conduct training programs for personnel involved in this aspects.

4. Lack of linkages with the provincial and district DOH.

Review present set-up and develop strategies and approaches to establish and strengthen linkages and motivate personnel at various levels to attain desired coordination. Formulate national policy for recommendation to government.



5. Lack or insufficiency of overall direction in operating and maintaining the network of stations.

Assess various assistance from NGOs and other agencies and relate this to the overall objectives of developing a national data base for water resources planning and development. Formulate strategies and approaches in coordinating and consolidating these assistances for more effective and efficient utilization.

6. Inefficient radio communication between Central DOH and field. Lack of transportation for station inspections, repairs and maintenance of instrument.

Consider this in the assessment of present network and include in the rehabilitation plan formulation.

#### **WATER MANAGEMENT OFFICE**

1. Objectives and functions on O&M of irrigation systems are not well defined. Absence of policy and guidelines .

Review and delineate the present O&M practices in irrigation systems. Define the existing linkage mechanism between Central and field level DOH. Define and delineate the O&M roles of central, provincial and district DOH to improve present situation. Develop guidelines and manuals of procedures for each level. Implement guidelines and manuals on selected provinces to test applicability , introduce improvements and amendments. Finalize O&M guidelines and manuals of procedures. Prepare training programs for O&M personnel at various levels. Formulate a system of monitoring and evaluation as feedback mechanism from one level to the other and vice versa. Consolidate O&M guidelines including manuals of procedures and monitoring and evaluation system into a single document for recommendation to the government for adoption as a national policy.

2. Absence of policy and guidelines on involving the farmers in irrigation development.

Review the current schemes of involving the farmers in various projects undertaken by various agencies particularly the NGOs. Establish the role of the different levels of government agencies and develop appropriate approaches and strategies in setting up the necessary environment for a healthy farmers' participation. Develop guidelines and manuals of procedures in farmers organization, farmers training programs, DOH staff training. Apply the initial guidelines and manuals in the provinces used for testing the O&M guidelines and manuals. Improve guidelines and manuals based on test implementation. Formulate and install in the selected provinces the necessary feedback mechanism to strengthen linkages with the Central DOH. Formulate a draft national policy on farmers participation in irrigation development for recommendation to the government.

3. Absence of overall plan for rural water supply program and lack of coordination with government ministries involved in rural water supply.

Review existing government policies in developing rural water supply to assess possibility of consolidating the program under one existing Ministry or as an initial step towards this goal, formulate approaches and procedures in developing centralized data bank on rural water supply. Assist the government in formulating an overall program delineating the roles of various Ministries and levels of the government. Based on this assessment and in coordination with concerned Ministries and NGOs develop an overall rural water supply program delineating the roles of each Ministry and the needed coordination mechanisms for

stronger linkages horizontally among Ministries and vertically among various government levels.

4. Lack of policy and guidelines concerning O&M of completed rural water supply projects.

Assess the various experiences of different NGOs and government Ministries on O&M of rural water supply projects. Formulate strategies and develop O&M manuals for various levels defining the roles of the Central, Provincial and District DOH. Develop feedback mechanism (monitoring and evaluation) from one level to the other. Test the guidelines and manuals in the pilot provinces selected for irrigation O&M and farmers participation to debug the processes. In coordination with other experts, develop the final version of the manuals and formulate training programs for O&M personnel and beneficiaries for installation of the system of procedures in other areas.

5. Lack of vertical and horizontal coordination among various offices within DOH resulting to delays in releases of materials and spare parts for projects. Cumbersome office procedures concerning these aspects.

Review present office procedures. Establish flow charts and examine and identify bottlenecks. In coordination with concerned DOH offices and management officials recommend changes to streamline cumbersome procedures. Develop simple and easy to monitor systems and office procedures when necessary. Test new procedures upon approval of DOH officials. Design document tracer slips to identify further bottlenecks and introduce further improvement in the procedures.

#### DESIGN OFFICE

1. Unclear or lack of criteria for project selection.

Develop set of criteria for project selection based on technical, physical, socio-economic, water users

- associations, and political factors. Depending on the size of project formulate the mechanics of selection considering the various levels of the DOH and other aspects influencing the selection process. Formulate a system of comparing the projects for decision-making.
2. Lack of proficient personnel to conduct project feasibility studies and evaluation.
- Develop procedures in conducting feasibility studies for small, medium and large projects. Delineate role of Central, Provincial and District DOH in conducting studies for various sizes of projects. Formulate training programs for DOH personnel at various levels.
3. Lack of design manual for irrigation structures.
- Review present procedures in the Design Office and develop design manuals for standard structures (culverts, flumes, turnout, checkgates, canal crossing, etc.). Establish training program for use of the manuals in coordination with experts in other related offices.
4. Limited number of people proficient in test procedures of the Soils Laboratory.
- Provide technical support to the Soils Laboratory particularly in establishing various test procedures and training personnel. Assess available laboratory equipment and determine essential additional requirements to support construction quality control.
6. Unclear relationship of the Water Management Office (WMO) in planning and design of irrigation projects.
- Review present system to identify entry points in involving the WMO to institute participation of farmers. Formulate strategies or approaches in encouraging early involvement of farmers in the development of the project to prepare them for the eventual O&M of the completed

irrigation system.

### CONSTRUCTION OFFICE

1. Construction quality control is virtually not practiced in the field and not monitored from headquarters.

Review DOH set-up and identify appropriate unit that should be responsible on quality control of construction implementation. Delineate system and procedures in quality control both on earthwork and concrete work. Prepare manuals of construction procedures for the guidance of field engineers and foremen. Review physical and personnel capability of DOH laboratory in supporting quality control requirement. Recommend necessary improvements to build up laboratory capacity. Develop training programs for personnel involved in quality control.

2. Monitoring and evaluation of project implementation on a project by project basis is not practiced.

Prepare and develop a system for project management and control emphasizing on implementation planning and monitoring and evaluation (M&E). Develop reporting formats for M&E so that proper accounting of inputs and outputs on a project basis is established. Identify the appropriate outfit within the Office who will be responsible for this activity. Develop training program for these personnel to install the M&E system.

3. Untimely delivery of construction materials.

Review DOH office procedures relevant to this unit and recommend changes when necessary to streamline system. Include in the review the possibility of delegating the management and control of construction materials to the Construction Office. Appropriate safeguards should, however, be installed to ensure these materials are used as intended.

4. Unclear relationship or role of WMO during construction and in the turnover of completed projects.

Review the present system in order to formulate a mechanism of involving the WMO in the turnover processes. This might open opportunities in instituting a better transition from construction to O&M. Early involvement of the WMO is desirable to initiate organization of farmers in water users association.

5. Deficiencies in the Workshop due to cumbersome office procedures and lack of repair instruments and tools, lack of spare parts and limited repair capability of mechanics.

Assess overall capacity of DOH in workshop management and equipment repair and maintenance. Include in the review the present capability of personnel, available instruments and tools, spare parts procurement and warehousing, appropriate levels of inventory of various parts, preventive maintenance procedures, equipment deployment procedures and systems, and proficiency level of operators and drivers. Relate this current capacities to current and projected needs and develop a program for personnel training, office procedures, workshop capacity build-up and manuals on preventive maintenance for heavy equipment, pumps, vehicles, and other construction equipment. In coordination with the NGOs and other financing agencies formulate funding proposals to support identified urgent requirements.

#### **PLANNING AND STATISTICS OFFICE**

1. Absence of overall development program in both the irrigation and rural water supply sectors.

Review current activities of the Office with the objective of delegating the different activities to other appropriate offices. Assess the possibility

of reorienting the focus of this office toward macro level planning, monitoring and evaluation. Develop a systematic set of procedures in formulating a Department level program as the overall guideline of the entire Department and offices within it. Formulate a department-wide M&E relating this to the different M&E systems of the various offices. The Office should concentrate in providing the overall direction of the Department in irrigation and rural water supply development in support to the country's overall goals in food sufficiency and rural water supply. Realign the objectives and functions of the Office to provide the DOH Director the necessary support in defining the overall mission of the Department, priorities in project development, rehabilitation of existing systems, general strategies and approaches in O&M, delineating policies in involving beneficiaries, monitoring and evaluation, strengths and weaknesses of various programs, resource requirements, and the Department's contribution to the food supply situation of the country.

2. Lack of proficient staff to undertake activities suggested in item no. 1.

Prepare training programs to develop the staff in providing Department wide support in planning, monitoring and evaluation. Conduct this training program using the formulation of the first overall plan as an exercise.

**ADMINISTRATION, FINANCE AND ORGANIZATION OFFICES**

1. Cumbersome office procedures, difficulty of coordination.

Review the organization of the whole Department and assess possibility of consolidating offices with related functions to minimize coordination problems and reduce too many steps in processing documents. Identify current functions of these offices that are better delegated to other offices and make necessary recommendations. Review current office systems and procedures and recommend improvements to eliminate current bottlenecks and constraints. Develop manuals of procedures for key activities such as accounting system, recording and bookkeeping, stock inventory, procurement, release and delivery of materials, spare parts, and funds, monitoring of project cost/expenditures, deployment and dispatching of equipment and vehicles, etc.

2. Absence of an overall HRD program based on systematic training need assessment.

Conduct training need assessment by first reviewing and improving job descriptions of various groups of personnel and develop a comprehensive HRD program. Contact in-country and out-country training institutions to identify appropriate programs and make proposals to funding agencies for support. Assess various levels of DOH to establish need for training and developing in house trainers in certain areas. Develop a mechanics/system by which the DOH would have assurances that trained personnel are deployed on relevant activities and that they would continue to serve DOH for a period of time commensurate to their training duration. In the Philippines,



for instance, government employees sent on training must sign a contract to serve the government for at least three times their training duration upon their return. Failure to comply with the provisions of the contract will make the personnel accountable for the training expenditures.

### EQUIPMENT RESOURCES

#### Office

- photocopier 1
- plan copier 2
- level 37
- theodolite 33
- electronic distomat 5
- plan table 11
- stencil machine 1

#### Vehicles

- 4-WD 12
- transport truck 7
- motorbike 3
- small truck 1
- land rover 1

#### Heavy equipment

- fuel tanker 2
- fork lift 1
- dumptruck 24
- trailer truck 3
- bulldozer 17
- tire roller 7
- wheel loader 4
- workshop truck 3
- small trailer 5
- grader 2
- tractor ripper 1
- crane truck 3
- excavator 21
- deep loader 2
- cement mixer 5
- well drilling 4

BUDGET SITUATION DOH  
(IN MILLION RIELS)

| YEAR | ACTIVITY | REQUESTED BUDGET | APPROVED BUDGET | RELEASED BUDGET |
|------|----------|------------------|-----------------|-----------------|
|------|----------|------------------|-----------------|-----------------|

|      |          |      |      |      |
|------|----------|------|------|------|
| 1989 | PROJECTS | 46.4 | 36.8 | 36.8 |
|      | ADMIN    | 44.0 | 44.0 | 44.0 |
|      | TOTAL    | 90.4 | 80.8 | 80.8 |

1 US\$ = 160 Riels

|      |          |       |       |      |
|------|----------|-------|-------|------|
| 1990 | PROJECTS | 97.5  | 92.5  | 36.0 |
|      | ADMIN    | 144.0 | 46.5  | 33.0 |
|      | TOTAL    | 241.5 | 139.0 | 68.0 |

1 US\$ = 600 Riels

|      |          |       |       |       |
|------|----------|-------|-------|-------|
| 1991 | PROJECTS | 192.0 | 175.0 | 41.0  |
|      | ADMIN    | 293.5 | 293.5 | 293.5 |
|      | TOTAL    | 485.0 | 468.5 | 334.5 |

1 US\$ = 1100 Riels

|      |          |         |  |  |
|------|----------|---------|--|--|
| 1992 | PROJECTS | 1,164.5 |  |  |
|      | ADMIN    | 757.0   |  |  |
|      | TOTAL    | 1,921.5 |  |  |

1 US\$ = ? Riels

**DEPARTMENT OF HYDROLOGY  
MANAGEMENT SUPPORT PROGRAM**

Job Description

**HYDROLOGY PROGRAM ADVISER**

**MAIN RESPONSIBILITY:**

Serve as a generalist Adviser to DOH and NGO in strengthening both technical and administrative capabilities of the DOH particularly in formulation of policy advice and improvements in management structure and procedures. Administer the operation of the Program Office and maintain close liaison with DOH offices, Hydrology Advisory Board, NGO experts deployed at DOH, and other government agencies essential to the implementation of water resources development activities.

**SPECIFIC DUTIES:**

To the Hydrology Advisory Board:

1. Advise the HAB on general direction of support in the water resources development sector.
2. Present regular reports on progress and constraints in the implementation of the Hydrology Support Program.
3. Prepare and discuss proposals for required short consultancy to strengthen the program in the water resources development sector.
4. Provide updates on the activities of experts working in the different areas relating these to the overall objective of the Program.
5. Prepare annual work plan in accordance with the objectives of the Hydrology Support Program.

To the Department of Hydrology:

1. Provide recommendations on improving office policies and procedures on irrigation O&M, project formulation, beneficiaries involvement, administrative and organization issues, etc.
2. Formulate and discuss policy advice on establishing relations with the provincial and district level DOH.

3. Identify additional areas of concerns, prepare proposals to address these areas, and discuss with HAB and DOH for inclusion in the Program and formulation of financing scheme.
4. Present regular reports on progress and constraints in the implementation of the Hydrology Support Program particularly on responses of DOH offices on recommended changes on procedures.
5. Provide policy advice on issues relevant in increasing DOH capacity in formulating short and long term water resources development plans and in handling bigger investment levels in irrigation development.
6. Initiate inter-office coordination meetings in the DOH to improve communication links among offices and establish discussion forums for issues of common concern.

To the NGO Experts:

1. Support experts in preparing annual and long term work plans in accordance to overall objective of the Program.
2. Assist experts in establishing communication links with other offices in DOH and in identifying and formulating proposals in their respective areas of concern.
3. Monitor, evaluate , and advise on experts activities to be in accordance with the program objectives.
4. Assist experts in synthesizing experiences to formulate policy and organizational advises to strengthen DOH.
5. Organize meetings with all experts to discuss issues relevant to the implementation of the Program and of general importance to the DOH.
6. Assist experts in organizing sectoral meetings in their areas to facilitate exchange of experiences with other experts working outside the Program.

PERSONAL QUALIFICATIONS:

Education and Experience:

\_ Bsc in Water Resources, Agricultural or Civil Engineering preferably with M.Sc or Ph D. in related field.

- At least 10 years experience in large government office dealing on water resources development in developing countries with at least 5 years handling managerial position. Experience should be in the field of irrigation system management, project

management, institutional development particularly in water users' associations, water resources development planning and implementation, and / or rural water supply.

Other Characteristics:

- Willingness to travel to the Provinces on a frequent basis.
- Proven Management and communication skills.
- Familiar with government bureaucracy in developing countries.
- Ability to stimulate team work and motivate people.
- Willingness to learn Khmer.

**DEPARTMENT OF HYDROLOGY  
MANAGEMENT SUPPORT PROGRAM**

Job description

**ADMINISTRATIVE OFFICER**

**MAIN RESPONSIBILITY:**

The Administrative Officer has four main responsibilities: secretariat for the HAB and HPA; act as catalyst in installing approved changes in office procedures and system at DOH; develop manual of procedures for key administrative activities at DOH; and train key personnel on administrative matters.

**SPECIFIC DUTIES:**

1. Keep books of account and disbursement records for the Program. Design a system of financial control and accounting to keep track of all program expenditures and cash inflow.
2. Prepare financial reports for inclusion to corresponding Program reports to be submitted to the HAB and funding agencies.
3. Assist DOH administrative units in installing recommended and approved changes for improvement of office procedures and systems.
4. Assist the DOH in coordination with the HPA and other experts in developing manuals for key administrative activities such as accounting systems, recording and bookkeeping, stock inventory, procurement and other support services to the technical group.
5. In coordination with the Organization and HRD Specialist, formulate organizational structure for the DOH to improve and streamline flow of office documents for more effective support to project implementation, construction and O & M activities.
6. Train DOH personnel on new procedures and guidelines in administrative activities particularly on the accounting system, stock inventory, procurement and property management.
7. Organize in-country training courses and workshops to facilitate the learning process of key personnel in administrative, accounting, and organization matters.
8. Supervise the Admin Unit in its function as support service to the Program, particular in specific work such as organization of

meetings and maintaining records, organizing travel permission for in-country travel, translation of documents etc.

**PERSONAL QUALIFICATIONS:**

**Education and Experience:**

- BSc in Business Administration or Accounting or Management preferably with MBA or MSc in Management.
- At least 10 years experience in large government office dealing with water resources development with at least 5 years handling position in administrative matters such as accounting, procurement and property management, personnel management, and office management.

**Other Characteristics:**

- Willingness to learn Khmer
- Familiar with government bureaucracy in developing countries
- Proven management and communication skills
- Proficient in computer application in accounting system
- Be able to work in a team and motivate people



**DEPARTMENT OF HYDROLOGY  
MANAGEMENT SUPPORT PROGRAM**

Job descriptions area experts

**METEOROLOGIST**

**MAIN RESPONSIBILITY:**

The job description of the Meteorologist is premised on the provision of technical assistance to the DOH in improving operation and maintenance of meteorological stations, training of Central and Provincial personnel in data collection, compilation, preservation and dissemination, and developing practical data bank and retrieval system at the Central DOH.

**SPECIFIC DUTIES:**

1. Assess and formulate rehabilitation plan for existing network of meteorological stations. Prepare proposal for consideration of funding agencies, based on capacity of DOH in installing and maintaining stations.
2. Review present data collection arrangements, record compilation, system of submission of data to Central DOH, data preservation and dissemination, and recommend appropriate system for improvement with special attention on data quality and observers motivation and relationship with Central DOH.
3. Review the existing arrangements on deployment of stations observers and recommend ways of improving the same to effect a more reliable data flow from the field to the Central DOH.
4. In coordination with the Hydro-meteorology Office and the Hydrologist, develop manuals and training programs to improve station Operation & Maintenance, data collection and submission. Conduct training of station personnel through on-the-job experiential learning process.
5. In coordination the Hydro-meteorological Office and the Hydrologist, prepare proposal for developing centralized data bank system for a meaningful support to water resources planing and development. Develop and conduct training to personnel in data compilation, preservation and dissemination.
6. In cooperation with the Hydro-meteorological Office and the Hydrologist prepare year books of hydrological and meteorological data.
6. Encourage DOH personnel in retrieving and compiling meteorological data collected before the war in as many

stations as possible and prepare guidelines and procedures in using these to assess quality of present-day data from existing stations and in supporting current data requirements of DOH and other agencies.

#### PERSONAL QUALIFICATIONS:

##### Education and Experience:

- BS in Engineering with major in Meteorology or Hydrology
- At least 3 years experience in operation and maintenance of meteorological stations preferably in recognized institutes of hydrology and meteorology.
- Experience in computerized data bank management would be helpful.

##### Other Characteristics:

- Willing to travel to the Provinces on a frequent basis
- Willing to learn Khmer
- Proficient in computer application in statistical analyses
- Experience in weather forecasting would be helpful
- Ability to communicate easily
- Ability to develop and conduct training programs

#### IRRIGATION ENGINEER (OPERATION AND MAINTENANCE)

##### MAIN RESPONSIBILITY:

There are five main responsibilities of the Irrigation O&M Engineer: develop guidelines and manuals of procedures in O&M of irrigation systems; develop and conduct O&M training programs for DOH personnel; formulate and recommend O&M policies; formulate strategies to improve existing linkages with the Department of Agronomy and other levels of DOH; and assist delineate functions of various levels of DOH on O&M.

##### SPECIFIC DUTIES:

1. Review present practices in O&M of existing irrigation systems

and formulate and recommend appropriate strategies in improving the same.

2. Initiate delineation of roles of Central, Provincial, and District DOH.
3. Prepare guidelines and manuals of procedures in O&M of irrigation systems and prepare a proposal in pilot testing these in selected provinces in coordination or jointly with the Community organizer.
4. Develop and conduct training programs for O & M personnel at central, provincial and district level.
5. In coordination with the Community Organizer formulate and recommend policies for O & M of irrigation systems particularly emphasizing the roles of farmers and farmers associations.
6. Assess present linkages of DOH with other government departments dealing on agricultural production like the Department of Agronomy and recommend strategies in promoting coordination and cooperation among these agencies to accelerate delivery of support services to farmers in irrigated areas.
7. In coordination with the Community Organizer, develop training programs for farmers to enhance their capability in O&M of irrigation systems or part thereof.
8. Initiate sector meetings with other agencies / experts to exchange experiences in irrigation O & M
9. Initiate inter-office meetings particularly between Design, Construction and Watermanagement to discuss and address issues effecting O & M and farmer participation.

#### PERSONAL QUALIFICATION:

##### Education and Experience:

- B S in Agricultural or Civil Engineering preferably with post graduate courses in Water Management or Hydrology
- At least 5 years experience in actual operation and maintenance of irrigation systems in developing countries with beneficiaries participation
- Attended practical training courses in irrigation management and farmers participation in irrigation development
- Experience in preparing training programs for government personnel and farmers

**Other Characteristics:**

- Willingness to learn Khmer
- Proven management and communication skills
- Willingness to travel to the Provinces on a frequent basis
- Ability to stimulate team-work and motivate people

**IRRIGATION ENGINEER (PLANNING & DESIGN)****MAIN RESPONSIBILITY:**

The Irrigation Engineer will be responsible for four main areas: training and developing a core of multi-discipline group for project formulation; development of project selection criteria based on technical, socio-economic, and political factors; assistance to the survey team; and preparing design manuals and training design section staff.

**SPECIFIC DUTIES:**

1. Review present project selection and develop set criteria based on technical, socio-economic and political factors
2. Develop procedures in conducting feasibility studies for small, medium, and large scale irrigation projects
3. Assist the DOH staff in preparing and conducting training programs for strengthening of provincial DOH personnel
4. Assist DOH in training and developing a core of multi-disciplinary group for project studies and formulation
5. Develop guidelines for project identification and formulation for central and provincial DOH and develop and organize training programs for introduction of these
6. Develop design manuals for project design and standardization of irrigation structures and facilities
7. Introduce appropriate project planning, implementation and cost estimation systems according to present standards in irrigation development
8. Formulate and conduct training programs for different technical staff such survey group, project study group, and

design engineers to familiarize with new systems

9. Assist DOH in establishing project pipeline for both rehabilitation and new projects.
10. In coordination with the Construction Engineer and Laboratory Specialist, formulate procedures for instituting construction quality control and in expanding the laboratory capability to support the requirements of the quality control system.
11. Initiate sector meetings with other agencies / experts to exchange experiences in irrigation planning and design
12. Initiate inter-office meetings particularly between Design, Construction and Watermanagement to discuss and address issues effecting the planning and design of irrigation systems.

PERSONAL QUALIFICATION:

Education and Experience:

- BSc or MSc in Civil or Irrigation Engineering preferably with post graduate courses in Hydraulics Engineering or Hydrology
- Experience in irrigation projects feasibility studies and design of irrigation structures and facilities

Other Characteristics:

- Willingness to learn Kmer
- Willingness to travel to provinces on a frequent basis
- Management and communication skills
- Must be able to stimulate team work and motivate people
- Ability to prepare and conduct training programs

CONSTRUCTION ENGINEER

MAIN RESPONSIBILITY:

The job of the Construction Engineer is divided into four major components: develop appropriate construction guidelines and manuals for earthwork and concrete works; institutionalize construction quality control in the DOH; design suitable monitoring and evaluation

system for project implementation; and train DOH personnel on the above activities.

#### SPECIFIC DUTIES:

1. Review current construction practices and develop appropriate construction guidelines and manuals for earthwork and concrete works to improve the present situation and correct inappropriate practices.
2. Formulate strategies and approaches in institutionalizing quality control procedures delineating the roles of Design, Construction and Laboratory groups.
3. In coordination with the Irrigation Engineer (Planning and Design) and Laboratory Specialist, formulate proposals to expand the laboratory capability to include support tests for quality control and materials testing.
4. Prepare guidelines for project implementation planning, civil works packaging, and corresponding monitoring and evaluation systems in project implementation making clear the importance of comparing expenditures against physical accomplishments.
5. Develop and conduct training programs for DOH personnel at central and provincial level on major aspects such as construction methods, quality control and materials testing, project implementation and monitoring and evaluation.
6. Initiate sector meetings with other agencies / experts to exchange experiences in irrigation infrastructure construction
7. Initiate inter-office meetings particularly between Design, Construction and Watermanagement to discuss and address issues effecting the construction of irrigation systems.

#### PERSONAL QUALIFICATION:

##### Education and Experience:

- BSc in Civil Engineering preferably with graduate courses in quality control and materials testing.
- At least 5 years experience in actual construction work of irrigation structures and facilities.

##### Other Characteristics:

- Willingness to travel to the provinces on a frequent basis.
- Willingness to learn Khmer for better communication with

field construction crew members.

- Working knowledge of computer-aided monitoring and evaluation of project implementation would be useful.
- Management and communication skills
- Ability to stimulate team work and motivate people
- Ability to prepare and conduct training programs

#### OTHER AREA SPECIALISTS

The job descriptions of the other area specialists which were already committed to be provided by the cooperating NGOs were already prepared by the corresponding NGOs. The following specific duties for each were found necessary for inclusion:

##### RURAL WATER SUPPLY SPECIALIST:

1. Review existing government policies and programs in developing rural water supply and formulate approaches and procedures in establishing centralized data bank on rural water supply.
2. Assist the government in delineating an overall program in rural water supply development delineating the roles of various ministries and government levels.
3. Assist the DOH in preparing annual and long term plans for the Rural Water Supply sector
4. Review existing policies and practices in O&M of completed projects and develop O&M manuals taking into consideration the roles of Central, Provincial, and District authorities and the villagers themselves.
5. Review existing feedback mechanism from field level to central and recommend improvements.

##### WORKSHOP MANAGEMENT AND ORGANIZATION SPECIALIST:

1. Assess overall capacity of DOH in workshop management and equipment repair including available tools and repair instruments.
2. Develop manuals and procedures in spare parts procurement and

warehousing, preventive maintenance for pumps, vehicles, and heavy equipment.

3. Review organization and assess feasibility of consolidating the workshop responsibility under one outfit within the DOH to allow co-sharing of resources between the separately run construction workshop and water management workshops.
4. Formulate and conduct training programs for workshop staff and technicians.
5. Assist the central DOH in preparing and conducting appropriate training programs for provincial and district level personnel

#### COMMUNITY ORGANIZER:

1. Review current schemes of farmers participation in various projects of funding agencies and develop guidelines and manuals of procedures in farmers organization and strengthening their capacity in agricultural production and irrigation system O&M.
2. In coordination or jointly with the Irrigation O&M Engineer, pilot test procedures in selected provinces.
3. In cooperation with the Irrigation O & M expert prepare training programs for O&M personnel and farmers.
4. Assess the need for developing in-house core of trainers for farmer organization and recommend ways and means of installing this.
5. Formulate and recommend policies on farmers participation delineating roles of various levels of DOH.

#### ORGANIZATION AND HRD ADVISER:

1. In cooperation with the DOH review and improve current job descriptions of DOH personnel.
2. Determine appropriateness of developing in-house trainers in certain areas of training needs.
3. Identify in- and out-country training programs and prepare proposals for funding support.



**HYDROLOGIST:**

1. In coordination with the DOH and the Meteorologist develop manual of procedures on data collection, preservation, compilation, and dissemination.
2. In coordination with the DOH and the Meteorologist prepare proposal for developing centralized data bank system for meaningful assistance in water resources planning and development.

**LABORATORY SPECIALIST:**

1. In coordination with the DOH, the Irrigation Engineer and Construction Engineer, assess and prepare proposal for the expansion of the laboratory capability to include support to construction quality control and materials testing.
2. In coordination with the Rural Water Supply Specialist, assess and prepare proposal for the expansion of the laboratory capability to include support to water quality testing and analysis.

**HEAVY EQUIPMENT WORKSHOP ADVISER:**

1. Design simple heavy equipment maintenance manuals.
2. Prepare workshop operation guidelines addressing environmental issues.
3. Coordinate activities with regard to procedures and management with the Workshop Organization and Management Adviser

**TO BE INCLUDED IN ALL JOB DESCRIPTIONS:**

- Ability to prepare and conduct training programs in the respective field of expertise
- Initiate the organization of sectoral meetings in the respective area to facilitate the exchange of experience with other experts / agencies working outside the program
- Organize inter-office meetings in DOH with relevant offices to improve communication and coordination of activities

ASSUMPTIONS ON COST ESTIMATESA. PERSONNEL COSTS:

## 1. Hydrology Program Adviser

- Maximum salary per annum is assumed 48,000.

## Administrative Officer

- Maximum Salary per annum is assumed 36,000.

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Salary costs per annum total 84,000.

The actual salary will depend on qualifications and experience of and on negotiations with the candidate, but should be competitive to international standards.

## 2. Accommodation

With regard to accommodation it is assumed that the employed person will establish him/her self in Phnom Penh with family and that the maximum contribution towards renting accommodation would be US\$ 1,000. per employee per month.

## 3. Insurance

It is assumed that insurance would cost US\$ 2,000. per employee (incl. family in PNH) per annum.

## 4. Rest &amp; Recreation

It is assumed that employee and family (2 children) would have the right to take one roundtrip per annum to Bangkok, for which a reservation is made of US\$ 2,000. ( maximum 4 persons) per year per employee.

## 5. Recruitment costs

This amount would have to cover advertising and communication costs for recruitment of both positions. It is proposed that a final interview of the Hydrology Program Adviser be held in Phnom Penh with members of the Hydrology Advisory Board; the reservation is made to facilitate travel of candidate.

## 6,9. Sea/air freight

This amount is to enable the employee to ship in/out personal effect for himself and family; the amount to be actually spend will depend on family size.

## 7,8. Inward travel, repatriation

This is the estimated maximum costs for the employee (and family) to come to Phnom Penh at the beginning of the contract and to travel home at the end of the contract. The actual costs will of course depend on family size and country of residence.

10. Home leave

It is assumed that the employee has a right to a home leave in the middle of the second year, assuming he will serve the full three year contract. Actual costs will depend on family size and country of residence of the employee.

B. OPERATING COSTS

1. Vehicle operation

HPA, 4wd vehicle maintenance 10 % of purchase value is US\$ 2,300 and US\$ 2,000. per annum for fuel.  
Total US\$ 4,300. per annum

Admin Unit, vehicle maintenance 10 % of purchase value is US\$ 1,200. and US\$ 1,500. for fuel.  
Total US\$ 2,700. per annum

2. Office supplies

For stationery, paper, maintenance office equipment, etc.

3. Communication

Telephone, fax, etc.

4. Training fund

It is expected that most of the out-country training would take place in the second year of the program, when additional training needs for counterparts have been identified. It is assumed that this kind of training would cost approx. US\$ 2,500. per man month

a. counterparts of HPA

4 man months of training available for Director and/or vice Directors, and/or planning unit

b. counterparts of Admin Officer

6 man months of training available for finance, administration and organization DOH personnel

c. Language training

A sum of US\$ 5,000. assumed to be necessary for in-country English language training and possibly out-country language

training for an interpreter/translator

- d. In country training and workshops  
This amount is assumed to be required to facilitate in-country training and workshops, on financial, administrative, organizational and planning issues.

C. VEHICLES AND OFFICE EQUIPMENT.

1. One 4wd vehicle for project visits
2. One ordinary vehicle to facilitate the Admin units work
3. One motor-bike to facilitate the Admin Units work
4. one set each for: HPA and counterparts, Admin Unit administration and finance, Admin Unit translations.
5. -
6. Miscellaneous, like filing cabinets, type writer, any unforeseen items

D. REVIEW AND EVALUATION MISSION.

1. It is assumed that a team of two external experts supplemented by two local experts would conduct a program review and evaluation mission by the end of the second year. It is estimated that this would cost approx. US\$ 10,000. per expert, incl. travel and accommodation.