

ASIAN DEVELOPMENT BANK

TAR: TIM 35451

TECHNICAL ASSISTANCE

TO THE

DEMOCRATIC REPUBLIC OF TIMOR-LESTE

FOR

INTEGRATED WATER RESOURCES MANAGEMENT

November 2002

CURRENCY EQUIVALENTS

(as of 31 October 2002)

Currency Unit – US dollar (\$)

As of 20 August 2001 the legal tender of Timor-Leste is the US dollar.

ABBREVIATIONS

ADB	–	Asian Development Bank
EA	–	Executing Agency
IWRM	–	integrated water resources management
MAFF	–	Ministry for Agriculture, Forestry and Fisheries
MDE	–	Ministry for Development and Environment
MTCPW	–	Ministry for Transport, Communications and Public Works
TA	–	technical assistance
WSS	–	Water and Sanitation Service
WRMD	–	Water Resources Management Decree

NOTE

In this report, "\$" refers to US dollars.

This report was prepared by A. Hinduja, Pacific Department.

I. INTRODUCTION

1. The Asian Development Bank (ADB) is assisting Timor-Leste to rebuild and rehabilitate its water supply and sanitation infrastructure as part of the ADB-managed projects¹ funded under the Trust Fund for East Timor.² The current water projects include a capacity-building subcomponent that provides support for policy, legislation, and regulation development. Output from this subcomponent is advanced and includes a proposed decree to authorize a very simple and basic level of water resources management, including assessment and protection of the resource; water resource management plans; and a basic form of water licensing system, primarily for urban water supplies.

2. The need for an integrated natural resource management strategy was first discussed by the transitional administration during the early part of 2002. Subsequent to independence on 20 May 2002, a request received from the Ministry for Transport, Communications and Public Works (MTCPW) (submitted at the Pacific Regional Consultation on Water in Small Island Countries, Sigatoka, Fiji Islands, 3 August 2002) reconfirmed the need for technical assistance³ (TA) to undertake a review of the current status of the country's water resources and develop a comprehensive water resource management strategy and policies to manage these resources.

3. A Fact-Finding Mission visited Timor-Leste from 5 to 17 October 2002 and confirmed that development of an integrated water resources management (IWRM) system in Timor-Leste will become increasingly urgent as economic development accelerates. At the conclusion of the mission, during a joint discussion with the representatives of the relevant ministries, the immediate need for such TA was reaffirmed. The TA framework is in Appendix 1.

II. ISSUES

4. **National Water Policy.** The May 2002 National Development Plan for East Timor deals with water resources principally in the context of water supply and sanitation. Chapter 13 of the Plan, for example, entitled Natural Resources and Environment, has no mention of IWRM. Currently, a series of water policies are being planned in several ministries. Significant among these is the water and sanitation policy contained in three proposed decrees approaching finalization by the Water and Sanitation Service (WSS). This policy includes some elements of water resource management. Also, the Ministry for Agriculture, Forestry and Fisheries (MAFF) has prepared draft terms of reference for a water resource policy study that will focus on agriculture and irrigation. The Ministry for Development and Environment (MDE) is preparing legislation on environmental impact assessment and pollution control, which, *inter alia*, will cover water quality issues and licenses to discharge into water.

5. While these proposed policies are planned to have some linkage to other national policies, there is no umbrella water resource policy for guidance and to provide overall coordination of the sector. The absence of a national policy that specifies the key principles of IWRM to be applied across Timor-Leste, coupled with a lack of water resources management skills and experience, poses a very high risk of future incompatible subsector strategies and conflicts over water resource allocation as demand for water grows.

6. **Institutional Arrangements.** During the pre-independence period, the concept of a separate water resource agency or apex water body or similar mechanism was considered, but not

¹ Grant 8185-ETM(TF): Water Supply and Sanitation Rehabilitation Project – Phase I and Grant 8189-ETM(TF): Water Supply and Sanitation Rehabilitation Project - Phase 2.

² ADB is the joint administrator with the World Bank of the Trust Fund for East Timor.

³ The TA first appeared in *ADB Business Opportunities* on 5 February 2002.

accepted. Consequently, water resource management functions are currently spread across three principal ministries,⁴ with several others having an interest.

7. The Water Resources Management Decree (WRMD, referred to in para. 4), currently under preparation, is associated with WSS within MTCPW. This is entirely pragmatic and is based upon establishing an initial regulatory structure that can be administered with current civil service resources. However, this legislation is based on the operational needs of WSS; specifically excludes agricultural use of water, for which separate legislation is planned; and does not include mechanisms for solving water allocation disputes between water use subsectors.

8. Timor-Leste is poorly endowed with water, and competition for this scarce resource is inevitable and will be potentially severe as economic development proceeds. The Constitution places ownership of water resources with the State. However, the current absence of a single "owner/manager" from at least a global water allocation perspective, and the absence of dispute resolution procedures and mechanisms, have the potential to cause future difficulties for existing and prospective water users.

9. **Focus of Attention in Water Management.** The focus of attention of all current activities is rightly on priority rehabilitation of damaged and deteriorated infrastructure, both for water and sanitation and for irrigation. With current water demands depressed because of the state of the infrastructure, among other things, there is little attention at present to matters of water sharing, particularly intersectoral water sharing. This creates a risk that water development demands will overtake the administrative capacity to manage them.

10. This limited attention to the overarching matters of water management is compounded by limited awareness at all levels of IWRM, and by the need to establish more comprehensive water resource management skills in the country. Such skills will take many years to establish.

11. **Water Data.** Considering the level of destruction of both infrastructure and data that took place during the independence struggle, the available water data in Timor-Leste is insufficient to support water planning and water sharing policies. Consequently, there is very limited understanding of water resource availability or current and forecast bulk water demands. In addition, with defunct or non-existent rainfall, groundwater, and river flow monitoring and measuring systems, there is no available national system in place to generate the necessary data for planning, including the monitoring of trends arising from changing demands or from factors such as climate change. The risks of a poor water resource information base for a relatively dry country are clear.

12. **Financial and People Constraints.** The only government agency with a water resource management unit is WSS. The unit comprises one manager supported by two water quality officers, who operate the WSS water quality laboratory. The single manager may be adequate to service WSS's needs as experience and knowledge grows, but cannot hope to do justice to the nation's water resources as a whole. An ongoing IWRM policy function, a surface and groundwater assessment function, and a water licensing administration function need to be added as a minimum in the near future.

13. Financing and staffing limitations in the civil service mean that establishing the additional capacity needed for IWRM will be slow and challenging. Consideration of financial constraints raises potentially controversial issues of application of resource management service charges across all water use sectors. This, in turn, is embedded in issues of national water pricing policies.

⁴ The three principal ministries involved are MTCPW, which covers WSS; MAFF; and MDE.

Apart from financing additional staff resources, the acquisition of the necessary professional skills implies that some specialist technical and/or tertiary studies will be needed for these staff in the future.

III. THE TECHNICAL ASSISTANCE

A. Purpose and Output

14. The overall purpose of the TA is to create a national water policy that will lead to the adoption and progressive implementation of IWRM in Timor-Leste. This is consistent with the major thrust of ADB's water policy. The policy will need to be broad ranging, covering institutional, legal, water assessment, water sharing and allocation, and environmental issues. Supported by an extensive community consultation exercise, the policy will focus on integrating management activities across government, and will include simple statements of guiding principles for each issue, accompanied by broad strategies for subsequent implementation. In particular, the policy will set the strategic direction for more comprehensive legislation to eventually supersede the WRMD, now in its final stages of development.

15. To support the policy and to identify areas with water scarcity, a simple assessment of water availability and demand for the nation will be prepared. This will be supported by a network of inexpensive, simple rainfall gauges as a precursor to the establishment of a national meteorological network and assistance with water resource assessment. In addition, the TA will construct up to four basic river gauging stations to reestablish at least elementary trend monitoring and to permit improved calibration of hydrological models. The TA will also establish a plan for data collection and an information management system along with the necessary capacity-building initiatives.

16. The WRMD, developed as a component of the principal legislation for water supply and sanitation, empowers WSS to impose conditions on water-use licenses. In the absence of any other formal body monitoring water use, it may be appropriate, as an interim measure, to operationalize this provision in order to achieve a measure of protection of water resources within a reasonably short time. Once the TA has assisted in developing a comprehensive legal framework by way of a national water law encompassing cross-sector water use and supported by the necessary capacity-building initiatives, the management role of the nation's water resources may be shifted to an appropriately authorized regulatory body.

17. Capacity development will be a vital component throughout the TA duration. It will comprise initial awareness raising at both the political and senior official levels to set the scene for informed national policy development. This will be followed by specialist seminars on key elements of water policy and of IWRM. Capacity development, including initial awareness raising designed to support and sustain IWRM development, will be a key element of the TA. Additionally, both the resource assessment and the policy development process will also include needs assessment of local capacity along with a human resource development plan.

B. Methodology and Key Activities

18. To develop a draft national water policy and supporting strategy, the process will be initiated by an awareness-raising exercise for all stakeholders so as to achieve informed and effective ownership of the ensuing policy. In recognition of its national importance, and to ensure government ownership, policy development will occur under the guidance of a ministerial-level steering committee. The process will be guided by experienced international consultants and will

result in a broad consensus accomplished through a series of facilitated workshops and seminars. Participants in this process will be senior officers of the civil service and potential user groups.

19. Resource assessment will include research on available data (including data still in Indonesia) and the use of hydrological and hydrogeological models for estimation of water resources to reconfirm the limited recorded quantitative information. International hydrology and hydrogeology specialist consultants, working with appropriate local staff for capacity-building purposes, will make this assessment. Timing of this activity will be as early as possible in the TA to provide the basis for informed decision-making and policy development. Gauging stations at sites identified and prepared by the specialist consultants will follow generic designs for construction using local resources and will include a plan for an information management system.

20. International consultants, with some support from local facilitators, will conduct both capacity building and awareness raising through development of targeted training and seminar programs. In addition, the processes of policy development and water resource assessment will be used throughout as case material for training opportunities.

C. Cost Estimates

21. The total cost of the TA is estimated at \$706,000 equivalent, as detailed in Appendix 2. Of this, \$544,000 equivalent is the foreign exchange cost and \$162,000 equivalent is local currency cost. The Government of Timor-Leste has agreed to finance up to a total of \$106,000 equivalent of the local currency cost and has requested ADB to finance the full foreign exchange cost and the remaining \$56,000 equivalent of the local currency cost. The TA amount of \$600,000 equivalent will be financed on a grant basis by ADB's TA funding program.

D. Implementation Arrangements

22. The primary counterparts for this exercise are the three ministries with key water responsibilities: MTCPW, MAFF, and MDE. Together they will provide a ministerial-level steering committee for the national water policy development process, and provide a joint working group for various policy elements.

23. A secretariat representing the ministerial-level steering committee is proposed to act as the Executing Agency during the implementation of the TA, assisted where necessary by the international consultant/team leader for the TA. The secretariat will be headed by a local officer with skills satisfactory to ADB. This local officer should be available subsequently for attachment to any apex body that may emerge from the national policy development process.

24. Since initially the WRMD prepared by WSS will be used as the monitoring mechanism, WSS will be requested to second its water resource management staff for training in water use licensing and in the water assessment processes. Similarly, WSS will provide the personnel to assist in the field operations associated with rainfall gauge and flow gauging station installations to be established within the first 3 months of implementation. Until a comprehensive operational plan can be established, continued operations of the river gauging stations will be the responsibility of WSS, and collecting rainfall data will be shared by district irrigation officers and district agricultural officers from MAFF.

25. The TA will be implemented over a period of 12 months and will be completed by March 2004. ADB will play a vital supporting role throughout the implementation period to develop an effective IWRM system catering to the evolving needs of the country. Up to five international consultants will provide a total input of 12 person-months beginning in March 2003. The team of

consultants will be engaged by ADB from a firm, in accordance with its *Guidelines on the Use of Consultants* using the simplified technical proposal and the quality and cost based selection method along with other arrangements satisfactory to ADB for the engagement of domestic consultants. The consultants will comprise (i) a water policy and water resources management specialist, who will act as principal policy/strategy developer and also as team leader, to be recruited for 6 person-months; (ii) a hydrology specialist to complete the resource assessment and to develop a plan for an information management system to process the data from gauging and rainfall stations, with an input of 2.5 person-months; (iii) a hydrogeology specialist to complete a groundwater assessment, for an input of 1 person-month; (iv) an institutional/environment specialist to guide the review of institutional arrangements, and to assist with the design of new arrangements with emphasis on integration, for 1.5 person-months; and (v) a water law specialist to guide the detailed legislative policy framework, for 1.0 person-month. The outline terms of reference for the consultants are in Appendix 3.

26. Additionally, during the initial stages of the TA, support will be provided by the water resources and environment specialist engaged under Phase II of REG-TA 6031.⁵ This specialist, with no cost implications for this TA, will provide 5 person-weeks of input, including public consultations through community participation workshops. This activity has been included in the consultant's terms of reference and the team leader of this TA will coordinate his/her participation during implementation. A short-term domestic public participation workshop specialist may also be recruited to assist in the process.

27. Procurement of equipment for setting up the gauging stations and other ancillary and office equipment will be handled by ADB following ADB's *Guidelines for Procurement*. The members of the steering committee, the working group, staff involved in development and management of IWRM, and representatives of various stakeholders will participate in training and workshops undertaken by the consultants.

28. Dissemination of the principal output will be in the form of an approval by the Council of Ministers of the draft National Water Policy and its subsequent public announcement through the normal channels. During the implementation period, the consultants will also submit an inception report within 21 days of commencement; regular monthly updates; a midterm report giving the inputs and results; a draft final report at least 1 month prior to completion; and a final report upon completion, incorporating the comments provided by both ADB and the ministerial steering committee, and accompanied by copies of the approved policy documents.

IV. THE PRESIDENT'S DECISION

29. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$600,000 on a grant basis to the Government of Timor-Leste for the purpose of Integrated Water Resources Management, and hereby reports this action to the Board.

⁵ ADB. 2002. *Technical Assistance for Promoting Effective Water Management Policies and Practices*. Manila.

TECHNICAL ASSISTANCE FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<p>Goal To establish a system of Integrated Water Resource Management (IWRM) in Timor-Leste</p>	<p>Individual agencies with a water interest carrying out their functions in accord with a coherent and integrated national strategy framework</p>	<p>The extent to which agency and sector policies and practices conform to the principles of IWRM</p>	<p>Long-term commitment of the National Government and local communities to IWRM and achieving sustainability of water resources</p>
<p>Purpose To create a National Water Policy that will lead to adoption and progressive implementation of IWRM</p>	<p>Acceptance of the philosophies and practice of IWRM by the Government and its agencies</p>	<p>Progressive appearance of agency and sector policies and practices conforming to the principles of IWRM, following approval and dissemination of the National Water Policy</p>	<p>Support of the Government and communities for the duration of program implementation</p>
<p>Outputs</p> <ol style="list-style-type: none"> 1. National Water Policy 2. Water resource assessment 3. Rainfall and river flow 	<p>A simple set of policies and accompanying strategies that is acceptable to stakeholders, to guide all ministries and agencies in the protection, sharing, and supply of water</p> <p>Available data collected, and water availability and demands assessed sufficiently for national planning purposes</p> <p>Monitoring systems installed in</p>	<p>Draft to be provided for review with the midterm report</p> <p>Approval of the draft National Water Policy by the Council of Ministers</p> <p>Monthly progress reports; submission of completed national water resource assessment prior to preparation of the draft final report</p> <p>Monthly progress reports;</p>	<p>Government supports a requirement for sector policies to conform to national policies. Key stakeholders actively participate in the project/policy development process.</p> <p>Success in locating and acquiring previous data; enough geology to permit groundwater assessments</p> <p>Commitment to ongoing</p>

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<p>monitoring system</p> <p>4. A well prepared plan based on good water sector assessment and a program of action specifying interventions to achieve major milestones/objectives</p> <p>5. Implementation of water use licensing</p> <p>6. Awareness raising</p> <p>7. Capacity development</p>	<p>representative watersheds (minimum needed for ongoing water resource assessment)</p> <p>Monitor the programs and workable milestones</p> <p>Systems in place to administer the water licensing regulation</p> <p>Policy developers and decision makers have a working knowledge of IWRM.</p> <p>Increased skills in water policy, water resource monitoring, and water use licensing</p>	<p>completion of installation within first 3 months</p> <p>To be evaluated during midterm review</p> <p>Progress reports; existence of completed procedures and systems</p> <p>Feedback from consultants as part of midterm report; monthly training evaluation reports</p> <p>Feedback from consultants; training evaluation reports; technical assistance review missions</p>	<p>operation and maintenance, including provision and training of personnel</p> <p>Decree is made law. Adequate resources are available for implementation.</p> <p>Active participation of key people</p> <p>Availability and active participation of appropriate agency staff</p>
<p>Activities</p> <p>1. Series of workshops with key officials from the 3 water ministries, facilitated by team leader and relevant consultant(s).</p>	<p>Development of understanding and knowledge of IWRM water data acquisition; water resource assessment; and water use licensing</p>	<p>Feedback from consultants; training evaluation reports</p>	<p>Key line agencies support the programs and actively encourage participation. Participants are available from within normal work schedules. Rate of training is absorbable.</p>

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<p>2. Data gathering and; a. synthesis by rainfall-runoff modelling of surface water availability, b. estimation of groundwater reserves, and c. estimation of sector water demands</p> <p>3. Establish simple rainfall network and construct up to 4 river gauging stations.</p> <p>4. Procedures written in conformity with the licensing law; developing/installing administrative system</p> <p>5. Short initial IWRM workshop/seminar at government and senior official level</p> <p>6. Develop and conduct training, including participation in policy development and other activities.</p>	<p>All available data from within Timor-Leste, supplemented by records from Indonesia; completion of modelling; completion of groundwater assessment; completion of estimates of current and forecast water demand</p> <p>Satisfactory installation of measuring facilities</p> <p>Completion of procedures and systems</p> <p>Awareness of IWRM principles achieved among high-level decision makers</p> <p>Enhanced skills of officials in policy and strategy development</p>	<p>Monthly progress reports</p> <p>Project completion report detailing the national situation of water availability and demand</p> <p>Monthly progress report; completion report</p> <p>Monthly progress report; part of midterm report</p> <p>Consultants' feedback; extent of constructive participation in IWRM policy development</p> <p>Consultants feedback; training evaluation reports</p>	<p>Cooperation of Indonesian authorities in locating data; stakeholder participation in gathering and estimating demand data</p> <p>Agency cooperation in providing ongoing data gathering and facility maintenance</p> <p>Decree is made law. Adequate resources are available for implementation. Existence of the law is made known to prospective water users.</p> <p>Active participation at senior levels, including ministerial steering committee as appropriate</p> <p>Effective transfer of knowledge and skills</p>

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
Inputs International consultants <ol style="list-style-type: none"> 1. Water policy specialist (team leader) 2. Hydrology specialist 3. Hydrogeological Specialist 4. Institutional/Environmental specialist 5. Water law specialist 	6.0 person-months 2.5 person-months 1.0 person-month 1.5 person-months 1.0 person-month	Inception report Consultants' progress reports Midterm report Draft final report Final report	Selection of appropriate consultants and support from participating agencies

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Foreign Costs	Local Costs	Total Cost
A. Asian Development Bank Financing^a			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	216.0	0.0	216.0
ii. Domestic Consultants	0.0	0.0	0.0
b. International and Local Travel	42.0	24.0	66.0
c. Reports and Communications	7.0	0.0	7.0
2. Equipment ^b	95.0	0.0	95.0
3. Training, Seminars, and Workshops			
a. Seminars and Workshops	50.0	0.0	50.0
b. Training Programs	40.0	2.0	42.0
4. Surveys	7.0	3.0	10.0
5. Administrative Support and Other Support Costs	10.0	13.0	23.0
6. Representative for Contract Negotiations	7.0	0.0	7.0
7. Contingencies	70.0	14.0	84.0
Subtotal (A)	544.0	56.0	600.0
B. Government Financing			
1. Office Accommodation and Transport	0.0	25.0	25.0
2. Remuneration and Per Diem of Counterpart Staff	0.0	10.0	10.0
3. Surveys	0.0	8.0	8.0
4. Domestic Travel by Counterpart Staff	0.0	12.0	12.0
5. Communications	0.0	15.0	15.0
6. Office Supplies and Equipment	0.0	15.0	15.0
7. Contingencies	0.0	21.0	21.0
Subtotal (B)	0.0	106.0	106.0
Total	544.0	162.0	706.0

^a Financed by the Asian Development Bank TA funding program.

^b Includes gauging stations and ancillary equipment, and office equipment like photocopying machines, overhead projectors, etc.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. Whatever records may have been kept in the country during the Indonesian administration, nearly all have been removed or destroyed. As a result, to date there is no national appraisal of water availability and demand for all purposes. The resource management exercise, therefore, will have to build a picture of available water data by accessing duplicate records, if possible, as may exist in Indonesia and in Portugal, and at the same time urgently reestablish a climatological and rainfall network that will (i) allow changes and trends to be detected, (ii) support water resource assessments, and (iii) provide day-to-day management information for agriculture. It can be concluded that the need for a water resource assessment program is acute.

2. The technical assistance (TA) will require approximately 12 person-months of international consulting services. Services of five specialist consultants are identified as being necessary to conduct this exercise. Additionally, in the interest of sustainability, the program will include capacity building of local personnel. Some minor inputs by short-term consultants and facilitators will be required to support specific training programs, seminars, and workshops.

A. Water Resources Management /Water Policy Specialist (Team Leader)

3. The internationally recruited consultant will be the team leader for this TA. The consultant will be required to have broad water resources management knowledge and skills, in addition to well-developed water policy skills so that he/she can also successfully undertake the role of team leader.

4. The consultant will form, together with at least one counterpart official, a secretariat to service a ministerial-level steering committee drawn from the ministries of Transport, Communications and Public Works; Agriculture, Forests and Fisheries; and Development and Environment. The steering committee will have the primary task of developing a National Water Resources Policy for Timor-Leste, assisted by the secretariat and a working group formed from senior level staff of the three ministries, together with other stakeholders as appropriate. Additionally, the steering committee and consultant will have oversight responsibility for all TA activities.

5. Summarized terms of reference for the consultant are as follows:

- (i) Complete the formation of the ministerial-level steering committee and interdepartmental working group.
- (ii) Provide at the start of the TA appropriate awareness-raising seminars on need for integrated water resources management (IWRM) for all secretaries of state, ministers, and their advisers with responsibilities or an interest in water, and, if necessary, separately for the relevant senior civil service officers.
- (iii) Assess IWRM policy and institutional needs, including national water allocation principles and management/dispute resolution mechanisms, and formulate a revised detailed methodology and work plan for the policy and accompanying strategy development process.
- (iv) Under guidance from the steering committee and through workshops and use of the interdepartmental working group, draft the National Water Resources Policy and accompanying strategies for presentation to the Council of Ministers.
- (v) Provide input to the national water policy development process to ensure that the policy and accompanying strategies contain agreed upon principles of water pricing and tariff structures for Timor-Leste.

- (vi) Oversee the activities of the hydrology and hydrogeology specialists, provide them with training facilitators and/or local consultants as required, and oversee the preparation of their joint report on water resource availability and demands as an early input to the policy development process.
- (vii) Design and provide, in conjunction with the training facilitators, an awareness-raising seminar for the steering committee, which will include the ministers, secretaries of state, their advisers, and the working group, on the principles and practices of managing water resources in the context of its role as an economic good for comprehensive IWRM. If necessary, a separate session will be organized for relevant senior civil service officers and other interested groups. The seminar is to include matters of financial sustainability of management and services entities, principles of water pricing and tariff structures including consideration of resource management costs, and reference to transferable water entitlements.
- (viii) Arrange through the Water and Sanitation Service (WSS) for the construction of river gauging stations as designed and sited by the hydrology specialist.
- (ix) Formulate with WSS and the project management unit a system of administration for the regulation of water licensing. Provide training for relevant staff.
- (x) Schedule and provide training facilitators and/or domestic consultants for the initial awareness-raising seminars required progressively from the institutional and water law specialists.
- (xi) Mobilize training facilitators and domestic consultants for inputs as required.
- (xii) Coordinate and review with the environment specialist the water pollution policy, and balance the water quality requirements to present adverse effects as opportunities for water use.

B. Hydrology Specialist

7. The hydrology specialist will be recruited internationally. The primary tasks of the consultant will be to support the national policy development process by preparing a national assessment of surface water supply and overall water demands, and by establishing a basic surface water resources assessment program for Timor-Leste.

8. Specific terms of reference are as follows:

- (i) Gather and prepare an inventory of all available surface water data both from other projects that have attempted this and by asking again, where possible, original Indonesian and Portuguese sources.
- (ii) Construct and calibrate, to the extent feasible, rainfall-runoff models for catchments covering the country, and which are selected to become appropriate IWRM management units in the future. This will include reference to recent similar work in four selected catchments for the Directorate of Irrigation and Water Management.
- (iii) For each catchment, estimate current water usage and future demands for water supply, irrigation, and industry by reference to population, irrigation schemes, and any other data, including making appropriate distinction between actual

consumption and diversion. Include traditional water uses. In the absence of data, make best possible estimates of consumption uses and rates of consumption.

- (iv) Prepare a report for the TA steering committee, in conjunction with the hydrogeology specialist, summarizing the outputs from supply and demand studies and presented in a form suitable as an input to IWRM policy development.
- (v) Design and implement the establishment of an elementary rainfall network using manually read gauges. Establishment is to include selection and training of gauge readers. The design should incorporate any existing functioning gauges and support ongoing rainfall assessments for the selected IWRM catchment units.
- (vi) Select four representative IWRM catchments for installation of basic river gauging facilities to support ongoing water resource assessment. Propose suitable designs, including consideration of robust automatic water level recording, and assist in managing construction of the facilities. Select and procure river-gauging equipment and provide initial training for WSS personnel in basic river gauging techniques.
- (vii) Design and establish a suitable simple relational database for rainfall and river flow data. Formats should be suitable for later migration to a more comprehensive time-series data management system.

C. Hydrogeology Specialist

9. The hydrogeology specialist will be recruited internationally. The primary task of the consultant will be to support the national policy development process by preparing a national assessment of available groundwater supply and usage.

10. Specific terms of reference are as follows:

- (i) Gather and prepare an inventory of all available groundwater data both from other projects that have attempted this and by asking again, where possible, original Indonesian and Portuguese sources.
- (ii) Prepare estimates of storage and withdrawals for each major aquifer system. In the absence of useful borehole, standing water levels, or similar data, make the best possible estimates from geological and any other relevant data to ensure that the situation for the whole country is assessed, even though confidence levels may not be high for some aquifers.
- (iii) Assist the hydrology specialist in water demand estimations, and cooperate with the hydrology specialist in the preparation of a joint report for the TA steering committee, summarizing the outputs from supply and demand studies and presented in a form suitable as an input to IWRM policy development.

D. Institutional and Environmental Specialist

11. The institutional and environmental specialist will be recruited internationally. The consultant will ensure that the national policy will adequately address the environmental needs and at the same time will not impede the economic growth of the nation. In coordination with

the team leader and the water law specialist, the consultant will also assist in the awareness-raising program.

12. Specific terms of reference are as follows:

- (i) Assist in the design, in conjunction with the training facilitators, of an awareness-raising seminar for the steering committee, which will include the ministers, secretaries of state, their advisers, and the working group, on the principles and practices of institutional design in IWRM. The awareness raising should prepare the way for policy development including, in particular, issues of the institutional matters associated with national and intersector water allocation management, institutional relationships with environmental agencies, and with other related natural resource agencies and managers.
- (ii) Provide input to the national water policy development process to ensure that the policy and accompanying strategies present a well-developed and agreed upon position on the institutional issues of IWRM. This is to include consideration of the formation of an apex water body or other coordinating or integrating mechanism, matters of catchment management in an IWRM context, and sector regulation.
- (iii) Provide advice on human resources needed for an expanded IWRM function in Timor-Leste in the future, and identify the capacity-building and training needs to be addressed.
- (iv) In coordination with the team leader and the water law specialist, review the options for establishing water usage rights; review historic/traditional means of resolving competition over water; and recommend guidelines for efficient resolution of such claims, keeping in mind cultural implications.

E. Water Law Specialist

13. The water law specialist will be recruited internationally. The consultant must have prior working knowledge in developing a comprehensive legal framework for an IWRM and will be required to develop such framework to suite the needs of Timor-Leste. The consultant will also assist in developing a capacity building program to develop the understanding and capability to implement the legal framework.

14. Specific terms of reference are as follows:

- (i) Assist in the development of the design and provide, in conjunction with the training facilitators, an awareness-raising seminar for the steering committee, which will include the ministers, secretaries of state, their advisers, and the working group, on the principles and practices of water law in the context of IWRM. The awareness raising should prepare the way for policy development including, in particular, water rights management and mechanisms for dispute resolution.
- (ii) Review the system developed for the administration of water-use licensing to ensure that it is legally sound and enforceable. Assist in the training of licensing administration staff.
- (iii) Provide input to the national water policy development process to ensure that the policy and accompanying strategies clearly state the principles that will guide the preparation of Timor-Leste's next phase of water legislation, which will eventually replace the proposed Water Resource Management Decree. This consultancy

does not include writing new legislation but rather the development of a legislative framework for the future.

- (iv) Coordinate very closely with the team leader and the institutional and environmental specialist on developing water quality standards and control mechanisms.
- (v) In coordination with team leader review the options for establishing water usage rights; review historic/traditional means of resolving competition over water; and recommend guidelines for efficient resolution of such claims, keeping in mind cultural implications.

F. Reporting Requirements

15. The consultants will be required to provide the following reports:

- (i) **Inception report.** This report will be prepared within 21 days of the commencement of TA implementation. As part of the report, the consultants will prepare, in coordination with the Asian Development Bank and the implementing agencies, a detailed methodology and work plan and a monitoring schedule, and will also confirm membership of the ministerial-level steering committee, the steering committee secretariat, and the interdepartmental working group.
- (ii) **Monthly progress reports.** These reports will provide the details of the progress achieved and a brief analysis of the activities undertaken.
- (iii) **Final report.** This report will provide a detailed account of the national water resources policy development process, the achievements in awareness raising and specific training, and of the establishment of a water resources assessment program. It will also include an analysis of issues encountered and provide relevant information to assist future implementation of the policy.