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TA 6031-REG
PROMOTING EFFECTIVE WATER MANAGEMENT POLICIES AND PRACTICES

REPORT OF WATER RESOURCES AND ENVIRONMENTAL SPECIALIST

PHASE I

MISSION TO EAST TIMOR 5-18 OCTOBER 2002

October 2002

CURRENCY EQUIVALENTS
(as of 31 October 2002)

Currency Unit – US dollar ($)

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

ABBREVIATIONS

ADB	-	Asian Development Bank
ALGIS	-	Agriculture and Landuse Geographic Information System
DIWM	-	Directorate of Irrigation and Water Management
DoE	-	Division of Environment
FAO	-	Food and Agriculture Organization
IWRM	-	integrated water resource management
JICA	-	Japan International Cooperation Agency
MAFF	-	Ministry of Agriculture, Forests and Fisheries
TA	-	technical assistance
UNTAET	-	United Nations Transitional Administration in East Timor
WRM	-	water resource management
WSS	-	Water and Sanitation Service

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

EXECUTIVE SUMMARY

This report has been constructed along the lines of a discussion paper to assist with informing future developments in integrated water resource management (IWRM). At some risk of over-simplifying, it is useful therefore to briefly summarize the key findings and recommendations of the report.

Key Findings

1. IWRM does not so far been developed in East Timor, as attention has been focused on priority issues of water supply.

2. Whilst new water demands are presently low, continued economic development will eventually bring a need for both comprehensive rights-based water sharing and a need for progressive adoption of all aspects of IWRM.

3. Achieving IWRM will be constrained by financial resources and by human resources, skills and experience.

4. The current institutional arrangements, which allow water-use sectors to develop their own policies and legislation with no formal coordinating body and no umbrella water resource policy, carry some risks in the longer term.

5. The draft Water Resources Management Decree is designed to meet current needs, but will require revision as water demands escalate in the future.

6. Placing national water resource management in the Water and Sanitation Service is a pragmatic and workable response to current circumstances. It is likely that future pressures will arise for water resource management to be incorporated into an integrated natural resources management framework.

7. Water resource information is both scarce and inadequate for national planning purposes and there is no system as yet for ongoing assessment of the resource.

Key Recommendations

1. A national water resource policy should be developed immediately which, together with a set of implementing strategies, sets the long-term goals of East Timor and describes the preferred path towards them. The policy will consider the full range of matters applicable to IWRM, including institutional arrangements, integration and coordination across natural resources, water resource assessment, water planning and development, water allocation, dispute resolution mechanisms, water protection, economic and water pricing issues.

2. A minimum network of basic rainfall and river flow measuring stations to support water resource management should be established as soon as possible.

3. To inform the national policy development process, a nation-wide inventory of water availability and demand should be immediately established.

4. Capacity development is critically needed to support the above and to establish the capacity for continued development of IWRM in East Timor.

I. INTRODUCTION

1. This report addresses Phase I of the terms of reference for the Water Resources and Environment Specialist engaged under TA 6031: Promoting Effective Water Management Policies and Practices. Phase I covered a fact-finding mission (the Mission) of the Asian Development Bank (ADB) to East Timor from 5 to 18 October 2002. The Mission comprised Amarnath Hinduja, Senior Project Specialist/Mission Leader, Peter King, Director PARD and Brian Haisman, technical assistance (TA) consultant and Water Resources and Environment Specialist.

2. This is a companion document to the TA proposal document of October 2002 developed by the Mission and which incorporates recommendations from this report. As a lead-in to any subsequent TA, the report also discusses options that might be pursued in developing integrated water resource management in East Timor.

II. FINDINGS

A: Water Resources Information in East Timor

3. It is clear that whatever records may have been kept in the country during the Indonesian administration, nearly all have been removed or destroyed. To build a picture of available water data, it is necessary to access such duplicate records as may exist in Indonesia and in Portugal. Fortunately, several recent projects have undertaken this task to varying degrees and it is possible to estimate what information may be available.

4. East Timor once had an unusually good rainfall gauge network and many records have been located. However, measuring stations are largely defunct at the present time and there is an urgent need to re-establish a climatological and rainfall network that would (i) allow changes and trends to be detected; (ii) support water resource assessments; and (iii) provide day to day management information for agriculture.

5. Briefly, it seems there were 42 Portuguese stations in operation between the two World Wars[1]. These fell into disuse during World War II and were then re-established and expanded post-war. Good records have been recovered for the period 1952 to 1974. The Agriculture, Land Use and Geographic Information System Unit (ALGIS) in the Ministry of Agriculture, Forests and Fisheries (MAFF) has collected significant rainfall and other data and has developed such products as: Annual Average Rainfall (based on 56 stations); Mean Monthly Rainfall (50% exceedance); Isohyetal Map of East Timor; Mean Daily Penman Evapotranspiration Estimate; Mean Daily Temperature; and so forth.

6. A more recent study[2] has reviewed rainfall data for the express purpose of rainfall-runoff modeling and has commented, “Analysis of the existing rainfall data indicated that generally the data collected between 1952 and 1974 (23 years) is consistent and of good quality”.

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[1] Keefer D.J. Nov. 2000, *Report on Restoration of Meteorological Network – Timor Loro Sae,* Dili: United Nations Transitional Administration in East Timor.

[2] SMEC International Pty Ltd. Oct. 2002. *Draft Interim Feasibility Study Report – Feasibility Study of Seical Up, Maliana I, Uatolari I and Caraulun Irrigation Schemes.* Dili: Directorate of Irrigation and Water Management, MAFF, East Timor.

7. Restoration of a rainfall/climatological network should clearly be done on an integrated basis to meet the needs of all potential users. There have been cost estimates of between $262,711 (Keefer, 2000) and $335,000[3] for this task. Keefer reports distributing 50 basic rain gauges in 2000 (funded by AusAID at a landed cost of less than $1000) for use by District Agriculture Officers to provide immediate information for agricultural monitoring and planning. Whilst the siting of these is no doubt somewhat different from the ideal for water resource assessment purposes, the concept is highly relevant to East Timor's present situation.

8. River flow information is almost non-existent. It appears from various project reports that up to six hydrometric stations existed in the 1980s. Table 1 shows the results of research conducted by the current MAFF irrigation scheme feasibility study (SMEC 2002).

Table 1: Hydrometric Stations in East Timor - 1

River	Station Name	Type	Year Constructed	Present Condition	Remarks
Caraulun	Carualun-Same	AWLR	1984	Broken	Never produced data
Saketo	Saketo-Makadiri	AWLR	1985	Missing	No data available
Malibaka	Malibaka-Memo	AWLR	1982	Broken	No data available
Bulobo	Bulubo-Bulobo-Meliana I	AWLR	1982	Broken	No data available
Cuha	Cuha-Viqueque	Staff Gauge	1983	Missing	No data available
Belia	Belia-MataHoi	Staff Gauge	1983	Missing	No data available

Source: SMEC (2002)
AWLR = automatic water level recorder

An earlier study[4], [5] noted some of the above, but with a station on the Comoro River added. See table 2. Some flow information is available for the Comoro.

Table 2: Hydrometric Stations in East Timor - 2

Ref. No.	Catchment	Tributary	Palace	Gauge	Coordinates	Start	Owner
RRT1	S. Lois	S. Malibaka	Memo	A	09 00'S/125 08'E	?	DPMA
RRT2	S. Cuha	S. Cuha	Vikeke	B	08 47'S/126 07'E	?	DPMA
RRT3	S. Belia	S. Belia	Waniuna	B	08 46'S/126 32'E	?	DPMA
RRT4	S. Comoro	S. Comoro	Comoro	A	08 06'S/125 32'E	?	DPMA

Source: RePPProt (1989a)
RRT = River gauge, East Timor; S = sungai; A = auto water level recorder
DPMA = Direktorat Penyelidikan Masala Air (Division of Hydraulics & Hydraulic Engineering)

This earlier study (RePPProt 1989A) notes, "…Much of the information from East Timor was not available in Jakarta and had to be obtained from regional offices of BMG[6] and Public Works in Dili." With the loss of information known to have occurred in Dili, this suggests that the chances of finding data for these stations are slim. The Annex to the study suggests that from 2 to 6 years of data were collected. The study itself collected its climate and rainfall information from BMG; and collected hydrology information from Puslitbang Pengairan in Bandung; from Pusdata at Public Works Department; and from Perusahaan Listrik Negara.

[3] World Bank, ADB et al. Nov. 1999. *Joint Assessment Mission, Agriculture Background Paper.*
[4] RePPProT 1989A, *Review of Phase I Results Maluku and Nusa Tenggara Volume I: Main Report.* Jakarta: Government of the Republic of Indonesia Ministry of Transmigration, Directorate General of Settlement Preparation, Land Resources Department ODNRI and ODA.
[5] RePPProT 1989B, *Review of Phase I Results Maluku and Nusa Tenggara Volume I: Annexes.* Jakarta: Government of the Republic of Indonesia Ministry of Transmigration, Directorate General of Settlement Preparation, Land Resources Department ODNRI and ODA.
[6] Badan Meteorologi dan Geofisika, Department of Communications, Jakarta

9. Another possible source of hydrometric information noted, but not sighted, by the Mission was: Crippen International 1980A, *Timor Island Water Resources Development Study. Final Report. Vol. 1 - Executive Summar*y. Canadian International Development Agency, Ottawa, for Directorate General of Water Resources Development, Ministry of Public Works, Jakarta. In addition, it seems highly probable that published annual climate and hydrology statistics, together with other reports, remain to be discovered in the public archives of Indonesia.

B. Water Resource Assessment

10. Apart from the Crippen International study noted in the previous paragraph, the only other nation-wide review known is a recent study of water supply for 15 major towns[7]. Although done in the context of urgent rehabilitation of town water supply systems, the study made a comprehensive assessment, including some field work, of surface and groundwater sources relevant to the 15 towns. The field work included some measurements of spring sources, resistivity surveys for the towns using groundwater (Dili, Liquica, Suai) supplemented by catchment condition surveys and interviews with local residents. Table 3 below is drawn from two tables in the Main Report of this study and shows a comparison of current supply and demands.

Table 3: Water Supply and Demand in Main Towns

Towns	Source flows measured Oct-Nov 2000 l/s	Estimated potential in dry season l/s	Year 2003 Maximum daily demand l/s	Year 2010 Maximum daily demand l/s
Dili	514	426	322	469
Atauro	4	3	3	5
Manatuto	8016	4054	18	21
Bacau	55	44	20	22
Los Palos	99	99	22	36
Viqueque	121	121	21	25
Same	1143	291	18	30
Ainato	1130	160	12	15
Aileu	375	373	13	15
Maubisse	4	3.5	4	6
Gleno	1390	342	16	21
Ermera	1.7	1.7	5	8
Liquica	50	34	26	34
Suai	not measured	14.6	22	30
Maliana	not measured	88	28	35

Source: Tokyo Eng Consultants & Pacific Consultants (2001) JICA
l/s = flow rate in liters per second

11. The table shows that existing sources for a few towns (notably Dili) are close to inadequate in the dry season. However, other parts of the study made estimates of the Calculated Potentially Available Water (see Table B-2.1 of the study) by

[7] Tokyo Engineering Consultants Co Ltd and Pacific Consultants International, Feb. 2001, *Study on Urgent Improvement Project for Water Supply Systems in East Timor,* Dili, Japan International Cooperation Agency, for United Nations Transitional Administration in East Timor

estimating for each catchment the annual precipitation, evapotranspiration, total runoff, groundwater recharge, base flow, and direct runoff. Additions of base flow and groundwater charge are used to estimate potential groundwater supplies where applicable. This potential available water appears to be adequate on an annual basis, but implies that water conservation storage, including possible dams, may well be needed in some locations in the future – particularly for Dili should industrial water demands grow as a result of economic development. The calculations do not take account of competing uses from the catchments or aquifers.

12. To date, there is no national appraisal of water availability and demands for all purposes. The major user of water in East Timor is undoubtedly irrigation. Although no reliable figures are available, based on information from other similar countries it could be stated with some confidence that irrigation water use will not be less than 70% of the total water used in any year. The figure may well be higher as can be seen from a simple calculation. Once rehabilitation is complete, Table 3 suggests a total peak water demand for the 15 towns of around 800 liters/second. Total design irrigation area in East Timor is some 70,000 hectares spread over more than 400 schemes. Assuming say 40,000 hectares operating simultaneously at the design application rate of 2 liters/second/hectare, the peak irrigation demand is some 80,000 liters/second. This does not equate to annual usage, but the comparison with urban water supply demands is stark. Knowledge of irrigation requirements and the potential for conflicting requirements is clearly crucial for water planning.

13. At present only some 50% of the design area of irrigation in functioning. (See Table 4). This percentage relates to damage during the 1999 emergency but us said by irrigation officials to strongly reflect a backlog of maintenance. The response by MAFF is to move the irrigation schemes to community-based management. However, this will be a long task involving significant cultural change, as it is said that the Indonesian administration did all of the operations and maintenance and the irrigators are only slowly coming to terms with taking over themselves.

Table 4: Inventory of Existing Irrigation Schemes – March 2002

	Number of Schemes	Original Design Area hectares	Area Currently Functioning hectares	Percentage Functional %
Technical Schemes	24	10,587	5,384	51
Semi-Technical Schemes	58	18,320	7,770	42
Traditional Schemes	345	43,252	21,495	50
TOTALS	427	72,159	34,649	48

Source: MAFF, Aug. 2002, *Brief Summary of Irrigation in East Timor,* Dili

14. Irrigation demand is also presently depressed because of the lack of commodity marketing arrangements and the lack of infrastructure and conveyance, which makes internal transport highly costly. A Food and Agriculture Organization (FAO) report[8], states, "In rice marketing the end of BULOG[9], operations has left a large vacuum in the way rice is procured and traded, whilst at village level a large number of traders, who bought from farmers and sold to local markets, have now left. Consequently, there are already concerns that producers will have considerable problems in marketing and storing surpluses of rice and, in particular maize, which this year, will be more susceptible to storage losses." Anecdotal advice from

[8] FAO, April 2000, *Special Report FAO/WFP Crop and Food Supply Assessment Mission to East Timor,* FAO Global Information and Early Warning System on Food and Agriculture, World Food Program

[9] The National Food Logistics Agency of Indonesia

irrigation managers and advisers is that in some areas, as a consequence, farmers who were able to grow two crops per year were not doing so. In effect, they had returned to subsistence.

15. The combination of depressed demand for water in both urban centers and for irrigation creates a window of opportunity to make national water resource assessments. There have been recent hydrological studies with a focus on irrigation[10],[11], including SMEC (2002). These studies, coupled with urban studies (JICA, 2001), are demonstrating that it is possible to make useful assessments of both surface and groundwater, despite the paucity of river flow and other data. Whilst these assessments will be of limited accuracy, they are nonetheless quite adequate for national water policy and planning purposes. It is noted that some population reports are available[12], though these will require re-assessing in the light of the migrations associated with the 1999 emergency.

C. Institutional Arrangements

16. In mid-2001 a proposal for formation of a single agency with responsibility for water resources was not accepted. The present arrangements are therefore built around a requirement for coordination among agencies, without any peak body or specific coordinating mechanism in place. A Decree[13] following the creation of East Timor in May 2002 (sometimes referred to as the "Organic Law") describes the organizational structure of government and broadly lists the fields of responsibility of the various ministries The three principal agencies with water resource responsibilities are:

1. Water and Sanitation Service

17. The Water and Sanitation Service (WSS) is within the Ministry of Transport, Communications and Public Works and reports to the Secretary of State for Electricity and Water. It is understood there are plans to move WSS to a business unit basis in the near future, as it will start to generate its own revenue streams in 2003 through an authorized water tariff structure. Besides responsibilities for water supply and sanitation services within urban areas, WSS also carries responsibility for technical assistance with community-based rural water supply and sanitation, and for water resource management (WRM). This latter responsibility is shaped towards the needs of WSS for municipal and industrial water supplies on the basis that water for agriculture, including WRM aspects will be dealt with separately by the agriculture ministry.

18. However, draft legislation in the form of a Water Resource Management Decree, gives WSS responsibilities for the licensing of water use (other than irrigation) outside its areas of service, as an initial means of providing a measure of protection to water resources. Additionally, the draft legislation requires WSS to prepare Water Resource Management Plans in coordination with nominated agencies, which are to identify water

[10] SNC-Lavalin International, 2001. *Feasibility and Engineering Study in Respect of Rehabilitation of Identified Irrigation Schemes in East Timor*. Agricultural Affairs Department. United Nations Transitional Administration in East Timor (UNTAET).

[11] JICA, March 2002, *Study on Integrated Agricultural Development of East Timor,* Dili, UNTAET.

[12] Anwar, E.N. 1995, *Population projection 1995-2025, East Timor,* Jakarta: Demographic Institute of the Faculty of Economics of the University of Indonesia.

[13] Estrutura Organica do I Governo Constitucional. Decreto-Lein No. /02, Governo, Republica Democratica de Timor-Leste

management issues and set up action plans to deal with them. Importantly, WSS is also charged by this legislation with the responsibility for setting up an ongoing water resources assessment program for East Timor.

19. The draft WRM Decree, in effect, sets up WSS as the de facto national WRM agency. The WRM unit within WSS however reports to the Chief of Urban Water Supply and contains only 4 positions: a Water Resources Manager and 3 staff involved in water quality monitoring. The organizational structure in this respect resembles that of the archetypal urban water supply utility. As presently staffed, the unit has neither the numbers nor the WRM experience to tackle the national water resource assessment program and the water resource management planning responsibilities that the draft Decree places on WSS. Licensing demands will probably be low after approval of the Decree (and when the requirements are publicized), but even these will stretch the capabilities of the unit, as there are significant procedural requirements even for the simple licensing system proposed. There is one WSS officer located in each District, but these officers are fully engaged in WSS operational duties.

20. WSS operates East Timor's only water quality laboratory. This is a new facility and is set up to perform the usual range of physio-chemical tests, plus basic bacteriological tests (total coliforms and E.coli). Monthly tests are conducted on raw, reticulated and treated water points within the WSS supply system. There is no water quality testing program at this time for rivers generally.

2. Directorate of Irrigation and Water Management

21. The Directorate of Irrigation and Water Management (DIWM) is within the Crop Production Unit of the Ministry of Agriculture, Forests and Fisheries. Its water resource management responsibilities are not as well defined as those of WSS at this time because they have yet to do the necessary policy studies and development of complementary legislation. A discussion draft developed within DIWM of a proposal to conduct an 'Agricultural Water Policy Study' makes it clear however that the focus will be on water resources developed and managed to support agricultural and rural development. The study proposal recognizes the possibility of water usage conflict with other sectors as a potential problem in achieving this support.

22. Staff of DIWM are severely stretched at the moment in dealing with the many rehabilitation projects. Even though international advisers are provided, the workload on the few experienced officers is large. DIWM has one officer located in each of 12 Districts, but these officers are fully occupied with operational duties. As schemes are rehabilitated and marketing systems are re-created, the nature of present duties will change but not the quantum. In addition, DIWM has just presented its Minister with an ambitious proposed program for handover of irrigation scheme operations and maintenance to community based management groups and water users associations. Experience says this will be a significant task for the District Irrigation Officers. It should be noted that the Ministry is planning to make more effective use of its field officers by consolidating them from the existing 12 districts into 3 regional centers. This is a model to be commended to other agencies in light of the limited budget and staffing of the civil service.

3. Division of Environment

23. The Division of Environment (DoE) is within the Ministry of Development and Environment. It is significant that the Minister for Development and Environment is also the Prime Minister. DoE's responsibilities are not yet defined in detail by legislation. DoE is presently drafting pollution control regulations and environmental impact assessment regulations. It sees itself however as moving towards an independent stance with an oversight of environmental matters across all natural resources, and responsibilities for policy, standards and enforcement. To this end, DoE sees a priority to develop and implement environmental governance arrangements for East Timor.

24. DoE had convened a Natural Resources Working Group of senior officials from relevant agencies, in recognition of the need for integrated management. The group failed because, in the words of DoE, "…sectoral agencies saw little to gain from cross-sectoral coordination." The lesson is that at this stage of natural resource agencies only just getting to their feet, still recruiting staff, and, for water supply and irrigation, totally immersed in urgent rehabilitation works, no one has much time or need for the niceties of integration. DoE intends to resurrect the group at some time in the future and also sees merit in integration of coasts and catchment management. DoE itself has only some 13 officers. Capacity building has been going on, but this is a very small resource to meet all the responsibilities of comprehensive environmental management.

25. A number of other ministries and agencies have water interests. The Ministry of Transport, Communications and Public Works contains two as yet unstaffed units connected to water management. The most crucial unit is the Meteorological Service. The other is the Department of Roads and Bridges and Flood Control. The flood control function is designed principally to deal with erosion protection of road and bridge assets, but will contain skills relevant to the wider issue of flooding and catchment management. The Ministry of Health has a clear interest because of the part played in public health by water supply and sanitation. The Fisheries and Marine Environment Department of the Ministry of Agriculture, Forestry and Fisheries is vitally interested in water quality especially from the point of view of reviving local aquaculture. Small fish farms are scattered through the country and during the Indonesian administration, the then East Timor Fisheries Authority operated 5 hatcheries for supply of fingerlings to the community-based fish farms.

26. Another key player is the Forestry Department, which is also in the Ministry of Agriculture, Forestry and Fisheries. The Department is presently the home of protected area management, including national parks. The Department is therefore also home to the nearest thing to catchment management that currently exists in East Timor. It in fact has a small Division of Forest Protection and Catchment Management. Forestry is planning to develop approaches to catchment management jointly with WSS. Notwithstanding, some discussion is presently occurring through an inter-departmental committee as to whether or not a "national parks and wildlife service" function should not be better placed within the Ministry of Development and Environment. Finally, there is in the Ministry of Development and Environment, a Directorate of Minerals and Natural Resources. Whilst the Organic Law and the National Development Plan[14] (refer Chapter 13) construe the role of this

[14] Planning Commission, May 2002, *National Development Plan for East Timor*, Dili, Government of the Democratic Republic of East Timor.

department as managing minerals, oil and natural gas, there is apparent current consideration of an expansion to all natural resources. This, together with the discussions about national parks, coasts and catchments, suggests that the institutional arrangement for governance of natural resources may well enter a period of review and possible change prior to ultimate consolidation and stability of the arrangements. Consideration of IWRM arrangements is therefore timely.

27. In regard to water disputes, the WRM Decree allows for objections to the granting of a license, and for rights of appeal against use of the Decree by WSS to "a Court or Tribunal of competent jurisdiction". However, no specific Tribunal for water resources is known to be presently contemplated, neither are general conflict resolution mechanisms planned at this time to deal with such matters as inter-sectoral claims on water resources. It must be said that this is not of great import currently, as competition for water by existing users and demands for additional water by new developments are at very low levels. No new irrigation schemes are planned, and no significant development proposals appear to exist outside of WSS water supply areas. Anecdotal evidence is that conflicts between villages for use of the same spring are not unknown, but the provision for the community water management unit in WSS provides a mediation mechanism for conflicts at this level.

D. Current Status of IWRM in relation to Best Practice

28. Best practice concepts and principles of IWRM have two facets – water resource management itself, and the things that make up integration. Integration recognizes the interaction of water with other natural resources and the institutions managing those resources. This means having WRM integrated across all natural resource issues, across all jurisdictions, and across research, policy and implementation. A state with well-developed IWRM will have these characteristics:

- There is a national natural resource integrated policy framework;
- There is integration "on the ground" at district and regional levels;
- Ministries are working together on a "whole of resource" framework both nationally and within regions;
- Policies and strategies exist that take into account all aspects of natural resource management both nationally and within regions;
- Evaluations of proposed developments and projects take full account of the social, economic and environmental impacts and seek a balanced solution.

At present, none of these characteristics are present in East Timor. This, of course, merely reflects a stage in history, not shortcomings of administration. Every country goes through these stages.

29. WRM itself can be analyzed by considering its three component functions:

- Water protection
- Water sharing
- Water supply

The current status of these three functions is as follows.

1. Water Supply

30. East Timor is well down the path to having water supply organized. WSS exists, is shortly to be properly empowered through the planned Water Services and Sanitation Management Decrees, and will move to a form of business unit status in the near future in order to strengthen financial sustainability and to ensure water users are meeting appropriate water services costs. WSS also encompasses assistance for rural water supply in both its traditional use forms and other kinds of community-based

management. Irrigation water supply is managed under DIWM. Empowering legislation for irrigation management is not yet drafted but is being planned.

2. Water Sharing

31. Water sharing refers to organized mechanisms for allocating the nation's water resources. A water allocation system does not exist in any formal manner yet in East Timor. The basic licensing provisions of the draft WRM Decree are in fact rather more to do with resource protection than water sharing. Also there are no proposals for developing some form of bulk allocation for irrigation schemes and for towns that would support water-sharing negotiations. Experience elsewhere shows that absence of such systems leads to difficulties when competition for water escalates either because of a growth in water-using developments or because of water shortage at time of drought.

32. Management of water sharing in East Timor is, of course, about managing instantaneous shares of flows rather than volumes. There are well-developed methodologies for this and some excellent management software, for example from Brazil. Establishing a system requires both a capability and an empowerment. Empowerment can come easily enough by amendments and expansion of the WRM Decree. Capability is altogether more difficult in the light of budget constraints and staff freezes. Capability will also take significant time for development of the necessary skills and experience. Whilst comprehensive water allocation systems may not be required right now, there is no doubt they will be needed in the future. The long lead times for establishment suggests that preparations should begin reasonably soon.

3. Water Protection

33. Water protection is used here in the sense of protecting both water quality and the instream and riparian zone aquatic environment. Debates occur in many countries as to how responsibilities for this are to be arranged. The question revolves around the respective roles of an environmental regulator and various natural resource management agencies, especially the agency with water resource management responsibilities. The answer is that it does not really matter, provided the roles are clear and transparent and that no conflict of goals exists for any of the involved organizations. In East Timor in regard to discharges to waters, a de facto decision has already been taken that DoE will manage pollution licensing. From experience, some practical management issues of no great consequence arise from this. WSS has the only water quality laboratory at present and has more staff in the field. It is better placed therefore to perform water quality monitoring functions. However, as WSS moves towards a quasi-autonomous water utility or similar, its laboratory needs may not match the wider needs of national water resource management. Some careful thinking will be needed to get the least cost solution for the nation as a whole.

34. A more difficult issue to manage is that of instream and riparian zone aquatic environment. This immediately brings into play the whole of catchment (or watershed) management. Experience elsewhere shows that there is no one best simple answer, but that the best outcomes result from strong attention to integration and coordination.

E. Some Observations on Integration and Coordination

35. Beyond requirements in the draft WRM Decree for WSS to consult in the course of specified activities, IWRM does not yet exist in any tangible form. This is not surprising and is entirely appropriate at this time in East Timor's history when the clear and urgent need is to restore and enhance clean, safe domestic water supply and to get existing irrigation schemes back into business. However, the decision to not have a peak or coordinating body carries some risks in the longer run. It has been noted that the various agencies are pursuing water management agendas that are molded rather more to their particular functions than to cross-sectoral management of the resources as a whole.

36. The primary risk is that requirements for coordination among the agencies with water interests, although contained in Decrees and in the National Development Plan, may be honored in only a superficial manner in the absence of a coordinating body with specific authority to achieve the coordination necessary for IWRM. Incompatible policies and strategies are not unknown in other places where the coordinating function is weak or non-existent. Also, sooner or later, pressure for additional water for economic development will occur and experience shows that informal or quasi-formal water-sharing arrangements often collapse under economic forces. Water is an economic good. Rights to use water, whether implicit or explicit, are property rights and the holders of these rights can be expected to defend them in a court of law, regardless of policies of cooperation.

37. Other risks relate to the limited financial and human resources presently available for natural resource management. In these circumstances, overlap and/or duplication should be avoided where possible in such things as laboratory facilities, water quality monitoring generally, environmental management skills, water planning skills, and so forth.

38. Whilst the need to move to the next level of sophistication of water management (and the resources to implement it) may well be some 5 years away as postulated by the developers of the WRM Decree, there is merit in being prepared in view of the long lead times involved. In the meantime, a national water policy would assist in ensuring coherence and compatibility of sector policies and strategies. Ideally, an umbrella natural resources policy would be developed and no doubt this will occur in the future. In the meantime, it is suggested that the risks of not having at least a national water policy are unacceptable and that such a policy should be developed as soon as possible.

III: OPTIONS FOR IWRM DEVELOPMENT IN EAST TIMOR

A. Overall Policy Framework

39. The present limited demands for water development in East Timor lend weight to the view that comprehensive and sophisticated policies are not presently warranted. However, it is clear that both the water and sanitation and the irrigation agencies see a current need for a water resource policy from their perspective. What is more, it appears that at least one of them will develop such a policy in the near future, with or without ADB's assistance. This may pre-empt national policy considerations and is likely to have a narrower focus than would any national policy. Despite cooperative intentions, it is a fact of life that bureaucrats everywhere are competitive beings, and the possibilities for conflicting directions by individual agencies cannot be discounted.

40. In the light of this, the time is opportune to quickly develop an over-arching national water resource policy. This policy can afford to look well into the future and provide guidance for ministries and agencies as they develop their sector policies. A national water policy needs distinguishing from the strategies for its implementation. These strategies must be aligned with the emerging needs of the nation and prescribe a rate of implementation in harmony with these needs and with the capacity of the civil service to absorb the demands upon it. Water resource management needs in any country continue to change over time, but the goals tend to remain constant if well chosen from the outset.

41. It is envisaged that the first such national water resource policy would be quite broadly based, but would seek to set up enduring goals and principles. The rate of progress towards the goals would be contained within a complementary set of strategies, subject to periodic review. The policy would focus on integrating water management activities across government and would cover areas such as institutional, legal, water assessment, water sharing and allocation, and economic issues. In matters of integration, it would spell out the role of water resource management in the bigger issue of catchment management for instance.

B. Institutional Arrangements

42. Two institutional principles that have evolved from experience elsewhere might be borne in mind during this consideration. Firstly, keep it simple and do not apply more management effort than the situation demands; and secondly, a separation of regulator and service provider functions can clarify roles and minimize conflicts (the principle of separation of “gamekeeper” and “poacher” as some have termed it).

43. The Constitution of East Timor places ownership of the nation’s water resources in the hands of its people. There is a case to be made for creation of a single ‘owner/manager’ of all these water resources who acts in a fair and equitable way on behalf of everyone. On the face of it, the placement of East Timor’s only WRM unit within WSS, together with a draft Decree empowering WSS, not only has the effect of making WSS the nation’s ‘owner/manager’, but violates the principle of separation of regulator and service provider. The question is – does this matter?

44. The answer is – probably not at this stage. Because of the urgency of water supply issues, WSS is perhaps more established than other agencies. It can be argued that there is no other viable home for WRM at present. However, eventually the need for a comprehensive rights-based water allocation and sharing system, coupled with the need for integration of WRM across all natural resource issues (see paragraph 28) will lead to pressures for a natural resources management agency that also incorporates WRM. In the meantime WSS with officers in all Districts is best placed to conduct resource assessments, will always be representing the highest priority of water use, and is the smallest user of water on a volumetric basis. On the other hand, WSS will always need a small WRM function of its own, and if WRM becomes entrenched in WSS, it may prove difficult to move the function to a natural resource agency.

45. The suggestion for dealing with this dilemma, is to recognize it now in the national water resources policy and to signal the intention from the outset to move the WRM function at an appropriate future time into a more integrated natural resource management framework.

C. Coordinating Mechanisms

46. The options fall into three broad types.
   i) Do nothing. That is, rely on current coordination intentions.
   ii) Develop a more formal and specific coordinating mechanism; and
   iii) Create an independent body with full authority over water allocations and water rights, and with coordinating powers for other matters.

47. In considering these generalized options, the prime question remains – what level of IWRM is appropriate at this stage of development of the nation's water resources? Key Ministers are showing interest in further achievement of integration, suggesting that the time to move is sooner rather than later. Table 5 lists briefly some pros and cons of the broad options.

Table 5: Broad WRM Coordination Options

Coordination Option	Advantages	Disadvantages
Do Nothing *(other than that contained in the draft WRM Decree)*	Least direct cost. Adequate at present. The WRM Unit is with the agency managing the smallest and highest priority water use.	May not cope well with acceleration in demands. No effective way to resolve inter-sector competition. WRM becomes entrenched in WSS and may be hard to move.
Formal Coordination Mechanism *(Such as Sub-committee of Council of Ministers to:* - *set national policy* - *approve sector policies and strategies)*	Still low cost. No one ministry dominates. Can drive genuine inter-dept. coordination working group. Policy integration achieved at highest level. Reasonable forum for inter-sectoral dispute resolution. (Though not between individual water users).	National water assessments, water allocation planning and management still needs a home agency. Inter-sectoral allocation issues remain a matter of policy, not a matter of property rights.
Water Resource Management Agency *(With an 'owner/manager' role for the nation's water resources on behalf of all interests)*	Facilitates unbiased 'best' mix of uses of nation's water resources. Sets up robust property rights regime that will deal best with intense competition for water. Strong path towards managing river health – including instream use considerations.	Requires most resources (dollars, people) Insufficient capacity available for success at present Demands on the resource are currently low and may not need this level of management.

D. Achieving Ecologically Sustainable Development

48. The draft WRM Decree has a quite powerful provision requiring development applications to be referred to WSS for consent. WSS has powers of consent or non-consent. In addition, it is mandatory for the referring agency to impose conditions of consent as advised by WSS. This provision does not apply to developments supplied with water by WSS. The draft Decree also empowers WSS to impose conditions on water-use licenses designed to manage or mitigate detrimental third party effects. These powers, together with widespread powers under the draft Water

Services and the Sanitation Management Decrees go some way towards creating what is needed for achieving ecologically sustainable development.

49. What needs consideration in the future is how to achieve similar management results for irrigation, extension of licensing or equivalent provisions to works or structures that affect river flows (dams, hydropower projects and the like) and positive management of the water-related environment. The longer term, and no doubt controversial, issue of water-use licensing for urban water supplies as part of national environmental management will appear sooner or later, probably driven by environmental management interests. The water sector would do well to anticipate these trends.

E. Water Resource Assessment Program

50. "You cannot manage what you do not measure" is a trite but largely true saying. Certainly, agencies with water interests are unanimous in their desire to have a resource assessment program quickly re-established. The principal barrier at present is the limited financial and human resources available. Synthesis of catchment yields is certainly possible as noted previously and will assist with initial policy formulation, but is generally inadequate for the longer term.

51. Modeling of climate change effects on net run-off in the temperate and semi-arid zones of Australia is producing predictions of changes already underway and becoming quite significant in only twenty to thirty years. East Timor will not be immune from this, although the actual effects will no doubt be different. Nonetheless climate change cannot be ignored by a country with a significant number of non-perennial streams and described in one study[15] as "exceptionally dry". This study goes on to state, "Comparing the availability of water in Timor with neighboring islands shows that nearly all areas of Timor were rated as moderate to very low." It can be concluded that the need for a water resource assessment program is acute. The only options relate to scale and cost.

F. Capacity Development

52.. The human resources challenge, as for other fields in East Timor, involves both the numbers of people available and the levels of skills and experience. Creating ownership of the various WRM programs and activities demands that East Timorese people operate these themselves as soon as possible. Apart from anything else, there is no recipe book for WRM, only a few universal principles. As with every other state, a unique East Timor solution to its WRM issues will emerge.

53. A first rough estimate of minimum capacity needs at present are:

- Two people to run a water assessment program. One with professional level hydrology skills (and preferably some hydrogeological capacity); and one knowledgeable in the techniques of measuring stream flows.
- One person with at least a little appreciation of water law and the ability to administer a water licensing system.
- One water resources management professional with both policy and general operational and planning capacities (plus at least some appreciation of the management of aquatic environment) to do everything else.

[15] Columbia University (NY) and Fafo Institute for Applied Social Science (Oslo), Nov 1999, *Social and economic Conditions in East Timor,* J. Pedersen and M. Arneberg eds. New York.

These people would need to operate together, assisting each other, as a broad-based, multi-skilled team. It will be difficult to implement the WRM decree with any lesser capacity. Given current levels of financial resources it may be necessary to attempt to do so however. In that case, there is little option but to combine the hydrologist and the WRM professional, and possibly the hydrographer and the licensing functions. (It is useful for a licensing person to know something of water measurement and with limited demand for water licenses the proposition is not totally impossible for at least a short period.)

54. Professional academic training is fairly specialized and could only be sourced off-shore. For the hydrologist, a first diploma or degree in civil engineering followed by a 3-month specialist hydrology course would be excellent. A similar approach would also be applicable for the WRM professional. Some of the most useful training however would be "on the job", and could be arranged by say a 3-month period with a WRM agency in a suitable country. This type of training is particularly applicable to the acquisition of hydrographic and water licensing skills.

IV. RECOMMENDATIONS

55. The over-riding conclusion and principal recommendation is that East Timor, in managing its water resources, should move down a path that is defined and governed by consideration of emerging needs and capability, and should keep this path under regular review. The policies and strategies that define the path should be guided by ultimate goals of best practice and should ensure that progressive decisions do not lead down undesirable sidetracks or dead ends. Specific recommendations proposed for immediate implementation are as follows.

56. Assistance is needed to set up without delay, the minimum workable water resources assessment program for East Timor. This should comprise a network of inexpensive daily read rainfall gauges, at least three recording pluviometers, and up to four basic hydrometric (river height/flow) stations with automatic water level recorders. The measuring systems should be accompanied by initial training of appropriate personnel and the setting up of a simple relational database as a precursor to future selection of more comprehensive time series software.

57. The various studies on water availability already done should be collated and gaps filled by further rainfall-runoff modeling and aquifer assessment to provide a nation-wide coverage of estimated water availability. This should be done for watersheds or groups of watersheds judged most likely to make useful management units when integrated catchment management is introduced in the future. These studies should be accompanied by complementary estimates of current and future water withdrawals in order to create a national picture of resource supply and demand in a form suitable to inform development of a national water resource policy. As the civil service does not presently contain the resources for this task, it will be necessary to provide international consultants to carry this out.

58. Assistance should be provided to develop the first national water resource policy for East Timor before individual sector policies are developed or established. Policy development should proceed in tandem with the resource assessment work. The policy should cover all aspects of IWRM, including those applicable in the medium to long term. The policy should be accompanied by a set of strategies for implementation that take due account of the rate at which needs for further degrees of water management might become appropriate, and of the human and financial resources available for implementation. A number of international consultant inputs would be useful to cover the various specialist fields contained in IWRM. Specifics

among these, apart from water policy generally, are institutional, economic and water law fields. The policy should be capable of giving direction to future legislation to replace the WRM Decree when appropriate and necessary. To give the policy authority, it could be developed under the Water Resource Management Plan provisions of the WRM Decree. A ministerial-level steering committee would provide guidance at the highest level and, incidentally, give some experience of the applicability or otherwise of the second institutional option listed in Table 5. Working group(s) of senior officials should be formed to support the steering committee.

59. The development of the national water resource policy should be preceded by targeted awareness raising in IWRM concepts, trends and best practices, and be interspersed with awareness raising of the various specialist components of IWRM as they arise in the course of policy development. The aim is to give both the ministerial-level steering committee and its working groups the necessary background and understanding to develop robust and durable policy objectives. The working group(s) in particular should receive training in the generic skills and practices of policy development.

60. Assistance should be provided to develop and install a basic water licensing system, together with training for selected licensing administration personnel. The aims are to operationalise the WRM Decree and also to build experience in licensing and water rights that will support subsequent amendments and enhancements of the WRM legislation.

61. Assistance should be provided to develop and deliver training and capacity building throughout the activities described above. This will require supplementing the various specialists with training facilitators to ensure successful and sustainable capacity building. In addition to the specific awareness raising and training already mentioned, all consultants must have the task of imparting knowledge and skill transfer on a continuing basis throughout for all the people they meet and work with during the course of the assistance program.