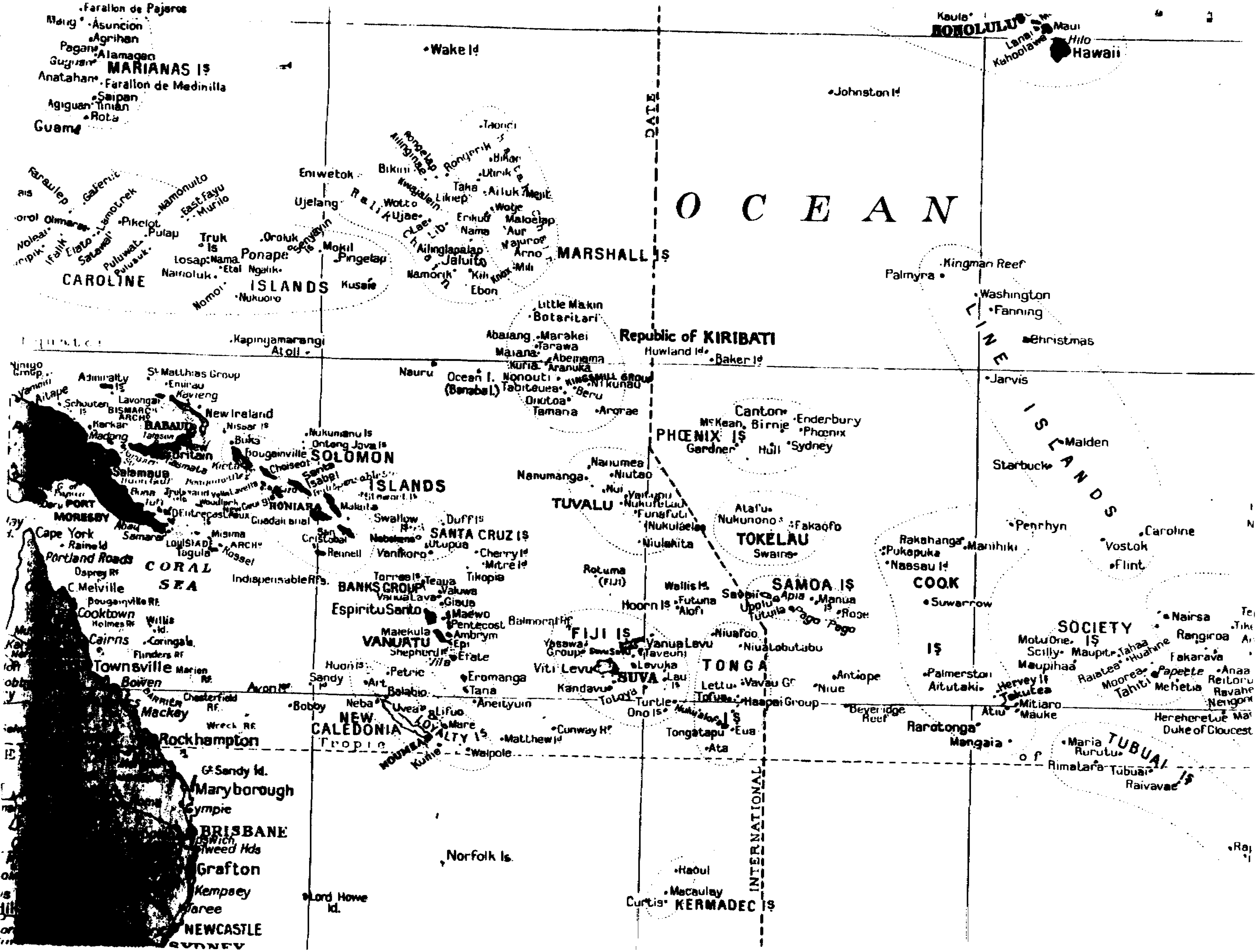
REPORT ON A MISSION TO THE SOUTH PACIFIC REGION

by Uri Golani
Special Technical Adviser, Water Resources Branch
Natural Resources and Energy Division
Department of Technical Co-operation for Development

United Nations, New York
May 1987

TABLE OF CONTENTS



Farallon de Pajaros
Asuncion
Agrihan
Pagan
Alamagan
MARIANAS Is
Anatahan
Farallon de Medinilla
Saipan
Tinian
Aguijan
Rota
Guam
Wake Id
Johnston Id
HONOLULU
Maui
Hilo
Hawaii
Lanai
Kahoolawe
Kaula
DATE
OCEAN
Eniwetok
Ujelang
Bikini
Taka
Ailuk
Wotje
Likiep
Utirik
Ujae
Wotho
Erikub
Maloelap
Aur
Majuro
Arno
Mili
Ailinglapalap
Jaluit
Namorik
Kili
Ebon
MARSHALL Is
Truk Is
Losap
Nama
Etal
Namoluk
Nomoi
Ponape
Oroluk
Mokil
Pingelap
Kusaie
Ngatik
Nukuoro
ISLANDS
CAROLINE
Pulap
Pikelot
Puluwat
Pulusuk
Satawal
East Fayu
Murilo
Namonuito
Olimarao
Little Makin
Butaritari
Abaiang
Marakei
Tarawa
Maiana
Abemama
Aranuka
Kuria
Nonouti
Tabiteuea
Beru
Nikunau
Onotoa
Tamana
Arorae
Republic of KIRIBATI
Howland Id
Baker Id
Kapingamarangi Atoll
Nauru
Ocean I.
(Banaba I.)
Palmyra
Kingman Reef
Washington
Fanning
Christmas
Jarvis
LINE ISLANDS
Malden
Starbuck
Penrhyn
Caroline
Vostok
Flint
Canton
Enderbury
Phoenix
McKean
Birnie
Hull
Sydney
Gardner
PHOENIX Is
Admiralty Is
St Matthias Group
Kavieng
New Ireland
Nissan Is
Buka
Bougainville
Choiseul
Santa Isabel
Nukumanu Is
Ontong Java Is
SOLOMON
ISLANDS
Madang
RABAUL
New Britain
Salamaua
PORT MORESBY
Samarai
HONIARA
Malaita
Guadalcanal
San Cristobal
Rennell
Swallow
Duff Is
SANTA CRUZ Is
Utupua
Vanikoro
Cherry Id
Mitre Id
Tikopia
Nanumea
Nanumanga
Niutao
Nui
Vaitupu
Nukufetau
Funafuti
Nukulaelae
Niulakita
TUVALU
Atafu
Nukunono
Fakaofo
TOKELAU
Swains
Rakahanga
Manihiki
Pukapuka
Nassau Id
COOK
Suwarrow
Cape York
Portland Roads
CORAL
SEA
C. Melville
Cooktown
Cairns
Townsville
Bowen
Mackey
Rockhampton
Gt Sandy Id.
Maryborough
Gympie
BRISBANE
Ipswich
Tweed Hds
Grafton
Kempsey
Taree
NEWCASTLE
SYDNEY
Indispensable Rfs.
BANKS GROUP
Torres Is
Vanua Lava
Espiritu Santo
Maewo
Pentecost
Ambrym
Epi
Malekula
VANUATU
Shepherd Is
Efate
Eromanga
Tana
Aneityum
Balmoral Rf
Rotuma
(FIJI)
Hoorn Is
Wallis Is
Futuna
Alofi
SAMOA Is
Apia
Upolu
Tutuila
Pago Pago
Manua Is
Rose
FIJI Is
Vanua Levu
Taveuni
Yasawa Group
Viti Levu
SUVA
Levuka
Lau Is
Kandavu
Niuafoou
Niuatobutabu
TONGA
Vavau Gr
Haapai Group
Tofua
Tongatapu
Eua
Ata
Niue
Antiope
Beveridge Reef
Palmerston
Aitutaki
Hervey Is
Takutea
Atiu
Mitiaro
Mauke
Rarotonga
Mangaia
SOCIETY Is
Scilly
Maupiti
Maupihaa
Raiatea
Tahaa
Huahine
Moorea
Tahiti
Papeete
Mehetia
Rangiroa
Fakarava
Anaa
Nairsa
Hereheretue
Duke of Gloucester
Maria
Rurutu
Rimatara
Tubuai
Raivavae
TUBUAI Is
Chesterfield Rf.
Wreck Rf
Bobby
Sandy
Huon Is
Petrie
Art
Belep
Neba
NEW CALEDONIA
Tropic
NOUMEA
Kunie
LOYALTY Is
Uvea
Lifou
Mare
Walpole
Matthew Id
Conway Rf.
Norfolk Is.
Lord Howe Id.
Raoul
Macauley
Curtis
KERMADEC Is
INTERNATIONAL

REPORT ON A VISIT TO FIJI

by Uri Golani, Special Technical Adviser
Water Resources Branch
Natural Resources and Energy Division
Department of Technical Co-operation for Development

The visit to Suva, Fiji took place from Saturday, 28 March to Wednesday, 2 April 1987. The purpose of the visit was to:

- Review the progress of the INT/86/R30 project "Planning and Management of Water Resources in Small Island Countries in the Pacific".
- Discuss with the UNDP Regional Office the preparation and implementation of the UNDP-financed regional water project.
- Prepare the project document for that project.
- Discuss with Government the activities of the regional water project in Fiji.
- Discuss with the CTA of the INT/86/R30 project and the University of the South Pacific the seminar on water resources in island countries which is planned for mid-1988.

During the stay in Suva, meetings and discussions were held with Mr. J. Berke, the UNDP Regional Representative, and members of his office, with Mr. P. Hadwen, the CTA of the INT/86/R30 project, with Government officials, experts from the UN agencies and staff of the University of the South Pacific. See list in Annex I.

The INT/86/R30 Project

The project, which is financed by the UN Regular Programme, started in May 1986. Its main purpose is to assess the needs of the Pacific island countries for assistance in the field of water resources exploration, assessment and development; to prepare a UNDP-financed large scale regional water project and to initiate the preparation for a seminar on water resources in island countries.

The project staff consists of a CTA and an administrative assistant. It is based in the campus of the University of the South Pacific in Suva. It has currently

one office but it will move within one month to a large building which is being renovated and prepared for the needs of the project. In this new office the project will have adequate space and good communication facilities (telephone, telex and facsimile).

The main activities of the project, which are essentially the activities of the CTA, consist of visits at least once to all the 15 countries included in the Pacific project. Many countries were visited twice or more. A visit was also made to the Maldive Islands in the Indian Ocean. Reports on many of the visits have been already prepared. For several of the countries, specific work programmes were prepared and for some countries project documents were prepared. In one country (Solomon Islands), work on a specific project has already started.

The CTA will prepare a report on each of the island countries of the region. It will include a general description of the country and its water situation, general recommendations as to the work that has to be done in these countries in the water sector and, when required, proposals for specific projects. These reports, some of which have already been prepared while others are under preparation, will be the main output of the INT/86/R30 project.

The state of the project work in each of the island countries in the Pacific is as follows:

Cook Islands: Report on a visit, proposal for a project in water supply.

Fiji: Visited, project proposal prepared for a project in ground water assessment and geophysical exploration (attached).

Federal States of Micronesia (FSM): Visited.

Kiribati: Report on a visit, project documents prepared for IPF project and for a CDF project (US$500,000). Supervision of a project in progress (Water Supply).

Nauru: Report on a visit, prodoc for a possible IPF project on Hydrogeological Exploration and Water Engineering prepared.

Niue: Report on a visit, work programme.

Marshall Islands: Visited.

Palau: Visited.

Solomon Islands: Report on a visit, project documents for IPF financed projects:n Water Resources Exploration and Planning, SOI/87/001 and Water Works Replacement, SOI/87/010. Both projects have been already approved (see attached report on a visit to Solomon Islands).

Tokelau: Visited.

Tonga: Report on a visit (attached).

Tuvalu: Report on a visit, project documents prepared for IPF project and CDF project (US$1,000,000).

Western Samoa: Visited. Project proposal prepared for ground and surface water assessment and water resources planning (see attached report on a visit to Samoa).

Vanuatu: Visited. Project proposal made (see attached report on a visit to Vanuatu).

Papua New Guinea: Report on a visit. Project proposal made (see attached report on visit).

Maldive Islands: Report on a visit. Project document for ground water exploration and assessment prepared.

In addition to the visits to all these countries, the CTA has made special efforts to establish contacts and working relationships with a large number of bilateral aid programmes, international technical assistance organizations, multinational and international donors and financing bodies. The purpose of these contacts is two-fold:

(a) To receive from donors and aid programmes direct inputs into the projects in the different countries. This includes mainly equipment and services of consultants.

(b) To promote follow-up investment to water resources development schemes that the project will produce.

The entities that have been contacted and have shown interest in the project are as follows:

Asian Development Bank (ADB)
Commonwealth Science Council (CSC)
CCOP-SOPAC
ESCAP-EPOC
FAO
South Pacific Commission (SPC)
South Pacific Bureau for Economic Co-operation (SPEC)
South Pacific Regional Environment Programme (SPREP)
UNESCO
UNICEF
UNIDO

University of the South Pacific (USP)
University of PNG
University of Guam
University of Hawaii
Technical Institute of Education, Lae
WHO
University of Melbourne.

The UNDP regional office in Fiji is in charge of all the regional projects in the Pacific. However, the regional water project deals also with countries that come under the UNDP office in Apia, Western Samoa (Western Samoa, Cook Islands and Tokelau) and with the UNDP office in Port Moresby, Papua New Guinea. Since the water project may be also involved at least partially with the Maldive Islands, it will also have to deal with the UNDP office in Male.

The project received strong support from these UNDP offices as well as from the Government of Fiji where it is based and from the University of the South Pacific, which provides the project with its offices at no cost. The CTA and, in future some of the experts, will voluntarily lecture at the University. The first series of lectures on hydrogeology and engineering geology will start in May.

The main difficulty of the project is the poor communication between the islands. The distances are large, the frequency of flight is low (to some islands there is only one flight a week) and flight schedules of many airlines that operate in the region are not very reliable. Cost of air travel is much higher than in many other parts of the world.

The accomplishment of the project in its first 10 months can be expressed in one word - excellent. This is due mainly to the hard work, dedication and resourcefulness of the project CTA.

The project's Administrative Assistant/Secretary who joined the project in January 1987 is also a very dedicated person and an asset to the project.

The Seminar on Water Resources in Island Countries

The Seminar on Water Resources in Island Countries will be held from 4 to 9 July 1988 on the premises of the University of the South Pacific.

This will be the fifth international meeting on the subject. The previous ones were:

October 1980, Barbados, organized by UNDTCD
1983, Suva, Fiji, organized by ESCAP

July 1984, Suva, Fiji, organized by the Commonwealth Science Council
December 1985, Bermuda, organized by UNDTCD.

Whereas the first three meetings dealt mainly with the water problems of small island countries,the last one in Bermuda already was geared towards presenting solutions. It was organized to present the successful specific case of Bermuda.

UNDTCD and other national and international organizations have been heavily engaged in water problems in small islands for the last 20 years or so. The tremendous exprerience gained through these efforts should be used by all island countries. One way to present this experience is at international meetings.

The main purpose of the Seminar is to present for the first time in an international forum the currently available range of solutions to the different water problems of island countries. The other purposes are to present several successful case histories and, to the extent possible, offer to island countries in the Pacific tested solutions to their specific problems.

Fiji country project

The Government of Fiji has officially requested inputs from the regional water project to assist the Hydrogeological Section of the Ministry of Energy and Mineral Resources to carry out hydrogeological and geophysical studies .

UNDP suggested that this assistance be included in an IPF-financed project that will operate under the guidance and supervision of the regional project.

A project proposal to this effect was prepared during the visit to Fiji for Government consideration. Once approved by the Government, the CTA will prepare the necessary project document. The project proposal is attached (Annex II).

Water Legislation

A proposal for water legislation for Fiji was prepared by a consultant under UNDP/FAO project FIJ/86/001. This project is ending, and the follow-up work on water legislation will be carried out by the regional water project.

Annex I

PERSONS MET - FIJI

Mr. Jerrold Berke	Resident Representative, UNDP, Suva
Mr. Natsuki Hiratsuka	Asst. Resident Representative
Mr. Sao Hso Hom	Asst. Resident Representative
Mrs. Phyllis Buksh	Senior Programme Officer
Mrs. Ofanaite Dewes	Senior Programme Assistant
Mr. Cruz Matos	Project Manager, CCOP/SOPAC, RAS/86/125
Mr. Abdul Rahiman	Director of Mineral Development, MRD
Mr. Alfred Simpson	Asst. Director of Mineral Development
Mr. Bhaskar Rao	Principal Geologist, Mapping/ Hydrogeology, MRD
Mr. Geoffrey Green	Director, Water and Sewerage
Mr. Bhuwan Dutt	Permanent Secretary, Lands, Energy and Mineral Resources
Mr. Devon Nelson	Consultant, FAO Watershed Management
Mr. Stephen Booth	Hydrogeologist, British Geological Survey
Mr. Ian Gale	Hydrogeologist, British Geological Survey
Prof. J. Morrison	Prof. of Chemistry, University of the South Pacific
Mr. Vijendra Prasad	Senior Geophysicist, MRD

Annex II

PROJECT PROPOSAL

Project Title: Groundwater Exploration and Assessment - Fiji

Duration: Two years

Starting Date: Second half of 1987

Purpose of the Project:

- To carry out groundwater exploration and assessment of the entire Sigatoka river valley. Results of the studies will be used by the Sigatoka Valley Integrated Rural Development Project which is to be financed by the Asian Development Bank.
- Assess ground and surface water resources in several small islands for rural water supply schemes.
- Finalization of water legislation proposal work started in 1979 and revised in 1986 by UNDP/FAO FIJ/86/001 Project.
- Strengthening the capacity of the Mapping and Hydrogeological Section of the Ministry of Energy and Mineral Resources to explore and assess groundwater resources including the use of computers for hydrogeological data banking, hydrogeological computations and modelling and modern methods of geophysical exploration and computerized interpretations.

UNDP Inputs:

Consultants (water legislation, modelling) 3 m/m		38,000
Field vehicles x 2		22,000
Computer (PC-AT) and periperals		7,000
Hydrogeological and geophysical software		8,000
Geophysical equipment		10,000
Camping equipment		8,000
Operational costs		5,000
Sundry		2,000
	TOTAL	100,000

UN Trust Fund:

Hydrogeologist	24 m/m	At no cost
Geophysicist	24 m/m	At no cost

Notes:

- The request for assistance as described above has been formally requested by the Fiji Ministry of Foreign Affairs.

- The Project will operate under the Regional Water Resources Assessment and Planning. The senior staff of the Regional Project will guide and actively participate in the proposed Fiji Ground Water Project.

- The Project may subsequently be expanded and extended to include water resources assessment in most of the small inhabited islands of Fiji, as well as planning and designing water supply schemes on these islands.

REPORT ON A MISSION TO PAPUA NEW GUINEA

by Uri Golani, Technical Adviser
Water Resources Branch, Natural Resources and Energy Division
Department of Technical Cooperation for Development
United Nations, New York

The visit to Port Moresby, Papua New Guinea (PNG) took place from Wednesday, 8 April to Sunday, 12 April 1987. The visit was carried out together with Mr. Peter Hadwen, the CTA of the Regional Water Project, INT/86/R30, Planning and Management of Water Resources in the small Pacific Islands.

The purpose of the visit was to discuss with UNDP and Government, the possible participation of PNG in the Regional Water Project and prepare a proposal for a PNG country project that will operate under the regional water project.

Although PNG is not a small island, several Government officials as well as UNDP expressed interest in the regional water project. Following earlier discussions of the CTA with several Government officials from different offices and discussions carried out during this visit (see Annex), it was found that the best that the regional water project could do is provide technical assistance to the Engineering Geology and Hydrogeology Section of the Geological Survey, Department of Minerals and Energy in PNG.

Together with the people of the Geological Survey, a proposal for a country project was prepared. The draft of the project "Hydrogeological and Geotechnical Data Processing and Analysis" is attached.

This project proposal was discussed with officials from the Foreign Aid Management Division of the Department of Finance and Planning as well as with the UNDP Resident Representative and his deputy. If the Geological Survey gives some priority to this project, the Planning Department would consider approving this project either as an IPF project of under Government Cost Sharing arrangement.

The PNG National Water Board, Department of Works is operating a training school for tradesmen and technicians in different skills including laboratory technicians and plumbers, electricians, builders, etc. The impressively well equipped and managed facilities in Port Morseby are under-utilized and the management of the school would gladly accept trainees from other Pacific countries. The Government of PNG is also supporting such co-operation.

Since there are almost no similar training facilities on the other island countries of the Pacific and since there is a great need for trained technicians and tradesmen all over

the Pacific, the Regional Water Project will arrange for sending groups and individuals from the different countries to PNG for training. This will include the identification of suitable candidates, finding funding for travel and subsistence for the trainees and carrying out the necessary organizational and administrative work. Among other organizations the project will try to get finances from the UNDP units which promote TCDC.

A semi-official request for the services of a UNV instructor in subjects related to water was sent to the project by the Water Board in August 1986. The instructor will work in the training center and one of his main tasks will be to prepare simple manuals for different jobs related to water.

Persons Met in Papua New Guinea

Jan Wahlberg	Resident Representative UNDP
Raouf Galal Eldin	Deputy Resident Representative UNDP
Steve Ilave	Programme Officer UNDP
Jon King	Principal Engineering Geologist, Geological Survey, Department of Mines and Engineering
Eric Rooke	Senior Hydrogeologist, Geological Survey
Paul Boyama	Planning Officer, Central Planning Unit
Meakoro Opa	Economist, Department of Finance and Planning
E. S. (Ted) Webber Chris Hurley	Principal Engineer, Water Board Principal Training Officer,Staff Development and Training, Department of Works, Training School
John Nokup	Instructor, Water Quality Laboratory, Staff Development and Training, Department of Works, Training School
John Swinson	Static Plant Instructor, Staff Development and Training, Department of Works, Training School

DRAFT

PROJECT PROPOSAL

GOVERNMENT OF PAPUA NEW GUINEA

Title: Hydrogeological and Geotechnical Data Processing and Analysis

Number: PNG/ / Duration: Two years

Government Implementing

Agency: : Geological Survey, Dept. of Minerals and Energy

Executing Agency : UN Dept of Technical Cooperation for Development

Estimated Starting Date: Jan. 1988.

Government Inputs .K.....(in Kind)

UNDP Inputs US $ 58,000

DRAFT

A. DEVELOPMENT OBJECTIVES

To enable the country to rationally exploit its groundwater resources for urban and rural water supply, and for mines and other industries.

B. IMMEDIATE OBJECTIVES

1. To have a country-wide hydrogeological and geotechnical data base on which to plan proper development.

2. To introduce the use of computers for data banking and for hydrogeological and geotechnical computations and modelling.

3. To have a cadre of trained professional and technical Papua New Guineans in all relevant aspects of hydrogeology and geotechnics.

C. BACKGROUND AND JUSTIFICATION

The Geological Services Division of the Geological Survey consists of four quite distinct sections: the Geophysical Observatory, the Engineering Geology and Hydrogeology Section, the Geophysics Section and the Drawing Office. As its name implies, a major function of the division is the provision of geological/geotechical expertise, advice and information to Government departments, statutory bodies and also to the private sector both within Papua New Guinea and overseas.

The Engineering Geology and Hydrogeology Section carries out geotechnical investigations for specific development projects (such as hydro schemes, transmission lines, buildings foundations, roads and bridges) and hydrogeological investigations (urban and rural water supply, pollution studies) account for the large part of the activities of this section. It has also been involved in a wide range of geotechnical studies associated with major mining operations in Papua New Guinea. An active role is played by the section in the assessment and monitoring of natural hazards within Papua New Guinea and advising Government on measures that should be taken to avoid loss of life and reduce damage caused by such events.

DRAFT

The Engineering Geology and Hydrogeology Section is currently in the process of producing a Geotechnical Data Bank for Papua New Guinea. This will locate, store and cross reference all available sources of geotechnical information in the country and will be readily accessible to other Government departments, statutory bodies and the private sector. The section also possesses a small materials testing laboratory, capable of carrying out a variety of tests on soils and rocks.

A number of serious weaknesses exist in hydrogeology. In manpower, one Senior Hydrogeologist covers the entire country, and is the only trained professional in his field employed in Papua New Guinea either in government or in the private sector. Two posts for junior hydrogeologists are established; one being filled, but presently under training, the second post being unfilled. There is an urgent need for additional trained staff, together with supporting equipment, to enable the section to meet a basic work load that is rapidly expanding.

Because of staff shortage, the section responds only to some of the most urgent requests for hydrogeological work from other Government Departments, and from other organizations always on an ad hoc basis. Very soon a back log of such urgent work will arise. This situation prevents the section from performing baseline hydrogeological studies that are of fundamental importance to planners. There is also an urgent need for the Government to be able to assess the work of consultants, some of whose advice has resulted in costly errors, eg the Madang groundwater supply system which was almost a total failure.

Much drilling of wells is now taking place; the proposed Mining Act should require that all details of drillings be provided to the Geological Survey. In practice, expected staff shortages will hamper enforcement. Moreover for the same reason, inadequate supervision of drilling has led to and will continue to result in well completion to unsatisfactory standards. This is another example of the way that Government investments might be wasted, if an increase of staff cannot be realised. Also, there are currently few legal provisions covering groundwater, a very serious deficiency that needs correction without delay.

There is a large amount of existing data that needs collating and processing if the country is to continue to develop groundwater on a rational basis. The lack of a computer prevents the creation of a properly organised data base for both hydrogeology and geotechnics.

DRAFT

In view of the above weaknesses, the Government requests the help of UNDTCD and UNDP, through the Pacific Regional Water Project. In order to enable this project to adequately operate, a small amount of equipment is required, as provided for in this document.

D. OUTPUTS

1. A hydrogeological and geotechnical data bank and archive

2. Hydrogeological reports and models for key development areas, as defined by the Government

3. Reports on draft legislation recommendations covering groundwater

4. Creation of geotechnical models particularly related to landslides hazard zoning

5. A staff of trained Papua New Guinean professionals and technicians.

E. ACTIVITIES

1. Review and sort the existing hydrogeological and geotechnical data into a suitable form preparatory to creation of a data bank, and reorganise and expand the existing archive

2. Setting up a data bank and entry of the information

3. Carry out hydrogeological studies for specific key development areas to be identified by the Government. This will include desk studies, hydrogeological field work, test pumping, analysis of data and preparation of reports.

4. Supervision of drilling and test pumping where required

5. Review of existing legal framework and preparation of recommendations for groundwater legislation .

6. Commence the preparation of geotechnical models to prepare maps covering landslide hazard zoning

7. On the job training and short courses for Papua New Guinea staff.

8. Terminal Report preparation.

F. INPUTS

1. Government Inputs

The Government through the Geological Survey will provide the project with adequate office space and facilities with some of the needed instrumentation and with land transportation as required.

DRAFT

2. UNDP/UNDTCD Inputs

The bulk of the input into this project will come from or through the UNDP/UNDTCD financed Regional Water Project, and from a UN Trust Fund. This will include the following;

- The services of the CTA-Senior Hydrogeologist of the Regional Project (2 months)
- Junior hydrogeologist/geophysicist 24 months
- Junior Computer Specialist in earth sciences 24 months

3. Additional Inputs

The additional inputs that will be financed under this project will include

- computers and peripherals	US$ 15.000
- computer software	US$ 8.000
- hydrogeological instrumentation	US$ 10.000
- Air travel and Travelling allowances	US$ 25.000
	US$ 58.000

DRAFT

REPORT ON A MISSION TO THE SOLOMON ISLANDS

by Uri Golani, Special Technical Adviser
Water Resources Branch
Natural Resources and Energy Division
Department of Technical Co-operation for Development
United nations, New York

The visit to Honiara (Island of Guadelcanal), Solomon Islands, took place from Sunday, 5 April to Wednesday, 8 April 1987. It was carried out together with Mr. P. Hadwen, the CTA of the Regional Water Project, INT/86/R30, Planning and Manajgement of Water Resources in the Small Pacific Islands.

The purpose of the visit was to review the preliminary work of the new project SOI/87/001, Integrated Water and Sewerage Assessment and Development, and to discuss with Government the implementation of the project.

During the visit, meetings and discussions were held with Government officials and project personnel (see Annex).

The project document for project SOI/87/001 was approved in the beginning of April 1987. Some preliminary activities in water resources engineering already started in December 1986 with the arrival of the first Associate Expert. Since the beginning of the year the Associate Expert has been involved in studying several urban and rural water supply systems and designing several water supply schemes. A report on the rural water supply reconstruction programme and a report on a design of a water supply system for Binu were prepared by the end of March 1987. Studies to improve the water supply to Honiara are underway.

The second Associate Expert, a hydrogeologist, joined the project in March 1987. He already made several field trips to locate drilling sites for water supply wells. He will carry out a survey of all the wells in the Honiara area as a basis for finding additional ground water resources for the city water supply system.

The senior water engineer, who represents the main input of the project, is expected to join the project by June 1987 for a period of 24 months.

There is only US$8,000 budgeted for equipment in the project. During the visit, it was realized that, because of lack of sufficient transportation for the project experts,

their effectiveness may be reduced. With the arrival of the senior water engineer, the transportation problem will become more acute.

It is strongly recommended to reduce the number of man-months for the Senior Water Engineer by 3 months and transfer the savings to equipment. This would enable the project to purchase two field vehicles for the two engineers who are working with PWD and one for the hydrogeologist who is with the Geological Service.

The Government of the Solomon Islands requested the services of a UNDTCD Interregional Adviser in water legislation. His contribution will be an important input to the project. The Adviser is expected early in the second half of 1987.

The team of the SOI/87/001 project will handle the project SOI/87/010, Water Works Replacement. This will purchase equipment and supplies to replace parts of existing water works that have been damaged by cyclone Namu in May 1986.

Persons Met in the Solomon Islands

Mr. David Kere	Permanent Secretary, Ministry of Economic Planning
Mr. Stephen Donatogea	Chief Geologist, Geological Survey Department
Mr. R. J. (Bob) Curry	Water Resources Officer, Geological Survey Department
Mr. Dirk Libbrecht	Associate Expert Hydrogeologist, Geological Survey Department
Mr. Tony Millership	Chief Engineer, Ministry of Works
Mr. John Perry	Manager, Water Unit
Mr. Tim Waldron	Leaks/Waste Specialist, Water Unit
Mr. Peter de Coene	Associate Expert Civil Engineer, Water Unit
Mr. Hak Su Kim	Adviser Economist, CTA-UNDTCD, Ministry of Economic Planning
Mr. George Scott	Chief Surveyor, Lands and Surveys Department
Mr. Tom Lolemae	Chief Health Inspector, Public Health Department
Mr. George Kiria	Chief Planning Officer, Ministry of Economic Planning

REPORT ON A MISSION TO THE KINGDOM OF TONGA

by Uri Golani, Special Technical Adviser
Water Resources Branch
Natural Resources and Energy Division
Department of Technical Co-operation for Development
United Nations, New York

The visit to Tonga took place from Wednesday, 25 March through Saturday, 28 March 1987. It was carried out together with Mr. Peter Hadwen, the CTA of project INT/86/R30, Planning and Management of Water Resources in Small Pacific Islands.

The purpose of the visit was to discuss with Government the benefits Tonga could get from the Regional Water Project. During the visit meetings and discussions were held with Government officials from several offices (see Annex). A half a day field trip to see several water supply facilities on the main island of Tongatapu was arranged on Saturday before leaving Tonga.

Mr. Filipe Koloi, Manager of the Tonga Water Board made all the arrangements for the visit. Many thanks are due to him and all other Government officials who gave their time and attention.

At present, water is used in Tonga only for urban and rural domestic supply. A new brewery which is under construction and other planned industries will require large quantities of water in the near future. Using water for supplementary irrigation is also under consideration.

The existing water supply systems for urban and many rural areas utilize ground water resources. A large number of households get their water from roof catchments and storage tanks.

On the main island on Tongatapu and on most of the other large limestone islands such as 'Eua or Vava'u there seem to be enough ground water resources to satisfy human consumption, provided the abstraction of this water is done properly.

Several reports on ground water resources on Tongatapu island demonstrate the existence of a thick fresh water lens. Estimates of the safe yield of this lens run between 5 to 14 mgd. All reports insist on a more thorough assessment of the ground water as well as on a continuing monitoring of ground water abstraction and quality. None of the reports was detailed enough to propose specific abstraction systems and safe yields. With suitable types of wells, a correct spacing

between wells, an optimal number of wells and with a proper pumping regime and ground water management, there could be enough ground water on Tongatapu, not only for human consumption but also for industries and possible irrigation. All of the above listed requirements are yet to be established. The same goes for the other larger limestone islands, but there one cannot expect to have ground water for purposes other than human consumption.

The types of assistance that the regional water project could provide to Tonga are to:

- Assess or reassess ground water resources potential on Tongatapu and all other islands where ground water may be available.

- Design ground water abstraction facilities (wells, trenches, galleries, etc.) and supervise their construction.

- Establish ground water abstraction rates, and pumping regimes.

- Set up a ground water monitoring system.

- Design urban and rural water supply systems and supervise their construction (in co-ordination and collaboration with WHO and other organizations).

- Train national professionals and technicians in all aspects of water resources monitoring, planning and development.

- Establish future water requirements of the urban, rural, industrial and agricultural sectors and prepare a water resources master plan to satisfy their requirements.

- Review the feasibility of water supply schemes based on desalination of sea water on those islands where there is no fresh ground water and where rainfall is too low for roof catchments.

Within four to five years of the start of project activities as listed above, it is estimated that several new water supply schemes would be in operation or under construction. Funding for those schemes can be expected from bilateral or international donor funding organizations which would probably embrace a comprehensive and rational approach to the water problems of Tonga, similar to what the project is planning to provide.

This programme was verbally presented to different Government officials. Many agreed that the programme makes sense, but no commitment has as yet been made.

A follow-up visit to Tonga will be carried out by the CTA upon receiving Government reaction to the CTA mission reports and proposal as well as to this report.

The following documents provide a good background to the water supply situation of Tonga.

- Assignment Report (Ground Water Study of Tongatapa) by Chester Lao (WHO consultant) 1979
- Water Resources of Tonga (country paper) by Mr. Filipe F. Koloi presented in the "Water Resources of Small Islands Workshop" in Fiji, July 1984
- Water Supply Review in Kingdom of Tonga by B. C. Waterhouse of N.Z.G.S., November 1984
- Assignment Report (Hydrological Study of Ground Water Problems Ha'Apai Island Group), 1986
- Tonga Development Plan for 1987-91.

PERSONS MET IN TONGA

Mr. M. Vaipuna	Minister of Works
Mr. Filipe Koloi	Manager, Tonga Water Board
Dr. Tilitili Puloka	Senior Medical Officer of Health
Mr. David Abbott	Senior Planning Officer
Mr. Joshua Utoikamanu	Director of Planning, Central Planning Department
Mr. Sione Taumoepeau	Director of Works
Mr. Fenton McManus	Chief Engineer, Ministry of Works
Mr. Tomasi Simiki	Director of Agriculture
Mr. Richard Stoll	WHO Sanitary Engineer
Mrs. Jane Cunliffe	Assist. Trade Commissioner, New Zealand
Mr. Jon Lindborg	Country Director, Foundation for the Peoples of the South Pacific
Mr. Denis Wolff	Rural Development Unit, Central Planning Dept.

REPORT ON A VISIT TO VANUATU

by Uri Golani, Special Technical Adviser
Water Resources Branch
Natural Resources and Energy Division
Department of Technical Co-operation for Development

The visit to Vanuatu took place from Wednesday, 2 April to Sunday, 5 April 1987. It was carried out together with Mr. P. Hadwen, the CTA of the regional water project, INT/86/R30, Planning and Management of Water Resources in the Small Pacific Islands.

The purpose of the visit was to discuss with the Government the input and the activities of the regional water project in Vanuatu. Preliminary discussions with Government were carried out several weeks earlier by the CTA. During the visit, meetings and discussions were held with Government officials, as well as with members of ESCAP and the Asian Development Bank in Port Vila (see list of people met in Annex).

The Vanuatu Government is very keen to receive as much help from the Regional Project as possible. Specifically the immediate request is for assistance to:

1) Plan, design and supervise the construction of a new water supply system for the town of Luganville (Island of Espirotu Santo).

2) Carry out hydrogeological and hydrological investigations as the basis for rural and urban water supply and possible mini-hydropower schemes all over the country.

Once a formal request for this assistance is filed, recruitment of two Associate Experts will start. To enable these two experts to carry out their work effectively they would need transportation and some instrumentation at a total cost of about US$40,000. Efforts will be made to get this equipment either from the IPF (seems to be fully committed at the present) or from some other aid programme.

PERSONS MET IN VANUATU

Mr. Stephen A. Parsons	Senior Technical Adviser, ESCAP-EPOC
Mr. Peter K. W. Digby	Adviser in Statistics, ESCAP-EPOC
Mr. W. C. Hopper	Senior Project Engineer, Asian Development Bank
Mr. Harold Qualao	Director of Public Works
Mr. David Boag	Deputy Director of Public Works
Dr. G. C. Clark	Director, Department of Geology, Mines and Rural Water Supply
Mr. C. S. Cheney	Hydrogeologist, Department of Geology, Mines and Rural Water Supply
Mr. Arthur McCutchan	Consultant, Co-ordinator, Cyclone Relief
Prof. Sandford D. Clark	Law Faculty, Melbourne University

REPORT ON A SHORT VISIT TO WESTERN SAMOA

by Uri Golani, Special Technical Adviser
Water Resources Branch
Natural Resources and Energy Division
Department of Technical Co-operation for Development

The visit to Apia, Western Samoa took place on Monday and Tuesday 23 and 24 March 1987. It was carried out together with Mr. P. Hadwen, the CTA of the Regional Water Project INT/86/R30, Planning and Management of Water Resources in the Small Pacific Islands.

The purpose of the visit was to discuss with Government inputs and activities of the regional water project in Samoa and to discuss with Government and UNDP the possibilities of having in Samoa a country water project that will operate under the regional water project. See attached list of people met during this visit.

The following four reports provide concise background inormation on the general situation of water resources in Western Samoa:

- Agency Terminal Report on the SAM/74/006 project issued in 1982.

- Mission Report on Hydrology and Water Resources Assessment and Planning by Bo Wingard 1983.

- Orientation report on water resources situation and actions required by Peter Hadwen, CTA of the Regional Water Projectr INT/86/R30, May 1986.

- Western Samoan Fifth Development Plan 1985-1987.

A UNDP financed project SAM/74/006, Hydro Data Collection, operated in Samoa from 1974 to 1981. The project carried out hydrological research on several river basins for establishing the hydropower potential of the rivers. Since then, three hydropower schemes have been constructed and they are in full operation. In addition, the project initiated exploration and development of ground water for rural water supply in collaboration with Australian aid.

A proposal to continue these activities and to expand the project to include water resources planning under a new project was not approved because of lack of funds.

The state of many rural water supply systems is poor and the water in some of the wells providing water for these systems become saline because of incorrect pumping regimes.

Rehabilitation of these systems and planning and construction of new ones is urgently needed. Competing demands on the same resources by urban water supply, hydropower and commercial interests have led to the need of a national water plan. For protection of the water resources adequate legislation backed by regulations is required.

From discussions with Government officials it appears that the project could assist Samoa in several ways as follows:

- Creating a computerized hydrological data base that will serve to extend the hydropower production. This will be the continuation of the activities of the SAM/74/006 project.

- Assisting in exploration, assessment and development of ground water for urban and rural water supply systems.

- Designing of surface and ground water supply systems for urban and rural areas.

- Assisting in preparing a national water resources development master plan.

- Supporting activities related to water legislation.

The regional project would provide two junior experts to Samoa. One hydrogeologist who will work with the Apia Observatory, Ministry of Agriculture and one civil engineer who will be attached to the Public Works Department, Ministry of Works.

To enable the two experts to carry out their work effectively they will need field vehicles, instruments and a microcomputer. Total cost of this equipment is estimated to be around US$40,000. Samoa's IPF is fully committed. However, there is a proposal for a small water project (Development of a Water Supply System at Lata Savaii) that will be financed under the UNDP Special Measures Fund (SMF). Since many of the activities of the two experts fall within the criteria for SMF project, the Acting Resident Representative, Mr. R. Battra, has proposed to revise the existing prodoc and to include in it these activities as well as the required additional inputs.

The UNDP office in Apia also covers the Cook Islands and Tokelau. During the meeting with UNDP in Suva, discussions took place on the involvement of the regional water project in these countries. IPF projects in the three countries will be controlled administratively by the UNDP office in Apia.

Annex I

PEOPLE MET IN WESTERN SAMOA

Mr. Ufu Tone	Director of Works
Mr. Graeme Port	Acting Chief Water Engineer
Ms. Fagalaina Matalavea	Programme Officer, UNDP
Mr. Ram Battra	Acting Resident Representative, UNDP
Mr. Ata Maiai	Foreign Affairs Officer
Mr. Seve Yosi	Superintendent, Apia Observatory
Mr. Steve Ladings	Project Engineer, UNCDF/OPE Water Tank Project
Mr. Fata'La Malele	Hydrologist, Apia Observatory