SOPAC Trip Report 217

December 1995

WATER AND SANITATION PROJECT
VISIT TO HONIARA, SOLOMON ISLANDS

29 October – 11 November 1995

Derrick Depledge
Hydrogeologist

This project is funded by the
United Nations Development Program

PURPOSE OF THE MISSION

The two major purposes of the mission were:

- to obtain an official request from the Solomon Islands government to seek aid from the French government through the involvement of ORSTOM staff in a proposed catchment deforestation study.

  to establish the feasibility of the project, and in particular, the availability of suitable catchments for the study.

MEMBERS OF THE MISSION

J.M. Fritsch, Director, Hydrology Research Unit, ORSTOM, Paris
J. Merle, DEPAC Director, Noumea, New Caledonia
J. Danloux, Director of the Noumea Hydrology Section, ORSTOM, New Caledonia
G. Wotling, Hydrologist proposed for the project, ORSTOM, Noumea, New Caledonia
D. Depledge, Hydrogeologist, Water and Sanitation Project, SOPAC, Suva, Fiji

EXTENSION OF THE MISSION

From the beginning of the visit a serious water shortage occurred in Honiara and the SOPAC Hydrogeologist was asked by the Solomon Islands Water Authority (SIWA), and by the Ministry of Energy, Water and Mineral Resources, (MEWMR), to assist with investigating the cause of the reduced water availability and to suggest alternative sources.

To provide this assistance the mission was extended 1 week from the 4 to 11 November.

The additional week was also spent in assisting the MEWMR Water Resources Section in planning Water Resource Assessment Projects for 1996, as requested by the Acting Director of Geology, Nicholas Biliki, on the 21st June 1995 (ref. G11w). Other water and sanitation matters were also addressed during the visit as outlined below in the report.

ACTIVITIES AND RESULTS OF THE MISSION

Solomon Islands Catchment Deforestation Study

Introduction

The Deforestation Catchment Study proposal was one of three UNESCO IHP field projects proposed at the Workshop on "Pacific Water Sector Planning, Research and Training" held in Honiara in June 1994. It should be noted that the original discussions on the need for a study of a deforested catchment emphasised the needs for research into socio-cultural values and into the effects of extreme climatic events.

It should also be noted that the Solomon Islands is relying more heavily over the last few years on logging for its export revenue, and fears for uncontrolled deforestation are being raised. Such issues as the protection of forest productivity and minimisation of environmental impacts are also being discussed.

A number of versions of the project proposal have been produced, the latest prepared under contract to UNESCO by the National Institute of Water and Atmospheric Research Ltd., (NIWA) of Wellington, New Zealand. This version proposes a series of studies in the Aola catchment on the island of Guadalcanal in the Solomon Islands. The project is written to cover five years at a total cost of $267,580 USD.

In the second half of 1995, the Centre ORSTOM de Noumea have shown an interest in participating in the studies. They have proposed a three-year study to be supervised by G. Wotling as a Ph.D project at a cost of 1,770,000 Francs. A request is being made to the French Co-operation Fund for the Pacific to initiate the study.

Dr. M. Bonell of the International Hydrological Programme, Division of Water Sciences in Paris visited the Solomons in September 1995. His mission report indicated a possible change in site from the Aola catchment to paired catchments in the Mberande catchment.

This part of the trip report outlines the results of a mission by ORSTOM staff to Honiara to consider the feasibility and acceptance of the study.

Meeting with staff from the Ministry of Energy, Water and Mineral Resources, (MEWMR)

The mission attended a meeting with the following members of the MEWMR:

D. Tolia, Director of Geology
C. Bepapa, Principal Water Resources Officer
K. Bulehite, Senior Hydrologist

The meeting discussed a number of issues relating to the proposed project. The delegation from ORSTOM introduced themselves and outlined their part in the initiation of the project.

J.M. Fritsch said that ORSTOM could assist with this research project if the French government provide some funding. This would need a request from the government of the Solomon Islands for their assistance. G. Wotling introduced himself as the possible hydrologist in charge of the project if it were to go ahead. He indicated a keen interest in forest hydrology.

J. Merle said the project needed to proceed step by step. The first tasks were to establish the interest of the Solomon Islands government in the project and to establish the feasibility of locating suitable sites for the research. Donn Tolia stated that the original project was endorsed and selected for the Solomon Islands in June, 1994 at the Honiara Workshop. He said his government viewed the project as important for the country and his Minister had spoken in favour of it. There was a need to involve a number of Departments in the establishment of the project including Forestry, Environment and Conservation and Education, who dealt with projects in which UNESCO was involved.

J. Merle explained the need for an official request from the Solomon Islands government to obtain some aid from the French Co-operation fund for the project. D. Tolia agreed to send an official request through Foreign Affairs Department to the French Embassy in PNG, who deal with Solomon Islands activities, with a copy to the Embassy in Suva.

The ORSTOM participants emphasised the need to select accessible sites for the project because of the need to install heavy equipment and the need for frequent visits for such activities as sampling. It was agreed that G. Wotling and D. Depledge would spend some time during the week examining the feasibility of locating suitable project sites.

Three years of funding are required for the project with initial seed money necessary for the design and location of the project. J. Merle emphasised that some organisation, perhaps UNESCO or SOPAC, should coordinate a project which seems to be attracting international attention.

J.M. Fritsch reminded the meeting that at the recent SOPAC Annual Session it was agreed that SOPAC would approach the French government explaining its support for the project.

Donn Tolia suggested there was a need for a scientific meeting of all interested parties if funding became available.

There was some discussion on the feasibility of the project. Donn Tolia said that logging had been taking place on Guadalcanal for 20 years and now only sites distant from Honiara and generally in the upper catchments were available. The two catchments in the upper reaches of the Mberande catchment were difficult to access but were possible sites because of landowner and logging contractor cooperation.

J. Danloux suggested looking at other islands and small catchments of about 1 km^2. He also suggested logging could be arranged privately when required.

It should be noted that M. Duncan of NIWA recommends larger catchments (<3-4 km^2), because small catchments may dry up during the dry season, and that larger catchments are likely to be more representative.

D. Tolia and D. Depledge spoke about the intended output and aim of the study. Mr Tolia said that his government needed data on the impact of logging, and that an important component would be the training of his staff. Mr Depledge emphasised the need for some concrete findings from the project to aid the Solomon Islands in developing suitable guidelines for logging of the rain forests. He emphasised the need for broader studies than just hydrological impacts, including the effect on water quality, soil erosion and stability, social disruption and downstream effects, including impact on marine reef life. The ORSTOM participants were in general agreement with all these aims of the study, especially the training and broadening of the study to include other scientific disciplines.

Visit to Logging Sites, near Ndoma, East Guadalcanal

The mission visited two logging operations in catchments to the east of Honiara. The first was a selective logging operation run by a local company, Success. They were trialling the use of a Russian helicopter, operated by a New Zealand firm, Mahoe, who use the technique of removing selected felled logs to logging roadways. They are operating in New Zealand and currently in the island of Malaita.

The second logging operation seen was not yet in operation with only the access roadway under construction. This was being undertaken by contractors from New Caledonia. One small steep catchment was crossed which appeared to be of an ideal size for the project.

J.M. Fritsch, J. Merle and J. Danloux returned to Noumea on the 31 October.

Meeting with the Timber Control Unit, Ministry of Forests, Environment and Conservation

Discussions were held with the Manager of the Commercial Unit, Seamus Mulholland. The unit obtains logging programmes including maps from all logging companies, but only for the following year. He could not provide the information without the agreement of the individual logging companies.

Approximately 25 companies are presently working in the Solomon Islands, and the major problem for them was that the unit only had 14 timber control officers to monitor their operations. He provided the mission with a copy of the standard logging agreement and the draft code of practice for logging for the country. These are now available in the SOPAC library.

Mr Mulholland indicated that he thought the major impacts from deforestation were in the Western Province, and in particular, in New Georgia.

He also said he would be interested in knowing the differences between catchments logged according to the guidelines i.e. conventional logging as opposed to "freestyle" logging or reduced impact logging (RIL).

Demonstration of the GIS system, SOLFRIS

The mission was shown by Tia Miasolo of the Environment section, the capabilities of the Forestry Resources GIS system operating in the Ministry. Although the system is not completely up to date the mission was provided with two maps of potential and already logged areas on the Guadalcanal Plains and on New Georgia, Figures 1 and 2. From these it can be seen that much of the available forest has been logged on the Guadalcanal Plains but that on New Georgia there are still considerable undisturbed areas.

Visit to the Mberande Watershed

The mission visited the two small catchments chosen in the Mberande, the Mbula Kiki and the Mbula Kama. They were viewed from a track along the ridge on the opposite side of Mberande River. Access would be difficult to these two catchments, each 3-4 km^2 in size. The only advantages of these sites would be that direct negotiations with landowners and logging company, (Pacific Timber), have already been started by the Director of Geology.

Meeting with the Solomon Islands Development Trust, (SIDT)

G. Wotling met the Director of SIDT, Abraham Baenisia. Mr Baenisia explained that the SIDT theatre group were willing to collaborate with the project in providing community awareness about the project and its aims. Their input would be of great assistance in getting the cooperation of the landowners in any area chosen for the project. Mr Baenisia said that his team could operate in New Georgia as well as in Guadalcanal. They would send a revised budget for the theatre group to visit New Georgia.

The meshing of socio-cultural aspects with forest hydrology is a unique part of this project and should receive particular attention.

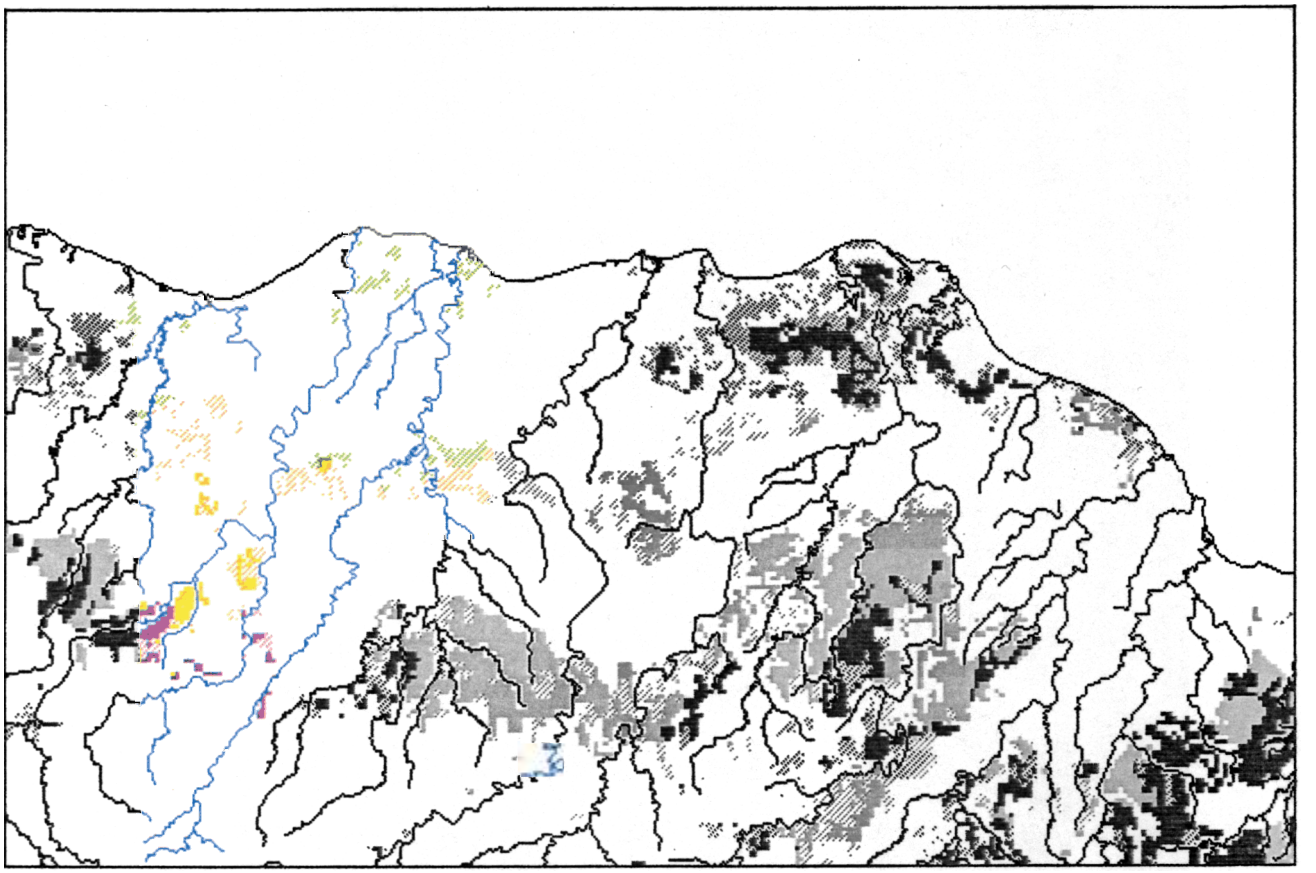


Figure 1. Guadalcanal Plains Forest Inventory.

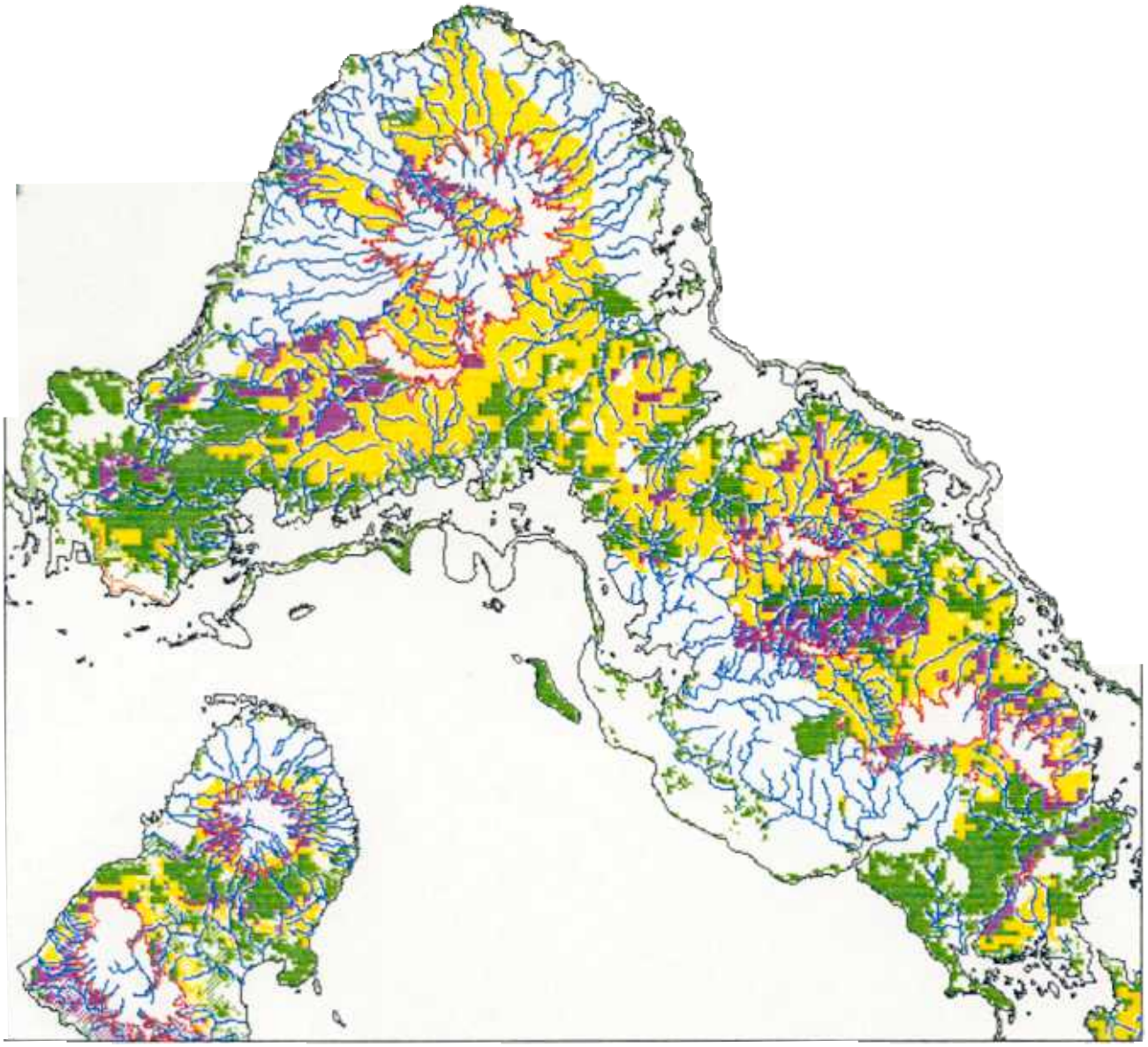


Figure 2. New Georgia Forest Inventory.

Conclusions and Recommendations

The mission concluded that the Solomon Islands government was in full support of the project and would convey that message to the French Embassy. The Director of Geology agreed to arrange for that letter to be despatched as soon as possible.

The mission also concluded that there were suitable small catchments, (<1 km^2), which could be used for the project in the country. The preferred location would be in New Georgia, where the impact of logging would be most obvious and where undisturbed areas existed which were identified as suitable for deforestation.

It is recommended that funding be sought for an immediate start to the project consisting of identification of two catchments suitable for the deforestation project, and negotiations with landowners and logging companies on access for the project.

It is recommended that SOPAC inform the French Embassy of their support for the project.

It is recommended that UNESCO convene a meeting of all interested parties as soon as possible after funding has been obtained to discuss the many technical aspects of the project.

Honiara Water Supply

Introduction

On Wednesday, the 25 October 1995 there was heavy rainfall in Honiara. On Friday, 27 October the White River Spring, which supplies about 50% of the water for Honiara was observed to have a greatly diminished discharge. This resulted in a reduced input to the storage capacity for the town and subsequent reduction in water supply to many consumers. The Solomon Islands Water Authority, (SIWA), dealt with the crisis by rationing water supply to two periods a day in the mornings and evenings. The situation is outlined in the first two pages of the Solomon Star, # 847, for Wednesday, 1 November, which is attached as Appendix 1. Water shortages affected most areas including the larger hotels. Appendix 2 indicates the level of problem encountered.

The Ministry of Energy, Water and Mineral Resources, (MEWMR), were requested by SIWA General Manager, Donald Makini, to assist in the investigations into the reduction in supply to the White River intake. The SOPAC hydrogeologist was asked to assist the Water Resources section in this project.

The course of action and findings as of 13 November are reported below.

White River Source

The White River catchment, situated East of Honiara, covers some 13.4 km^2. 60% of the catchment, mainly in the upper part, is covered by the Mbonehe Limestone formation. This is a late Miocene poorly bedded, recrystallised limestone with well-developed karst formation, including caves, sinkholes and interrupted stream flows on the surface.

The White River Spring emerges from a small cave at about 100 m above mean sea level, perhaps in the overlying Honiara Beds, and about 4 km from the river mouth.

Total flow rates from the spring have been measured as follows:

1 July 1987	273 l/s
17 July 1987	216 l/s
5 August 1987	163 l/s
24 February 1994	348 l/s - using a salt dilution gauging technique which may over estimate by 10%.

There is no clear indication of the amount of water taken from this source but the previous estimates suggest a total of 85 l/s from the two pumps and the gravity feed system.

On the morning of Friday, 27 October the pumps were unable to operate because there was insufficient water at the spring source. Since that time only one pump has been used, pumping for 30 minutes before being shut down for 30 minutes to allow recovery of the supply.

White River Investigations

The Minister and senior government officials held negotiations with the White River landowners on 29 October to allow access to the spring and cave system. This enabled investigations to start on Monday, 30 October.

Flow from the spring was measured by MEWMR staff using the rectangular weirs at the site on Tuesday 31 October at 95 l/s. About 13 l/s of this flows through a gravity feed pipeline into the water supply system.

Accessing the cave system from an entrance about 500 m from the spring, members of the Water Resources section of MEWMR were able to measure flow of an underground stream feeding the spring at 84 l/s.

Although it was considered that there may have been some blockage at the spring outlet these measurements indicated that water was able to emerge from the cave unhindered. Examinations of the cave and spring system by divers on 31 October confirmed that, although sand and other debris had accumulated within the cave system, and that rockfalls had restricted the outlet, there was no major restriction to flow.

The next phase of the investigations involved looking "upstream" of the section of cave already investigated. This consisted of a team of divers following the underground water course as far as possible, and Water Resources staff looking at the surface water sources for inflow into the ground water system.

The underground team managed to track the water course back to approximately 750 m from the cave entrance. They were unable to proceed beyond this point because of the limit of their ropes and because the water emerged from a large pool with a muddy base and no obvious inlet. No increase in the flow was evident at that point.

On the surface local people guided the Water Resources team to a location where a surface river flowed into a large sinkhole/waterfall. The flow was measured 60 m upstream of this sinkhole at 284 l/s. It is unclear what the exact location of this stream is, being described both as the Kohove stream and the Kogulai Inlet. The one and a half hour bush walk did not allow any clear indication of the location. An estimate of the distance from the spring source is 2 kilometres.

If these two surface and underground streams are connected it is clear that some 200 l/s, which previously flowed to the White River spring is being diverted to another course.

Other Investigations

It was hoped that the new course for the large volume of water that has been diverted from the White river spring would emerge at some other location. The only report of increased flows was from the Kakabona spring to the east of White River. This source was visited on 8 November but only a small flow of 5-10 l/s was seen and increases were attributed to the heavy rainfall of the 25 October.

Rainfall was investigated with the assistance of the Solomon Islands Meteorological Service.

Rainfall is recorded at 11 am each day and the value recorded for Wednesday, 25 October was 2 mm and for Thursday, 26 October 165.4 mm. The Met Service reported that rainfall intensities were the highest recorded in Honiara for October since intensity measurements started in 1978. The 24 hour rainfall was 130.5 mm and 30 minutes rainfall 25 mm.

The monthly records for Honiara were also looked at because the region has experienced lower than average rainfall over the last few years, which is related to the existence of a prolonged El Nino event. A prolonged drought event also occurred in 1987 when a low value of 163 l/s for the spring discharge was recorded. The monthly and yearly values since 1990 and the average values are given in Table 1.

Although there has been a series of lower than average rainfall years it is unlikely that this is the cause of the major reduction in flow from the White River spring source. The discharge was reported as normal just before the problem occurred and the heavy rainfall of the 25th October should have increased the supply to the source rather than reduce it. The Rove Creek and Kombito Spring, which both contribute to Honiara's water supply are both reported to be diminishing in flow and may be the result of the preceding low rainfall years. It should also be noted that the population of Honiara has increased greatly over the last few years, possibly to over 40,000 and demand will have increased accordingly.

Alternative Supplies

Honiara relies to a large extent on its spring sources to supply the town. In 1989 Hallet wrote a report on the water supply estimating that only 12% of the supply came from wells. This may have changed a little over the last 6 years but it is clear that more may have to be extracted from the ground in the future. At present 2 wells are pumped from the Tuvaruhu site on the Mataniko River and two from the Panatina borehole site.

Two production wells are included in the programme for the Honiara Infrastructure Project funded by the EC. These are being drilled at Kombito and are planned to be capable of inputting 45 l/s each into the water supply system. One of the wells is nearing completion but has not been fully pump tested to determine its specific capacity. Also no testing of the water quality has been carried out. In addition no power supply is available at the site.

A meeting of the project committee, specifically called to look at the possibility of fast-tracking the first borehole, was called on 8 November. This was chaired by the Permanent Secretary of Lands, Mr Donald Kudu. At this meeting the interested parties agreed to complete the well, including installing casing and screen and pump installation,

MONTHLY RAINFALL 1990 -PRESENT - HONIARA, SOLOMON ISLANDS													
			in mm										
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1990	231	71	333	160	168	53	112	48	123	42	74	274	1688
1991	274	275	235	151	189	140	144	154	139	75	35	16	1828
1992	91	423	109	117	61	46	68	35	24	131	100	155	1361
1993	62	233	131	188	60	112	98	96	33	41	43	168	1264
1994	258	364	344	140	174	201	73	97	19	55	18	98	1841
1995	78	98	344	152	151	40	41	71	129	260			
AVERAGES FOR LONG TERM PERIOD NOV 1954 TO PRESENT													
Average	248	280	305	192	132	80	91	95	96	129	141	213	1926
Lowest	32	71	66	24	24	0	15	7	12	9	18	16	
Highest	956	561	636	641	473	339	306	271	211	377	453	579	
				TABLE 1									

able

[PR21 Depledge]

connect the outlet to the supply line to the East Kolaa Ridge tank and provide a generator on site to provide the motive power.

The well has been pump tested at 4.5 l/s with a drawdown of about 8 metres. The well is drilled to 60 metres at present and is artesian, i.e. water is flowing freely from the top of the well casing. There is an existing borehole drilled to 30 metres also in Kombito which has been drilled previously, pump tested, and is high yielding. This has not been used in the past as it is expected to have poor water quality because of the surrounding housing development. The new well is thought to be capable of supplying the 45 l/s required although there has been insufficient testing.

If the aquifer, intercepted at 55 metres from the surface, from which the water is flowing, is of high capacity as suspected, a screen length of 6 metres would be sufficient to allow the required inflow to the well when pumped. It would be wiser, however, to increase the screen to 12 metres to allow for blockages of the screen and to allow more of the aquifer to be exposed, thus increasing the inflow possibility.

The SOPAC hydrogeologist provided the Water Resources Section with the following calculations and well design, assuming that the aquifer could provide the required discharge.

Screen Transmitting Capacity

The screen purchased for the Kombito boreholes is Johnson's stainless steel continuously wound with 4 mm slots. Open area is stated to be 57.1% and sections have a nominal length of 5950 mm and an outside diameter of 239 mm. At the maximum velocity of 3 cm/sec, at which friction losses will be negligible and rates of screen incrustation and corrosion at a minimum, one length of screen can transmit:

$Q = VA$

where velocity $= .03$ m/s

Area $= 5.950 \times .239 \times .571 = 2.55\ m^2$

$Q = .0765$ m3/s $= 76.5$ l/s

At the proposed extraction rate of 600 gpm (45 l/s) the screen entrance velocity V would equal Q/A, or 0.045/2.55 m/s. This velocity of 0.0176 m/s is well below the maximum allowable of 0.03 m/s.

Well construction should be carried out using 2 lengths of screen placed from 55 m to 67 m below ground level.

Completion of the well ran into problems on 9 November when the casing being installed broke at 34 m depth leaving 8 m of casing within the well. The top section of casing was removed but he drilling team was unable to retrieve the lower 8 metres of casing and the hole was abandoned.

It has been decided to drill a second well alongside this well. It will be necessary to seal the abandoned hole to avoid water loss and to eliminate the chance of contamination from surface sources.

Until this is completed an existing shallower well, (30 m), at Kombito can be used, although this is likely to be contaminated from the surrounding housing development. The water from

this source should be tested regularly, at least weekly, and if possible, some form of chlorination introduced. The initial introduction of this water source into the supply system was accompanied by a recommendation from SIWA via radio broadcasts to the affected areas to boil all water intended for consumption.

There is a third borehole at Tuvaruhu, which could also be used if a borehole pump and booster pump can be purchased. This well could provide about 30 l/s. A drilling rig has been moved to the White River area to attempt to find water adjacent to the pumping station. If this is successful it will be possible to pump directly into the water supply line to the Tasahe Tank. As of 13 November no drilling had been carried out because of the unavailability of diesel.

Conclusions and Recommendations

The reduction in the outflow from the White River source is likely to be the result of a natural phenomenon in limestone country, the redirection of flow within the ground after a major rainfall event. This new route for the water is likely to be in a vertically downward direction. This, in effect, means that some of the water which previously discharged at the White River source is now contributing to the ground water storage in the area. The White River source will probably never contribute the same quantity to the water supply system for Honiara. Had the water been diverted horizontally it would have emerged at another location and would have been noticed. Further investigations could include tracer tests to determine the path of the water, using such tracers as sodium chloride or fluorescent dye such as Rhodamine WT. This will largely be of academic interest and is not likely to lead to recovery of the source at White River.

The current water shortage in Honiara can best be relieved by developing ground water resources in the Kombito and Tuvaruhu area and possibly in the White River area. In general there is large capability within the Mbonehe limestone to store water. The formation is at least 100 metres thick and dips generally to the N or NNE, i.e. towards the coast. The catchment area for the ground water system is likely to be large and the lower portions of the formation covered are partly confined. This is shown by the number of wells with artesian flow within the Honiara area.

New sources should be tested for water quality before being used and if necessary disinfected by chlorination.

Energy Division, MEWMR - Hydro Power and Solar Pumps

The opportunity to visit the Energy Division was taken during the extended mission.

Discussions were held with the Project Co-ordinator of the German-Solomons Project: Improvement of Rural Electricity Supplies in the Solomon Islands, Peter Eichenberger. They are in the process of constructing a 150 kW micro hydropower scheme on the Jejevo river, Buala, on the island of Isabel. Peak loading is currently 27 kW so there will be scope for small development in the area in future.

The Buala scheme has a small headrace with 420 m^3 storage which will supply power for 2-3 hours each evening during periods of low flow, to avoid reverting to diesel generation. Penstock length is 150 metres with one small stream crossing. The scheme is funded 50%

by the German consortium, GTZ, and 50% by the Solomon Islands Electricity Authority, (SIEA), subsidising outer areas from the profits from the Honiara and Auki townships.

They are also looking at other hydropower schemes in Kirakira, Makira, Auki, Malaita, Kukundu, Western Province, and an extension to the 30 kW station at Malu'u in Malaita.

The Energy Division are collecting their own hydrological information using simple V-notch weirs, utilising a steel plate, sand bags and daily readings taken by SIEA staff. Gaugings are done by a small current meter or salt dilution techniques. These hydrological investigations replace the more expensive dataloggers previously installed by the Water Resources Section.

It was stressed to the Ministry that all hydrological information should be archived by the Water Resources in the usual TIDEDA format.

The Energy Section is also showing some interest in the use of solar power for water pumping. A recommendation has been made for the Tangarare School in East Guadalcanal, with a possible population of 300 - 500 people, to install a solar pumping water system. There would be 24 solar modules pumping to 10 water tanks of 1000 gallon capacity 4 to 8 metres above ground level. The SOPAC hydrogeologist agreed to send solar pump details and costs to William Garaema, the Senior Energy Officer, (Power), to assist with design and cost estimation of this and other schemes.

Rural Water Supply and Sanitation

A visit was made to the Rural Water Supply and Sanitation Section (RWSS), of the Ministry of Health and Medical Services, (MHMS). Robinson Fugui, the Head of the RWSS, expressed some concern at the present water shortage in Honiara. The lack of water and probable reduced hygiene together with the possibility of backflow into the distribution system could lead to a significant health problem. He advised me that there had been a major outbreak of diarrhoea recently in the town.

Ken Marshall, the WHO Engineer with RWSS, advised me that the first instalment of the AusAID funding for the Rural Water Supply and Sanitation section would start next year after the appointed project coordinator, from Coffey and Partners, Brisbane, arrived in Honiara, in February.

The first stage of the project, as stated earlier in the year, would involve training. A project identification document (PID) will be produced initially. RWSS still require assistance from SOPAC, both financial and technical, particularly with setting up training workshops.

The training centre will be built on the grounds of the Ministry of Health and Medical Services (MHMS). They will also be using Solomon Islands College of Higher Education, (SICHE), for advanced courses, (see Trip Report 188 by Ed Burke).

With regard to water supply, RWSS prefer to install gravity systems rather than more expensive options. They use the RWSS made Solomons Mark III direct action pumps for shallow ground water on the Guadalcanal Plains but are looking for a more robust pump such as the Nira AF85, for more remote locations, particularly on other islands. These require little maintenance.

With regard to sanitation RWSS install only VIP and Pour Flush systems. Ken Marshall showed me a report RWSS-had produced evaluating health education materials they would like to produce for the Solomon Islands. The methods proposed are similar to those suggested by FSP in Kiribati. UNICEF will be helping RWSS in producing these health education materials. RWSS had originally requested some assistance from WHO, in Suva, to run a course in Mapinfo, to be used in setting up a database of water supply and sanitation installations. WHO subsequently approached SOPAC to provide the training but completion of the necessary forms and delays in getting the information to the correct WHO office resulted in the cancellation of this project and the use of the funds on an alternative project.

Water Resources Section, MEWMR, Hydrogeological Projects

With the encouragement of David Scott, from the Canterbury Regional Council, New Zealand, during his annual 'Continuing Links' visits to the Solomons, the Water Resources Section, (WRS), have outlined three major hydrogeological and water supply projects.

Honiara Water Supply and Groundwater Project
2. Guadalcanal Plains Groundwater Project
3. Provincial Centres Water Supply Assessment Project

The SOPAC hydrogeologist had a meeting with Charlie Bepapa, Principal Water Resources Officer, Isaac Lekelalu, Senior Hydrogeologist, and Kenneth Bulehite, Senior Hydrologist, regarding these three projects. He suggested some initial work needed for each of the projects and agreed to provide written programmes and comments for each of them.

The general outline of work for each, conveyed verbally to the WRS is given below.

Honiara Water Supply Assessment

Project Title Groundwater and Surface Water Source Potential of the Ngoti/Kombito/Mt. Austen Area

The following activities should be carried out:-

collection and estimation of past, present and future population figures for Honiara. Produce a graph using Excel.

- collection and estimation of past, present and future water usage figures, (SIWA). Produce a graph using Excel.

produce an updated geological map of the Honiara area, using existing maps, borehole information and any local mapping, (see David Michael, Geology Section). The location and thicknesses of the Mbonehe Limestone, and any other likely aquifers should be noted.

A water quality study should be initiated for all existing and possible future resources.

This should include:

- bacterial analysis particularly thermotolerant coliform, *E.coli*
- total and free chlorine in the existing supply
- a full analysis including major ions for all sources, (see Henry Mahoe, Chemistry Laboratory)

- produce a map of the present sources and distribution system, including size and location of pipelines and tanks, (SIWA). For each source the available discharges should be recorded, where possible perhaps requiring some measurement of flows. for ground water sources record all data on aquifer and well properties where available i.e. well construction, bore logs, pumping tests,
- for all spring sources record all historic data on flow
- collect all rainfall and pan evaporation figures for stations in the Honiara area, particularly Honiara and Henderson. Plot data using Excel.
  collect all flow data for the Lungga and Mataniko Rivers. Carry out further gaugings where required.
  do simultaneous gaugings on all springs and streams in the Honiara area.

Guadalcanal Plains Groundwater

Project Title: Guadalcanal Plains Groundwater Availability Guide

The following activities should be carried out:

production of a base map for the Guadalcanal Plains. This could be done by Autu Gilbert, if he attends the Earth Science Certificate Course in SOPAC in 1996. He could use the opportunity to learn Mapinfo and produce a map for recording borehole locations, borehole data, river level and rainfall stations, resistivity survey locations, hydrogeology, topography, etc.

collect all rainfall data for the Guadalcanal Plains. More stations may need to be established in areas with no data. The eventual aim should be to produce an isohyetal map. Daily read rain gauges, preferably at 11 am to conform with S.I. Meteorological Service practice, would be sufficient, using local readers. Schools would be ideal locations.

collect all data on rivers within the Plains. Identify the extent of tidal influence on all rivers. Carry out low-flow gaugings on all rivers.

- collect and record all information on the Guadalcanal Plains including:
  - reports, e.g. flooding and landslide hazards
  - land-use, e.g. areas of palm oil plantation, forestry, etc.
  - water quality data, where available
  - village and school locations

Provincial Centres Water Supply Assessment Project

The following activities should be carried out:

For each of the nine specified locations collect and record all existing data on water resources, geology, population, base maps.

Establish from SIWA an order of priority for the provincial centres.

Systematically visit each centre, evaluate, investigate and report on the most suitable resource for any location. By way of an example, if we consider the provincial centre of Lata in the Eastern Province there appear to be at least three possible solutions.

At present there are perhaps 350 people living in the provincial centre of Lata. The present supply comes from a spring source approximately 7km from Lata. This supplies villages along the way with around 1600 people. The major problems is the cost of diesel to pump the water. At present pumps operate from 5 pm to 9 am.

One obvious source of water would be rainwater. Lata has a mean annual rainfall of 4274 mm and a potential evapotranspiration of 1655 mm. Therefore there is a mean surplus annually of over 2500 mm. Roofs from government buildings could be utilised to contribute rainwater to a central rainwater cistern which could be designed to cover most drought periods.

Secondly there appears to be a shallow but thin ground water lens in Lata. This could be exploited by the use of infiltration galleries and low volume pumping to 'skim' the freshwater lens.

Thirdly, considerable savings could be made by building a storage tank on the high ground adjacent to the spring, and letting the water be distributed by gravity over the 7 km distribution line. A solar pumping system would also reduce the on-going diesel costs in the Province.

Drilling Section

The drilling section has recently lost its foreman, Mr Dick Daoleni, who resigned. He is hoping to set up a private drilling company to be able to meet the increasing demand for wells, particularly in the provinces.

The long delays in obtaining the drilling sections services was noted by the RWSS of MHMS. They have been waiting some time for a 15-metre well to be drilled at the Kalufi Hospital, Auki, Malaita. SIWA also commented on the slow drilling rate of the section.

Drilling charges in Solomon Islands dollars set for 1995 are as follows:

WATER WELL DRILLING

Percussion Rig	
Commercial	210/metre
Non-commercial	170/metre
Rotary Rig	
Commercial	220/metre
Non-commercial	175/metre
Well Development	
Air compressor	150/hour
Test pumping	50/hour

SITE INVESTIGATION/BLASTHOLE/DEMOLITION DRILLING

Site Investigating	
Commercial	300/metre
Non-commercial	150/metre
Demolition/Blast Holes	
Commercial	250/metre
Non-commercial	125/metre
Survey Fees	
Commercial	200
Non-commercial	150

It is hoped to arrange a drilling workshop in Honiara in 1996 in conjunction with the Australian Drilling Industry Training Committee, (ADITC).

Annual visits from a drilling adviser Dale Preston, through the New Zealand 'Continuing Links' programme will continue in 1996.

New Reports for the SOPAC Library

MEWMR provided the following reports for the SOPAC Library:

Gilbert A. 1995 - Guadalcanal Plain Preliminary Borehole Survey
McGrail B. 1994 - Publications List 1994 - updated now to 1995
Institute of Hydrology 1993 - An Investigation into the Relationship between Altitude and Rainfall on Guadalcanal, The Solomon Islands

Engineering Geology Report

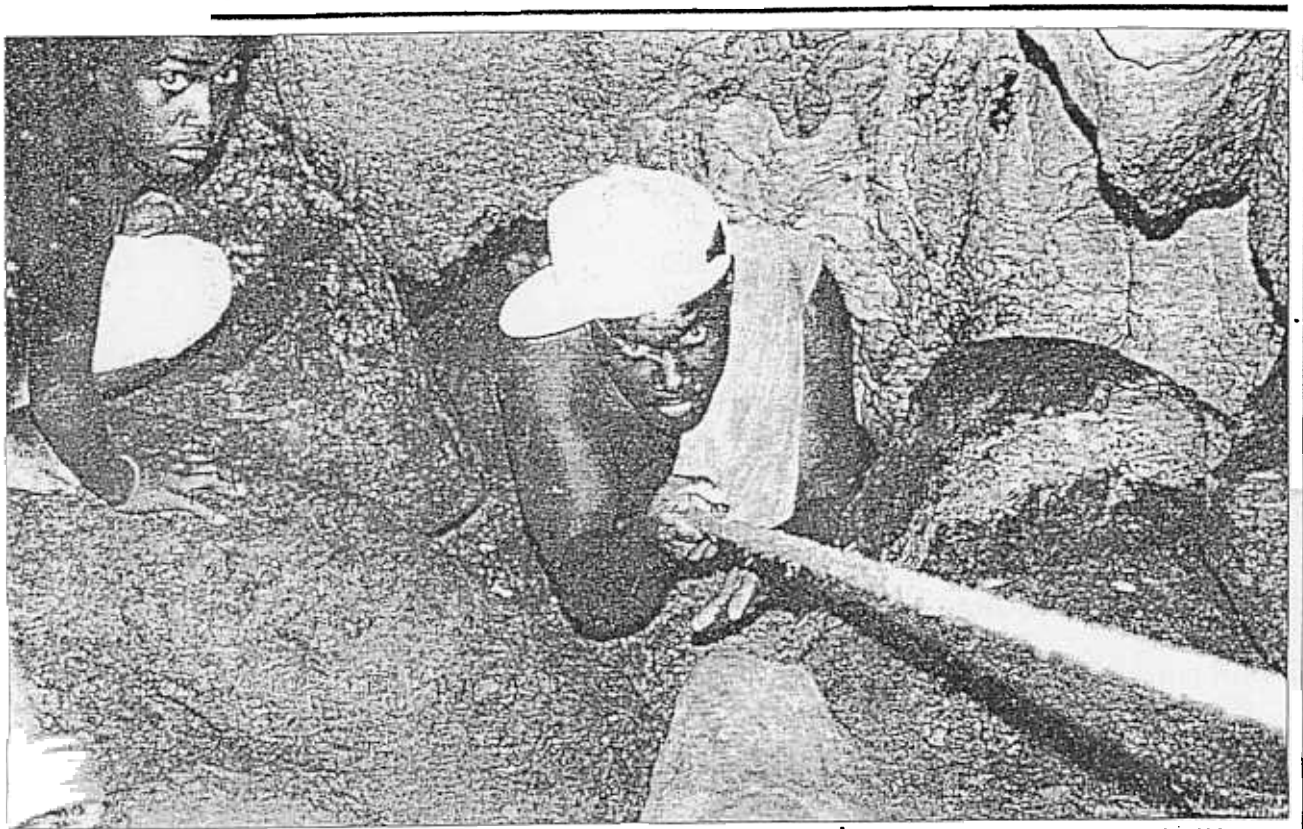
Comments and corrections were made to a report, 'A Preliminary Geotechnical Survey on Slope Instability, Malakerava 1, Gizo, Western Province by C. Qopota and M.G. Petterson, Tech. Report TR8/95.

New Zealand High Commission

A meeting was held with Jennifer MacMillan, the Deputy High Commissioner. The DHC showed some interest in the progress of the water shortage investigations. She also confirmed the on-going commitment to the Water Resources Division through the 'Continuing Links' programme, administered by the National Institute of Water and Atmospheric Research Ltd, (NIWA).

Solomon Star
No. 847 Wednesday 1 November, 1995 $1.50

INSIDE



General Manager of the Solomon Islands Water Authority, Donald Makini, arrives back on the top at the entrance of the 500 metre long cave, after spending more than two hours on Monday below, witnessing and assessing the cause of the low water level currently experienced at White River dam, which left many town residents without water.

Water tragedy

By Ofani Eremae

Solomon Islands Water Authority (SIWA) is still baffled about the natural phenomenon which inflicted the Whiter River source, leaving thousands of town residents without water since last Saturday.

By last night, water authorities are still struggling to find solutions to avert the problem.

It was still uncertain at this stage as to how soon the problem will be put back to normal. But the truth is, the cause of the tragedy appears to be so difficult to solve.

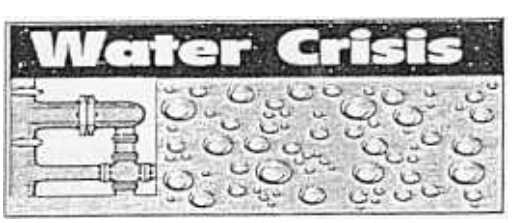
The problem started last Wednesday following the record heavy rain in Honiara. Although many homes were without water since Saturday, the cause of the low level of water at the Whiter River dam was not discovered until Monday, after differences between landowners and the government was solved.

The differences involved compensation claims from landowners, which apparently delayed SIWA from exploiting the causes of the problem over the weekend.

However, on Monday when things were sorted out, staff members of SIWA and the Geology Division, were given permission to enter a cave, about 500 metres which the White River source was drawn from.

It was discovered during the fact finding trip, that the narrow end of the cave which led to the dam was infiltrated with thick mud, which is believed to have been obstructing the flow of water to the dam.

The little amount of water which forced its way or spill through the mud and ended up in the dam, was just not enough to sustain the whole town.



At the entrance of narrow tunnel, the water is no longer flowing fast as it used to be, according to villagers who have been in the cave before.

A staff member of the Geology Division who visited the scene believed that the blockage has forced the water to spill into the structure of the cave walling and ended out somewhere.

As a result of the low water level at the dam, SIWA is using only one of its three water pumps to pump water from the source for distribution.

Usually, when the situation is normal, all three pumps are put into operation. But this can't be done at the moment because if they do so, it will drain out all the available water in the dam.

Too narrow

The end of the cave, which is believed to have been infiltrated with mud, was too narrow for human beings to walk freely through, making it really difficult to clear the mud.

People can only dive through the tunnel, provided they are equipped with diving gears, including oxygen tanks.

Since Monday, SIWA, with the assistance of the villagers have been trying all their best to solve the problem, but to no avail.

Yesterday, two scuba divers were hired to dive through the tunnel, from the entrance in the cave, where they discovered further down, a big deposit of mud lying across the tunnel.

SIWA's community education officer, Freda Unusi said because of the bank of mud, the divers couldn't go any further, but have to turn back.

She said with the understanding of the current situation, it was still unclear as to how soon the problem would be solved.

"But SIWA is doing all it can to find a solution for this," she said.

Yesterday evening, accord

Continue page 3

MP wants town to be a "disaste area"

By Duran Puia Angiki

The continuing wate shortage in town ha forced the Member o Parliament for Eas Honiara to urge the gov ernment to abolish th Solomon Islands Wate Authority and urgentl declare the whole town "disaster area."

John Maetia Kalua' made the call yesterda after claiming that many children in his constituency have died from dysentery during the past couple weeks due to drinking of contaminated water.

The water problem has recently affected many residential areas in town. but it was an on going problem to the people of East Honiara for the last couple of years and even worst this year.

According to Kalua'e, the water problem is now beyond the capability of the Solomon Islands Water (SIWA) and the government cannot watch and hope that a miracle will happen.

Many parts of the town. especially housing estates in East Honiara, have been reported to be closing the doors of their toilets while using bushes, sea-side beaches and drainage systems as disposal area, due to the water problem.

"This is really health hazard for people to live under and I appeal to the Minister of Energy, Mines and Minerals with the Minister of Works to convene a meeting with SIWA to talk about the situation."

He suggested the government should immediately seek assistance from aid donors to remedy the situation.

"People cannot contain the situation any longer and the government is duty bound to do something about it now!" Kalua'e said.

A report reaching *Solomon Star* yesterday, said the water shortage problem had caused by debris and mud which clogged the under ground water tamel that supply the White River main source.

Meanwhile, the water shortage has forced several primary schools in Honiara to temporary close.

Compensation paid

Villagers who owned the land where White River dam was, on Monday received compensation from the government for recent allegations that the water source was contaminated with human waste.

The compensation package, which included $300 and a pig worth $400, was received by village elder, Safino, from the Minister of Transport Works and Utilities, John Fisango.

The villagers earlier demanded a compensation claim of $40,000 from the Solomon Islands Water Authority (SIWA) following media reports that the source was contaminated, which had offended the landowners.

The compensation claim was made known to SIWA last Friday when it tried to locate the cause of the water shortage which is currently affecting thousands of town residents.

Landowners demanded that unless the compensation is paid, SIWA won't be allowed to enter into the cave where the water source was drawn from.

The huge compensation claim was however, lowered when Mr Fisango came in and negotiated with the landowners.

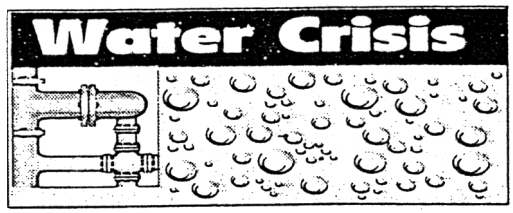
"I spent most of the weekend pursuing the landowners that the amount was too big to be paid in a compensation form.

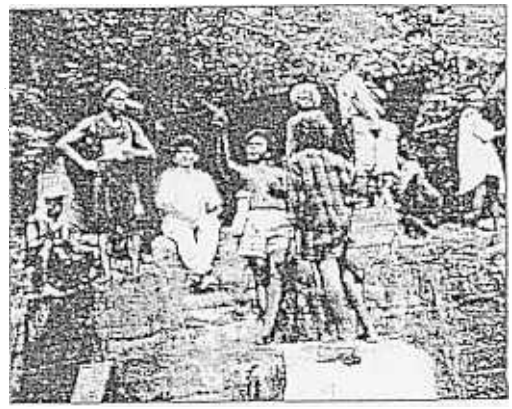
"So I propose to them that $300 and a pig should be enough to compensate for the allegation," Mr Fisango said.

The landowners finally agreed to the proposal from Mr Fisango and on Monday the Minister paid the compensation package.

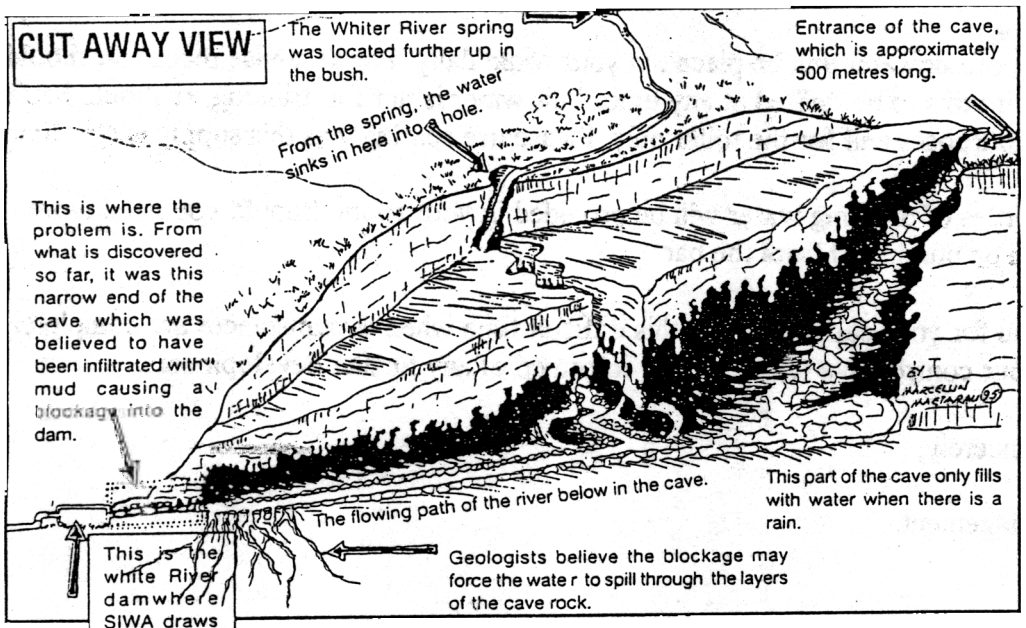
In addition, he also paid a $300 entry fee, and another $300 for villagers who are assisting SIWA to locate the problem.

It was after all these problems were sorted out that SIWA with the assistance of villagers made its first landing into the cave which is estimated to be about 500 metres long and about 15 meters below ground.





The White River dam is very low that you can't hardly see any spillage around. Here, villagers and SIWA staff gathered to find the cause.



This diagram is just a rough sketch to give our readers a more precise picture on where the problem which causes the water problem lies.

Water tragedy hits Honiara

*From front page

ing to Mrs Unusi, SIWA was trying to use a compressor to disperse the mud, which is believed to have blocked the flow of water into the dam.

Result of that attempt was not available as the paper went to print last night.

SIWA's General Manager, Donald Makini, who did not want to isolate the problem, also witnessed the natural happening in the underground cave on Monday.

He appreciates that the cause of the water shortage was not an easy one to solve.

And he has been at the scene of the water tragedy since Monday, working out possible measures to be taken in their attempts to tackle the problem.

On Monday, villagers and water authorities worked until midnight, but no solution was reached.

Crisis Point

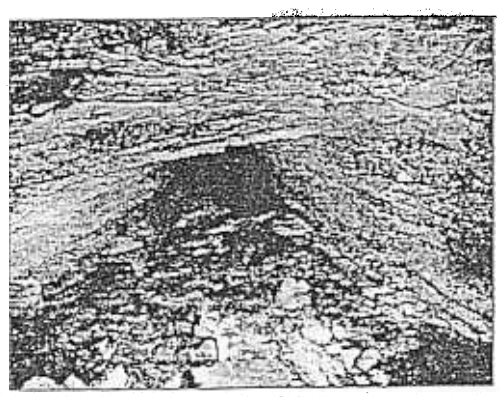
There is no other way we can describe the water shortage, but it is now reaching a crisis situation.

The most affected ones are residents of east Kola'a, Naha and Vura. Residents in these areas have been without even a drop of water since Saturday and they can no longer stand the situation.

A lot of working mothers just have to absent from their jobs in the last two days inorder to go out and find water during the day.

If the situation could not be brought back to normal this week, the severity of the problem will be worsen.

But SIWA is planning to regulate the water supply system in the next couple of days if the problem continues, by supplying certain amount on certain times with the available water source.



Interior part of the cave.

Appendix 2

3L9

HONIARA HOTEL

Telephone 21737
P.O. Box 4
Honiara
Solomon Islands
Telex: HQ66347
A/Back: Wing
Fax No.: 677-20376

Monday
30 October 1995

Dear Guest,

There is a water crisis affecting the whole of Honiara at the moment due to problems with the blockage of the main water source at White River. Until this crisis is over there will be no running water available at the Hotel.

A bucket of rainwater will be placed in your room daily. Please advise reception should you require this to be refilled at any time. This water is not for drinking. It should be for washing purposes and for the toilet only. Please use sparingly as this supply is also limited.

Small bottles of drinking water will be provided in your room. Should you need more then these can be purchased from the bar.

Thankyou for your cooperation at this difficult time when circumstances are completely beyond our control. We will keep you informed of any further developments.

Yours sincerely,

The Management