

INSTITUTE OF NATURAL RESOURCES
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POLLUTION RESEARCH, MONITORING AND TRAINING
WITHIN THE UNIVERSITY OF THE SOUTH PACIFIC
REGION AND IN PARTICULAR FIJI

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ABSTRACT

The Institute of Natural Resources, located on the Suva (Fiji) Campus of the University of the South Pacific (USP) is at present the only laboratory in the eleven countries which make up the University to have facilities for trace metal and pesticide residue analysis in environmental samples. No regular pesticide or heavy metal monitoring takes place in any government laboratories in the USP region but a number of small projects in this field are in progress at USP. These include analysis of edible shellfish for heavy metals using AAS/HGA and EPR, analysis of water and sediments for heavy metals, analysis of shellfish and vegetables for pesticide residues, analysis of fish and rice paddy water for pesticide residues and general water quality monitoring for sewage and industrial pollution. An increasingly important source of funding for these projects comes through the South Pacific Regional Environment Programme and its Research and Monitoring Network which links Pacific Island Universities and research institutions in cooperative research and monitoring projects. Closer links between IOC - WESTPAC and SPREP are desirable for the efficient coordination of marine pollution research and monitoring in the Pacific islands region.

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INTRODUCTION

The University of the South Pacific (USP) is a regional university, the member states being the Solomon Islands, Vanuatu, Fiji, Kiribati, Tuvalu, Western Samoa, Tokelau, Tonga, Nauru, Niue and the Cook Islands. The principal campus of the university is situated in Suva, Fiji and houses the School of Natural Resources, School of Education and School of Social and Economic Development. There is a smaller campus at Alafua in Western Samoa which houses the School of Agriculture. The University also has a number of research institutes and those of possible significance to pollution research include the Institute of Natural Resources (INR) and the Institute of Marine Resources in Suva, the Institute of Research, Extension and Training in Agriculture in Alafua, W. Samoa and the Institute for Rural Development in Tongatapu, Tonga. The only facilities for comprehensive pollution research and monitoring including trace, heavy metal and pesticide work, however, are at the Institute of Natural Resources and this is true even if the government laboratories are also considered.

Research and Monitoring Capabilities

A detailed review of information relevant to water pollution can be found in the publication 'Coastal and Inland Water Quality in the South Pacific - A Review of Existing Information, Monitoring Programmes, Monitoring Facilities and Legislation' prepared and written for the South Pacific Regional Environment Programme (SPREP) by J.E. Brodie and R.J. Morrison of INR. This 84 page document covers the 22 member states of SPREP and will be published by SPREP in early 1985. It gives a good coverage of laboratories and their facilities and recent and ongoing research and monitoring. It also provides a useful list of contacts for each state.

If the sections on the USP member states in this review are examined in more detail it can be seen that, outside of Fiji, only rudimentary laboratory facilities are available for pollution monitoring and in general no regular monitoring or research occurs. Limited period projects may be carried out but these are in response to an obvious critical problem e.g. the extensive water quality monitoring associated with the South Tarawa (Kiribati) lagoon pollution and subsequent Australian aid sewerage project. The level of awareness of pollution problems is also very low and since these states (except for Fiji) have very little industry the problems which have developed have mostly been related to sewage wastes. No regular water quality monitoring occurs outside of Fiji except for the most basic tests on the drinking water supplies of the larger towns. It is of interest to note that no drinking water supply in any USP state is regularly tested for compliance with WHO standards.

Within Fiji there are two main laboratories which have reasonable capabilities for pollution monitoring. These are the INR laboratory and the Fiji Government laboratory at Koronivia. The Koronivia laboratory has AAS and GLC but these have not normally been used for pollution work in recent times. The Institute laboratory is equipped with AAS/HGA with hydride and flameless mercury attachments, GLC with FID, NPD and ECD systems, U.V.-Visible spectrophotometers, turbidimeters, Kjeldahl apparatus etc. and a microbiology laboratory. The teaching School (SNR) has further facilities of AAS, GLC, powder X-ray, U.V.-Visible, I.R. etc. but these are normally committed to teaching requirements. Elsewhere the Fiji Government Department of Mineral Resources has a geochemical laboratory with AAS and this is sometimes used for groundwater analysis. The Colonial War Memorial Hospital clinical laboratory is used to do bacterial drinking water quality tests. The Vatukoula gold mine laboratory has been active in monitoring its own waste water, especially for cyanide and mercury but the results are confidential and have not been released.

Although there is no specific environmental legislation in Fiji, environmental matters are often handled by the Environment Management Committee. This is a rather informal body made up of representatives

of all government departments with a possible interest in the environment, and a representative of USP (at present J.E. Brodie). The Committee uses the existing legislation in such areas as the Health Act, Mining Act and Town & Country Planning Acts to enforce Environmental Impact Statement provisions on development projects such as new hotels, industries and land developments. Many of these developments have aquatic pollution implications and recently the first regular monitoring of a hotel sewerage scheme was enforced. The Fisheries Division of the Ministry of Primary Industries designates one of its Fisheries Officers as an Environmental Officer and this officer is active in studying the effects of development and marine pollution on coastal fisheries. Although there is no designated environmental officer in the Ministry of Works, a number of officers within the Public Works Department are active in looking at the effluents from PWD-run sewerage works and their effects on receiving waters.

Within USP a number of the lecturing staff have research interests related to pollution studies. These include:

- 1) Dr Harley Manner (Geography): Watershed studies, effects of vegetation cover (particularly pines) on soil and run-off water
- 2) Dr Randy Thaman (Geography): Pesticide usage and abuse
- 3) Dr Jenny Bryant (Geography): Environmental education
- 4) Dr Geoffrey Dougherty (Physics): Heavy metal pollution in shellfish using EPR
- 5) Dr Vili Fuavau (Chemistry): Heavy metal pollution in shellfish using AAS/HGA
- 6) Ms Milika Naqasima (Biology): Bacterial and heavy metal pollution of edible shellfish
- 7) Ms Neelam Keshni (M.Sc. Student): Pesticide residues in fish cultured in rice paddies
- 8) Mr Steven Roberts (Biology): Fresh water microbiology

The Institute (INR) has a staff of 4 chemists, one biologist and one engineer as well as technical and administrative staff. The four chemists, Dr John Morrison (Director of the Institute), Mr Jon Brodie, Mrs Regina Prasad and Miss Philomena Gangaiya are all active in the Institute's environmental work but in particular Mr Brodie coordinates this work and Miss Gangaiya has been employed to do such work with funds from the South Pacific Regional Environment Programme. In the Institute of Marine Resources Dr Uday Raj and Mr Johnson Seeto are active in coastal fisheries resource surveys particularly where development is likely to have an effect on these resources.

Recent and Ongoing Research

The establishment of the South Pacific Regional Environment Programme (one of the UNEP Regional Seas Programmes) has provided the first regular funding for pollution monitoring in the Pacific Islands region. The funds are very limited at present but provision of equipment (particularly, difficult-to-acquire capital equipment such as GLC) and staff to the participating institutions (USP, University of Guam, University of Papua New Guinea, University of Technology, PNG) has allowed a number of projects to begin. Projects under way in Fiji and the USP region are listed below:

1. Kinoya Sewerage Works (Suva) receiving waters study: This project has been in progress since 1980 with the aim of monitoring the effects of the discharge of the main Suva sewerage works into the reef-enclosed waters of Laucala Bay. It is a cooperative project funded by Australian aid and government funds and carried out by the Fiji PWD with the bulk of the analytical work done at INR. Heavy metals are not included at this stage.
2. Vitogo River Study: This is a baseline study of the Vitogo River (6) and estuary in western Viti Levu prior to the construction of a timber chip mill and in the future, possibly a pulp and paper mill as well. It is run by INR with funds from SPREP and monitoring began in July 1984. In 1985 shellfish and sediments from the estuary are to be examined for heavy metals including Cu, Zn, Cd, Pb, Cr, Hg and As.

3. Environmental Impact of the Monasavu Hydroelectric Scheme: This project funded from a number of sources in the past is now funded by the Fiji Electricity Authority and SPREP. Its aims are the elucidation of the limnology of the reservoir and the study of the effects on the river systems downstream from the dam. Studies commenced in 1982.
4. Pesticide Residue Project: This project funded by Australian aid has three components, (a) monitoring of cholinesterase levels in blood of workers associated with pesticides, (b) monitoring of pesticide residues in fresh vegetables sold at the Suva market and the Nuku'alofa market (Tonga) and (c) monitoring of chlorinated hydrocarbon insecticide and PCB residues in shellfish from Fiji and Tonga. No such measurements have ever been done in Fiji in the past. Analytical work at INR will commence in July, 1985.
5. Port Vila Arsenic Spill: This small investigation was carried out for the Vanuatu government by INR using funds from SPREP. Water, sediments and shellfish were examined for arsenic levels after several containers of As_2O_3 were spilled into Vila harbour in June, 1984.
6. Treasure Island Sewerage Scheme: INR is monitoring the effects on Treasure Island and its reefs (a small resort island off western Viti Levu) of the discharge of untreated sewage. This has been required of the company by the Health Department and hopefully is a fore-runner of further enforced studies for similar schemes.

At the undergraduate level the University has a degree programme in Environmental Studies which incorporates both physical sciences and geography but at present with the extremely low priority given to environmental matters by regional governments few students are given scholarships to pursue the programme. At the postgraduate level a few scholarships are available each year for Masters degrees. These are funded from outside Fiji - in particular The Netherlands, Canada and Japan. For USP local staff the Australian Universities International Development Programme offers extensive assistance to work

at Australian Universities for short periods. Two INR staff and one Biology staff will take advantage of this in 1985. The SPREP network also tries to run workshops in relevant areas for network members. The next of these is expected to be run in late 1985 in Port Moresby on chlorinated hydrocarbon residue analysis.

As both organizations appear to be working on similar problems in the region INR would like to see IOC-WESTPAC and SPREP work in closer consultation than appears to take place at present. The limited funding available could then be used to best effect.