

The Pacific Cities Project: a SOPAC regional initiative

Introduction

Most capital cities of the Pacific are at risk from a wide range of natural and man-made hazards. However, a critical lack of basic data in the region threatens to undermine current hazard mitigation efforts.

The picture of hazard assessment, risk analysis and disaster management in the Pacific during the current International Decade of Natural Disaster Reduction has been a rapidly evolving one. Two articles in the Winter 1997 edition of AJEM paint a part of that picture, describing how National Disaster Management Offices are now coming to maturity in a great many of the Pacific Island Countries. Prior to this development, investigation and mitigation of natural hazards had traditionally fallen to the various Pacific Island government departments dealing with geology, water, coastal matters, lands and natural resources.

The first phase of the South Pacific Disaster Reduction Program (SPDRP) under the management of UNDHA-SPPO (now UNOCHA-SPO) has concentrated on developing in-country capacity for disaster management and relief activities. Unfortunately, the level of understanding of the hazards and risks facing these very countries still remains dangerously inadequate. There seems little point in pouring aid funds into community awareness programs at this stage while the degree of threat or vulnerability has yet to be established.

Development of the Pacific Cities Project

Enter the South Pacific Applied Geoscience Commission (SOPAC) which this year celebrates its twenty-sixth anniversary of service—much of it directed towards the understanding and mitigation of the many hazards facing Pacific countries.

SOPAC is an intergovernmental organisation with a membership of fourteen independent island nations and two French Territories in the Pacific. In the past ten years the organisation's area of interest has expanded progressively inshore and landward from its original emphasis on oceanographic matters. SOPAC's work has provided an essential extension to the geological and marine science, coastal

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development and information management capabilities of its member states.

By 1995, SOPAC was already undertaking, managing, or collaborating in a wide range of hazard projects in the Pacific. This process was then formalised with the creation of a Commonwealth Secretariat-funded position for a three-year period, and the establishment of the Hazard Assessment Unit. A decision was taken at that time to link these projects through the common theme of risk assessment and mitigation under the banner of *Pacific GeoCitiPlan*.

At the October 1996 SOPAC meeting in Rarotonga, the Australian Geological Survey Organisation (AGSO) proposed a new collaboration with SOPAC in the Pacific. AGSO is sponsoring the *Australian Cities* project which is currently assessing the vulnerability of selected Australian cities to a wide range of geohazards, climatic and meteorological hazards, and is looking to extend the *Cities* operation to the international arena. SOPAC's pre-existing *Pacific GeoCitiPlan* was the ideal adjunct vehicle to take forward AGSO's initiative into the Pacific.

The newly-emerged, all-hazards concept, the *Pacific Cities* project, supplants *Pacific GeoCitiPlan*, and has been set up initially in eight major Pacific cities which are at very high risk from a range of hazards.

At present the collaboration with AGSO is on an informal co-operative basis recognising, though, that development of a fully-funded collaborative project in hazard assessment would give a tremendous boost to the self-reliance of Pacific cities in handling their own town-planning and disaster-response activities. The *Pacific Cities* scheme which is managed by SOPAC's Hazard Assessment Unit, is fully operational in Apia, Honiara, Nuku'alofa, Port Vila and Suva, while Lae, Luganville and the Nadi-Lautoka conurbation wait in the wings for a start, dependent on funding.

The final scene for an even higher level of integration within the disaster management network was set only this year

following the incorporation of UNOCHA-SPO within SOPAC as the Disaster Management Unit, together with much closer, formal links with the South Pacific Tropical Cyclone Warning Service Upgrade Project. These new units fully augment the existing disaster mitigation activities of the Hazard Assessment, Coastal, Water Resources and Human Resource Development Units, extending the relevant contact group for SOPAC considerably.

Risk Management Database

The *Pacific Cities* initiative—a move to bring an all-hazards assessment under one banner in high-risk urban areas of the Pacific—has matured quickly over the past couple of years. The risks facing cities in the Pacific arise from a variety of hazards including earthquake, slope failure and cyclone and related hazards, drought and flooding and the man-made hazards of pollution.

Pacific Cities not only conceptually ties together existing projects having disparate origins and funding agencies, but also promotes the development of an all-embracing Geographic Information System (GIS) database as a tool for providing a framework or infrastructure for the management of spatial data. Information from fields as diverse as geology, meteorology, physiography, engineering and population distribution is stored on a single database in multiple layers. Interactions between layers are possible, and the results of numerical modelling are incorporated through the generation of various disaster scenarios.

One of the cornerstones of the project has been the building assets survey for each city which seeks to individually assess each building for a series of characteristics related to its potential performance under earthquake, cyclone, flooding or unfavourable foundation conditions. Attempts are now being made to link this information through to the various city council and census demographic databases.

Ultimately, the risk to population and property can be measured through the GIS by considering the way in which hazards interact with, and affect, these community assets.

The geographic information system should ideally be able to answer any

question posed it by a user of the system such as a town planner or disaster manager. The reality of course, is that the basic data must first be input into the system.

GIS databases will be made available to national disaster management authorities in the respective member countries, and regularly updated by SOPAC and the country concerned. The databases have the potential to be used to assist town planning, post-disaster rehabilitation, the insurance industry, aid donors and reconstruction authorities, amongst other users. The *Pacific Cities* databases will form part of the new generation of information transfer; less emphasis placed on written reports, and more on visual representations of hazard and risk in two and three-dimensional graphics. Information arising from this program will be contained on compact disks rather than on the printed page.

Associated projects

The current health of the *Pacific Cities* scheme and the input of data to the system owes much to the support provided under several major sub-projects within the *Pacific Cities* project.

In late 1996, the Danish Government provided a large grant to purchase *MIKE 21* circulation and wave-modelling software and a four-week training course for SOPAC and member country staff. The software from the Danish Hydraulics Institute (DHI) is used for computer-modelling of the movement of water, contaminants and sediment to help answer the problems of coastal erosion, pollution, storm surge and tsunami impact.

The French Government initiated the project *Seismic Zonation of Suva Central City and Simulation of Tsunami Risks in the Harbour* last year involving the Mineral Resources Department of Fiji (MRD) and SOPAC with their own organisations, BRGM and A2EP based in Noumea, to

produce a 3D digital elevation model (DEM) and assess the effects of earthquakes on Suva City, including a sub-project by the French Laboratory of Detection and Geophysics (LDG) to predict and model the effects of a tsunami in Suva Harbour.

A three-year project currently being undertaken by Dr Avi Shapira and his team from the Geophysical Institute of Israel (GII) is investigating seismic response in buildings related to foundation conditions the four cities taking part in the USAID-funded project *Seismic Microzonation in Capital Cities of the South Pacific* underway in Honiara, Nuku'alofa, Port Vila, and Suva.

Avi and a team of technical experts set up computers and seismological systems in the cities to measure and interpret seismic events. They also provided the equipment and training to enable local staff to be able to undertake Nakamura seismic site response measurements around the cities. SOPAC carried out mapping for hazard zonation with counterparts in each of the cities, and appropriate locations were determined for Nakamura response measurements. These measurements were subsequently incorporated in the characterisation of each site with regard to its response to damaging earthquake frequencies.

New Zealand ODA provided funding for the costs of the development and execution of the building assets surveys – a critical aspect of the work – in the four Pacific capitals studied to date.

In recognition of the fact that many of the hazards facing Pacific cities originate or impact in the near offshore area, bathymetric and seismic reflection surveys are planned for the harbours of each city. Hazard assessments have already been completed or are underway for Suva, Port Vila and Apia harbours.

Digital elevation models will be developed for both the onshore and offshore city

precincts to enable modelling and visualisation of the areas affected by hazards. Funding is currently being sought to complete these areas of the project as they now have become the rate-controlling step for further progress.

Counterparts from each country are involved in each and every aspect of the work of *Pacific Cities*, and field work is succeeded by training attachments to SOPAC in Suva where each counterpart can follow through on modelling aspects and the development of the hazard and risk assessment GIS for his particular city. An IDNDR-AGSO sponsored Spatial Data Infrastructure Workshop was held in conjunction with SOPAC in Suva this month with the aim of strengthening the partnerships between counterparts, national disaster managers, and GIS experts from countries involved in *Pacific Cities*.

The newly emerged partnership between SOPAC and UNOCHA will ensure that the nature of the hazards and the results of risk assessment for each of the Pacific cities are fully understood before they are transmitted to the respective communities through appropriate awareness programs and education activities.

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He has a BSc, MSc from the School of Geology, University of Queensland, and a PhD from the School of Civil and Mining Engineering, University of Sydney, together with 28 years of experience in engineering geology and geotechnical engineering.

Graham has published a number of internationally-refereed scientific papers on geotechnical problems in Pacific Island countries.

His current work is focussed on developing a comprehensive GIS database/risk assessment tool for all the major Pacific cities.

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Disaster management for public health training course

Cairns, 10–15 October 1999

This course aims to mitigate the impact of natural disasters and emergencies on the Australian community by ensuring that public health and other professionals are adequately prepared for a disaster in their community.

Participants will be trained to prepare and implement a disaster management plan for their community, and reduce the physical and social impact of disasters on the environment and community.

Topics include potential public health disasters (particularly cyclones, storm surge, floods and earthquake), public health disaster plans, environmental contamination, provision of safe and adequate food

and water supplies, vector control, media relations, practical relief and recovery, medical disaster planning, community vulnerability, and case studies.

Registration includes comprehensive course notes, field trip (Skyrail), lunches, dinners, morning and afternoon teas. The venue has all resort style facilities and is close to the city centre.

Registration packages can be obtained by contacting the course convenor Paul Endres, e-mail: endresp@health.qld.gov.au or telephone (07) 4050 3616. Details can also be obtained from Anne Outram (07) 3854 1113 or George Hapgood (07) 3234 0948.