

NATIONAL REPORT FOR THE 18th SESSION OF THE IHP INTERGOVERNMENTAL
COUNCIL
PARIS
(9 -14 June 2008)

NATIONAL REPORT OF NEW ZEALAND

1. ACTIVITIES UNDERTAKEN IN THE PERIOD OCTOBER 2006 – MAY 2008

1.1 Meetings of the IHP National Committee

1.1.1 Decisions regarding the composition of the IHP National Committee

Dr Richard P Ibbitt and R J (Bob) Curry continued as Chairman and Secretary respectively on the IHP National Committee during the reporting period. However Bob Curry has, due to his pending retirement, handed over the position of Secretary to Dennis Jamieson with effect from 1 October 2007. Bob would like to take this opportunity to thank colleagues in the RSC for their support and cooperation over the years and wishes the RSC members every success in their continued collaboration towards furthering the IHP goals and aspirations in the region.

Dennis Jamieson, who attended the RSC meeting in Manila in November 2007, has had a long association with South East Asia, beginning with water resources development projects in Northeast Thailand associated with approaches developed at Khon Kaen University in the 1980's, and continuing with other projects in the region over the years.

1.1.2 Status of IHP-VI activities

The following projects, which commenced under IHP-V, continue to be funded:

- WG 1.1 (Information on New Zealand's Freshwaters: Water Resources Archive);
 - WG 2.7 (Land Use Intensification: Sustainable Management of Water Quality and Quantity);
and
 - WG 2.8 (Reducing the Impacts of Weather Related Hazards)
- (refer IHP-V Technical Documents in Hydrology No.2 UNESCO Jakarta Office 1999 for details).

While WG 1.1 is an on-going long-term project, projects WG 2.7 and 2.8 have undergone name changes to reflect changes in research direction and the way research projects are now organised in New Zealand. Funding for WG 2.7 now extends to the end of June 2009, while that for WG 2.8 extends to the end of 2008. Both projects are subject to periodic review.

WG 1.1 – "Information on New Zealand's Freshwaters: Climate and Water Resources Archives" was reclassified some years ago as "Nationally Significant Databases" with guaranteed long-term funding. Since reclassification funding levels have been static, and have been eroded by inflation. Although advances in technology and operating efficiencies have offset some of this inflation, both the climate and hydrometric network were operating in a minimal maintenance mode with only essential upkeep, site visits and data downloads being done. Following the increase in funding referred to in last years report, activity associated with the upgrading of recording stations and instrumentation, and the general lifting of standards, particularly those associated with the maintenance of stage / flow ratings at the less stable flow recording stations, has continued.

In 2000 New Zealand started to build a national soil moisture monitoring network. These sites take time to stabilize. The network, including some local government sites, has now reached 60 in total and is increasing, as appreciation of the value of the network is gained, particularly as pressure increases to make better use of limited water available for irrigation.

The year has seen the implementation of NIWA's nationwide data logger and radio/cellular-phone/satellite communications telemetry upgrade project which was designed to replace the ageing Aquitel (1980's) telemetry system and involves the upgrading of about 180 hydrometric stations.

In addition significant reinvestment funding has been assigned to:

- upgrade the general standard of the ageing hydrometric network infrastructure;
- standardise station layouts and instrument configurations;
- station "hardening" (floods & droughts), i.e. making stations more robust to provide better data on flood and low flow conditions;
- the installation of duplicate, but independent "back-up" recording systems (to minimise occurrences of missing record);
- accelerate the conversion from conventional mechanical type current meters to Acoustic Doppler Current Profilers (ADCP); and,
- use hydraulic gauging winches in order to deploy slackline cableways on wider rivers and thus remove gauging personnel from the hazards of gauging rivers from manned cableways and busy highway bridges (important health & safety issues).

In addition the automation / telemetry of a number of key climate stations continues to be implemented. These and other initiatives have enabled a significant increase in the numbers of telemetered climate and hydrometric stations, and this has enabled the provision of expanded near real time data services, while the ease of data input has facilitated the publication of regular bulletins such as "The Climate Update" and "Water Resources Update".

Also from an operational and health and safety point of view, the satellite phones which have been introduced as standard equipment with NIWA field teams have proved their worth on a number of occasions on field campaigns into remote areas. Extremely positive feed-back has been received on the assurance and comfort of having these phones available when working alone in remote field locations. Apart from the health and safety considerations, the phones have proved extremely useful for logistical purposes where no other forms of communication are available.

As a result of the latest review of WG2.8 the funding authority has invited the National Institute of Water and Atmospheric Research (NIWA) to renegotiate future funding for this project rather than require NIWA to write a new proposal for competitive rebidding. While this is good news as it recognizes the quality and value of the work already done, it precludes any funding increase above the present value of the contract, i.e. future work will be eroded by inflation. NIWA will be working with other government agencies to further improve funding support for national hydrometric (and other environmental data networks) to ensure information is available for local, national, and international decision making.

1.1.3 Decisions regarding contribution to/participation in IHP-VI

Key components of the New Zealand hydrological research programme are aligned with IHP-VI themes in eco-hydrology and sustainability. It should be noted that the bulk of hydrological research in New Zealand is funded through the Foundation for Research Science and Technology (FRST), whose mandate is to fund research that is in the national interest. All proposals submitted to the Foundation must therefore demonstrate that results will address national needs, and alignment with IHP themes is possible only to the extent that these themes are relevant to resource management requirements in New Zealand. Additional sources of support (e.g. WMO, internal support from NIWA and other institutes) are important to maintain links with colleagues in the Asia-Pacific region.

1.2 Activities at national level in the framework of the IHP

1.2.1 National/local scientific and technical meetings

Scientific and technical meetings are generally held within the context of professional societies (particularly the New Zealand Hydrological Society) and resource management affairs (e.g. workshops organized by the Ministry for the Environment under the aegis of its National Agenda for Sustainable Water Management and the governments inter-departmental Water Plan of Action).

The Secretary and Chairman of the IHP National Committee have met regularly to discuss IHP matters.

1.2.2 Participation in IHP Steering Committees Working Groups

The Chairman is a member of New Zealand's UNESCO Science Sub-Commission where he is able to promote hydrological matters at a national level.

Dr Ibbitt and Mr Curry attended the 14th RSC meeting held in Bangkok, Thailand and attended the 12th Technical Sub-Committee meeting associated with the 14th RSC meeting. Dr Ibbitt and Mr Jamieson attended the 15th RSC meeting held in Manila and participated in associated workshops and in follow up visits to colleagues in Lao and Vietnam.

1.2.3 Research/applied projects supported or sponsored

None

1.2.4 Collaboration with other national and international organizations and/or programmes

- Sustainable Water Programme Of Action (SWPOA)

The NZ government launched a suite of actions, coordinated through the Ministry for the Environment and Ministry of Agriculture and Forestry in 2006 to:

- Improve the quality and efficient use of freshwater by building and enhancing partnerships with local government, industry, Māori, science agencies and providers, and rural and urban communities
- Improve the management of the undesirable effects of land use on water quality through increased national direction and partnerships with communities and resource users
- Provide for growing demands on water resources and encourage efficient water management through increased national direction, working with local government to identify options for supporting and enhancing local decision making, and developing best practice.

The SPWOA takes a "whole of government approach" to deal with the situation where the existing regulatory environment was struggling to cope with issues such as, water allocation where the available water resources were becoming fully allocated.

IHP activities under IHP-V and capabilities resulting from these activities are being used to inform the process, together with wide-ranging consultation. Specific initiatives under the SWPOA include the development of National Environmental standards for Water Measuring Devices, Ecological Flows and Water Levels, and National Policy statements for Flood Risk Management and Freshwater Management. The above tasks are particularly challenging given they aim to bring consistency to a government system that was devolved to regional authorities some 25 years ago.

- The Chairman and Secretary of the National Committee are in frequent contact with the Regional Hydrological Advisor to the President of the WMO Regional Association V, and with the Hydrological Adviser, Charles Pearson, to New Zealand's Permanent Representative to the WMO. This contact enables coordination of activities under the aegis of IHP and the WMO

OHP in New Zealand. Frequent contact is also maintained with SOPAC's Suva based Water & Sanitation Unit, through its role of representing the SW Pacific Island states on water related issues.

- SOPAC – Pacific HYCOS project

A WMO Workshop and launch of Pacific-HYCOS meeting was organised in Brisbane, Australia. This was attended by representatives from all the Pacific Island countries and was a key step in the initiation of the HYCOS project and programme in the Pacific. The project, which is designed to establish and consolidate hydrometric network monitoring in the various countries, and provide capacity building over the next three years, was discussed in detail. Subsequent meetings were held with the two SOPAC co-ordinators with a view to assisting with the provision of standardised instrumentation and hydrometric recording equipment familiar to the countries, and the establishment of the various pilot networks. A history of the hydrometric activities that NIWA staff had been involved with in Vanuatu, Solomon Islands and Papua New Guinea over the years was provided prior to SOPAC's visit to each country to evaluate their needs. Information on the status of each country's current network operations, its hydrometric database, local staff, and instrumentation purchased in recent years, was provided, along with an assessment of each country's capabilities.

A generic proposal was provided to Ben Parakoti – Chief Water Supply Engineer with the Cook Islands Ministry of Works for instrumentation of an existing catchment under the HYCOS programme. The proposal is to telemeter one of the existing weir sites and two rainfall sites within the catchment. The sites are believed to be within cellular phone coverage of Rarotonga and the near-real time data could be transferred to the SOPAC regional archive via the Internet

The Chairman and Secretary of the National Committee are in regular contact with Pacific HYCOS staff and are actively working to advance key lessons from this project. The most important factor for future success will be the higher prioritization for funding and access to services (transport, vehicles etc.) for ongoing, "routine" monitoring work by Pacific countries. By the end of the project term there will be sufficient specialist equipment and trained personnel, but these advances need to be supported by ongoing local funding.

- WMO

Important outcomes of the Brisbane WMO Workshop (Working Group on Hydrology) were support for Pacific HYCOS, initial thoughts for a South East Asian HYCOS and a hydrological training centre (Bandung, Indonesia), and strategic plans and directions for greater coordination of national Hydrological and Meteorological services across the region. The sustainability of the Pacific HYCOS after the initial three years of European Union (EU) funding was recognised as a key challenge.

- Cook Islands Hydrology Network

Whilst visiting the Cook Islands NIWA staff member (Pete Mason) spent four days working with local colleagues from the Cook Islands Ministry of Works to reinstate the Cook Islands hydrometric monitoring programme which had all but stopped, except for one flow site. While the installations were all fine, the main problems came from a faulty serial port on the back of their borrowed laptop which was used to download data, and logger batteries that had been run so flat that they were unable to be brought back up to charge. A new set of batteries and charger were immediately air-freighted to Rarotonga with SOPAC funding support. All logger batteries were then replaced. A further day was spent gauging the three main river intakes on Mangaia Island with the Director of Infrastructure, Ora Henry. This was the first time any flow gaugings had been done on this island. All data files since the last visit have been processed and updated to the Pacific Islands section of the Hydrometric Database. Since the support funding finished two years ago, there has been a lot of missing record, which is clear evidence that even the simplest of networks will not survive without proper support.

On another occasion a NIWA donated, used Panasonic CF27 laptop was sent to the Cook Islands Ministry of Works after receiving word that the hard drive had failed on their field laptop.

This replacement laptop will be used to download all the field loggers until funding can be obtained to buy a new replacement laptop. Two rain-loggers were serviced and also sent as back ups to those already in the field

Such technical advice, assistance and maintenance of equipment service is typical of the type of on-going support required by Pacific Island nations. The level of work required is modest and will contribute to critical decisions about water resource availability and its use. However, such arrangements need to be formalised and funding arrangements made if long term monitoring networks are to survive.

- Samoa hydrometric network upgrade

A total of 16 Hydrologgers were provided to Samoa via NIWA Instrument Systems, signaling the start of an upgrade of their hydrometric network, facilitated via SOPAC.

- Fiji - Navua & Rewa Flood Forecasting Projects

NIWA staff (John Fenwick, Marty Flanagan, Martin Robertson) were contracted by SOPAC to undertake an EU funded telemetry and flood forecasting project on the Navua catchment on the main island of Viti Levu in Fiji. The Navua project involves the supply and installation of telemetered rainfall and river flow monitoring equipment and a flood forecasting system, together with the appropriate training required for the Fiji Public Works Department to operate the system.

Three water-level and rainfall stations were installed and commissioned, as was a fourth rainfall-only station and the main telemetry base station at Suva which was set up to run the Flosys 2 data management software. Remaining work includes a visit to re-set the radio frequencies once these are established at the repeater, setting and/or checking the TDServer/Client data transfer operation (with the broadband connection), refining alarms and the development of the forecasting model after some initial data collection at these new sites.

The Flosys hydrology data collection telemetry system is to be operated by the Hydrology section of the former PWD in Suva. Advanced warnings are to be forecast by running a flood forecasting model developed by NIWA which will be operated by the Fiji Meteorological Service (FMS) in Nadi, and warnings disseminated to the general public by the National Disaster Management Office (NDMO).

On a related project, advice was received from SOPAC that the EU funded flood warning and forecasting project in the Rewa catchment in Fiji has been approved. This proposal is similar to the project already underway for the Navua catchment, with many synergies existing with instrumentation, equipment, installation, flood forecast modeling etc.

- Palau hydrometric network upgrade

NIWA (John Fenwick) was contracted by SOPAC to undertake the appraisal and reporting on the proposed reinstatement of ex-USGS hydrological stations (8 flow and 5 rainfall) in Palau. A visit to Palau was made to install the Tideda hydrometric database software, provide the data converted from USGS format, and assess the needs for an on-going programme. Most of this work was carried out with the Environmental Quality Protection Board (EQPB). Following the evaluation a senate briefing paper was provided and an evaluation report was prepared detailing the "data rescue" from USGS format to Tideda, and detailing the resource, engineering and hardware needs for re-establishment of the stations and an on-going hydrometric programme for the main island of Babeldoab. Providing the Palau Government finds resources (a staff member), then funding will be available from the EU via SOPAC for the second phase - the upgrade of the network (including equipment procurement and installation) and data management system.

- Papua New Guinea – Ramu River flow monitoring

A proposal from the PNG Department of Environment and Conservation to SOPAC for a flow monitoring system in the Ramu River has been approved in principle by the EU, and the PNG

Water Resources Management Bureau (WRMB) has requested a quotation. This was provided in the form of the above mentioned Pacific HYCOS generic proposal and will be further modified to suit the Ramu case. This project is to monitor the environmental effects of a proposed Nickel and Cobalt mining operation in the lower reaches of the Ramu catchment

- Papua New Guinea – Digitiser acquisition

An investigation into available digitisers suitable for digitising rainfall and water-level charts was undertaken following a request from the Water Resources Management Branch of the PNG Department of Environment & Conservation. It is understood that SOPAC may fund this acquisition for PNG and possibly other Pacific Island countries. A similar request for a suitable digitiser was received from Sri Lanka showing the emphasis countries are placing on the rescue of old chart record data for archiving on electronic databases.

- Papua New Guinea – Data Rescue

Following a change of data processing software the PNG Bureau of Water Resources was left without access to much of their early hydrological data. Over the past two years the old data files have been retrieved and been the subject of international collaboration to translate the data into Tideda format consistent with the current PNG operated hydrological data processing software. The conversion began with the Australian Bureau of Meteorology (Ross James), converting the old files into a text format that NIWA (Richard Ibbitt, Jani Diettrich) with financial support from SOPAC (Llyod Smith) were then able to convert into Tideda format and assemble into a hydrological archive for return to PNG.

- Vanuatu – Data Rescue

Following a change of data processing software the Vanuatu authorities were left without access to much of their early hydrological data. The problem was exacerbated when offices of the Department of Mines, where the data were stored, were recently destroyed by fire. Owing to the foresight of a SOPAC hydrology specialist (Llyod Smith) who visited the offices just before the fire, an electronic copy of the more recent Tideda data was made. Earlier electronic data files held in Noumea were not affected. However, it is understood that most, if not all, paper records were lost in the fire. NIWA (Richard Ibbitt, Jani Diettrich), with support from SOPAC and assistance from Noumea (Geoffroy Wotling) have recently completed conversion of the Excel files into Tideda format, combined the data with the “rescued” Tideda data, and assembled the surviving hydrological data for Vanuatu into a hydrological archive. Copies of the data have been supplied to Vanuatu and SOPAC. This incident is not the first time that hydrological data has been lost to fire in the Pacific region and serves to remind everyone of the need to make back up copies that are stored off-site. NIWA and SOPAC are happy to provide off-site storage facilities for copies of electronic data.

- Republic of Korea Water Resources Association – MOU with NZ Hydrological Society

An MOU between the NZ Hydrological Society and the Republic of Korea Water Resources Association (KWRA) was signed in Wellington on 13 February 2007. Present at the signing ceremony were representatives of both organisations (Prof JaeWoo Song – President, KWRA plus three KWRA delegates, and Paul White & Tim Davies – past and present President, HydSoc), the Korean Ambassador to NZ (His Excellency Joon-gyu Lee), FRST (Anne French), MoRST (Amanda Tomlinson), The Royal Society (CEO – Steve Thompson and Eddie Davis – Manager International). The MOU aims to promote collaboration between the two societies through attendance at annual conferences and exchange of publications. Further to the MOU, in May four NZHS members gave papers at the KWRA annual conference in Gangwon Province, South Korea. In November NZHS will host four KWRA delegates at the NZHS annual conference in Rotorua. Further details on this collaboration can be found at: http://www.hydrologynz.org.nz/KWRA_link.php

- Lao PDR – hydrometric data collection reviews

NIWA continued to provide review and analysis of hydrometeorological data collected by the Department of Meteorology and Hydrology (DMH) for the Nam Theun Power Company (NTPC).

1.2.5 Other initiatives

Diatom invasion - *Didymosphenia geminata*

Concern about the spread of the diatom *Didymosphenia geminata* continues. The alga, which forms massive slimes over riverbeds and which appears to have been introduced by tourist fisherman, is slowly extending its range over South Island rivers and has been declared to be an 'unwanted species' in New Zealand because of the way it affects the quality and pristine status of our key trout fishing rivers. MAF has implemented a wide-scale containment strategy: actions have included preparing fact sheets, provision of information on the alga's biology to regional government agencies, and work to assess rates of dispersal, potential risks, habitat requirements, and border control / disinfection measures.

Trials to test biocides that might be used to control didymo have identified a compound that has proved effective in a trial situation, and which could be used in streams with flows up to 10 m³/s and where an economic justification can be shown.

Regional government agencies have been trained to recognize the alga and carry out periodic surveys of their regions. In November 2007 a national survey will be carried out to identify the current extent of the alga.

EcoConnect

Eco-Connect is a system aimed at delivering accurate weather forecasts for environmental forecasting. It uses a meso-scale weather model (NZLAM) run on a super-computer to downscale global weather forecasts with assimilation of satellite data which are delivered through a standardized information portal. Forty-eight hour forecasts are produced on a 12 km grid covering New Zealand. Output from the weather model is now input to five calibrated river basin models. Furthermore the operation of the rainfall-to-runoff models has been enhanced by introducing assimilation of hydrological data into each model. This process enables more accurate forecasts as the latest data on the state of the catchments is automatically included in each forecast. Over the past 18 months presentations have been made of the system to many local government agencies responsible for flood warning and also to the NZ Minister of Science and Technology.

1.3 Educational and training courses

1.3.1 Contribution to IHP courses

None.

1.3.2 Organisation of specific courses

Courses and workshops are generally organized in New Zealand to meet national needs. Because of the country's relative remoteness and distinctive resource management requirements, courses are not always suitable for participation by people from overseas.

NIWA Courses / workshops

Over the course of a year NIWA provide many courses for regional government agencies and their own staff. These cover many topics from general hydrological training to courses on specific topics. For examples of the courses and a full program for the coming year please refer to <http://www.niwascience.co.nz/edu/unitech>.

NZ Hydrological Society Workshops

The following workshops were conducted by the NZ Hydrological Society in conjunction with the NZ Association of Resource Management and the Meteorological Society of NZ at their annual joint symposia in Christchurch (ref 1.5.1):

- Uncertainty in model predictions
- How should groundwater be allocated?
- National groundwater Monitoring Programme: water quality with age
- Sustainable nutrient management
- Where to with telemetry?

ADCP Training for regional councils

NIWA provided training to several regional councils in the use of Acoustic Doppler Current Profiler (ADCP) instrumentation to measure river flows. This training was provided on a one-to-one basis with individual council staff through an “Envirolink” funding initiative offered by the New Zealand Government to foster technological and knowledge transfer from research institutions to smaller regional councils.

Hydrology of Ungauged Basins

A two-day training course on the Hydrology of Ungauged Catchments was attended by 10 Regional Council staff and consultants. The course covered new methods and national data resources to assist in estimating streamflow information (mean flow, seasonal patterns, floods, low flows) in ungauged catchments. A particular emphasis was placed on using the river network from the River Environment Classification as a method for organising data about rivers.

1.3.3 Participation in IHP courses

See 1.3.1.

1.4 Publications

Contributions to IHP publications have been principally through the Regional Steering Committee and the Asia-Pacific FRIEND. Other publications related to IHP activities include:

- Mean Annual Low Flow Model
We have completed development of a new method to estimate mean flows in ungauged catchments (Woods, R. A., J. Hendriks, et al. (2006), "Estimating mean flow of New Zealand rivers." *Journal of Hydrology (NZ)* 45(2): 95-110.), using a new national rainfall map (Tait, A., R. D. Henderson, et al. (2006). "Spatial interpolation of daily rainfall for New Zealand." *International Journal of Climatology* 26(14): 2097-2115.). Work is now focusing on long series of monthly flow data at several hundred locations throughout NZ.
- The “Climate Update” monthly bulletin
The National Climate Centre (NCC) has published a further 12 issues (88 to 99) of the monthly circular entitled “The Climate Update”. (<http://www.niwa.co.nz/ncc/cu/archive>) This publication summarises each month of New Zealand’s climate, including soil moisture and river flows. It also predicts the following three month’s climate, soil moisture and river flows, and states how good was the previous month’s forecast. Prediction of river flows continue to be used by Greater Wellington Water as input to its water supply planning for summer low flow periods.
- The “Island Climate Update” monthly bulletin
The National Climate Centre (NCC) has published a further 12 issues (73 to 84) of the monthly circular entitled “The Island Climate Update” (ICU). This NZAID, funded bulletin provides an overview of the present climate in tropical South Pacific Islands and a forward outlook, which continues to be published, and circulated widely throughout the South Pacific. (<http://www.niwa.co.nz/ncc/icu/archive>).

The ICU, produced by NIWA’s NCC in collaboration with SOPAC, is a multi-national project with important contributions from the meteorological services of countries around the region. The bulletin provides El Nino/Southern Oscillation and seasonal rainfall forecasts, discusses climate developments each month and provides a tropical rainfall outlook for the next three

months and tropical cyclone outlooks during the cyclone season. It also includes an editorial on some topical aspect of relevance and interest to end-users.

NZAID via SOPAC continues to support this activity through 2007 and to focus on climate effects on end users and a more collaborative and consultative approach with the recipient countries.

- “Water Resources Update” bulletin

The National Centre for Water Resources (NCWR) has published a further 5 issues (19 to 23) of the bulletin entitled “Water Resources Update” (<http://www.niwa.co.nz/ncwr/wru/archive>) This publication summarises seasonal groundwater, river flows, water clarity, water temperature and slime (periphyton) and focuses on a number of topical issues confronting New Zealand scientists.

- Access to climate and water resources information

NIWA has developed a real time environmental data site called EDENZ (Environmental Data Explorer New Zealand) which is available to the public on the web (<http://www.edenz.niwa.co.nz>) .

EDENZ provides visitors with near real-time access to Foundation for Research, Science & Technology (FRST) Public Good Science and Technology (PGS&T) funded data that are collected from the NIWA nationwide network of monitoring stations, installed as a component of the Nationally Significant Database programme.

Data on this site are automatically transferred using a national telemetry network and are un-audited. The goal of this programme is to provide comprehensive and accessible data as a basis for improved knowledge on New Zealand's climate and freshwater resources.

The programme collects, stores, and disseminates data from national monitoring networks, and comprises two core nationally significant databases - the Climate Database (CliFlo) and the Water Resources Archive. The data include air temperature, barometric pressure, wind direction, rainfall, lake and river water levels, river flows and sediment loads, and river water quality variables.

A key aspect of the archiving programme is application of stringent quality control procedures ensuring national consistency and providing assurance that data can be confidently used for scientific and planning purposes.

A recent review of NIWA's policy with regard to charging for labour in the provision of FRST funded data from its Nationally Significant Databases (includes climate and hydrometric archives) has been undertaken. As from the 1st July 2007 free access has been provided to all 100% FRST funded climate and hydrological data via the automated web based systems “CliFlo” and “EDENZ” (Environmental Data Explorer New Zealand) located on the NIWA website. This includes all hydrometric data from NIWA owned sites which are fully or partially funded by FRST, the terms and conditions for release of data from jointly funded sites being subject to individual site arrangements with the respective co-funders.

Free access to CliFlo in particular has seen an exponential increase in the use of the data. Usage rates are up by 4.5-fold (> 15 million rows downloaded in July) compared with last years monthly average, and there were ~550 registered users (up > 4 fold). A similar pattern has been observed with the greater use of the hydrometric data around the country.

The change in NIWA policy reflects changes in expectations by NIWA's owner and aligns with the long term position of NIWA personnel that easier access to data provides local, regional, national and international benefits.

1.5 Participation in international scientific meetings

1.5.1 Meetings hosted by the country

NZ Hydrological Society Annual Symposium

The annual conference of the New Zealand Hydrological Society, was held from the 20-23 November 2006 in Christchurch, New Zealand with the theme "Resource management under stormy skies: Water allocation @ the crossroads?" The Symposium was run in conjunction with the New Zealand Association of Resource Management and the Meteorological Society of New Zealand

1.5.2 Participation in meetings abroad

- New Zealand was represented at the 15th RSC meeting and scientific conference held in Bangkok, Thailand, 19-20 November 2007 by Dr Ibbitt and Mr Jamieson.
- New Zealand was represented at the 14th RSC meeting and scientific conference held in Bangkok, Thailand, 19-20 October 2006 by Dr Ibbitt and Mr Curry.
- Dr R A Woods convened a special session at the American Geophysical Union meeting in December 2006 on the topic of classification and similarity in hydrology.
- Dr Woods attended a PUB workshop on "Model Diagnostics" in Tucson, Arizona, USA in April 2007.
- Drs R A Woods and M P Clark attended the IUGG meeting in Perugia, Italy in July 2007. Dr Clark gave a keynote address while Dr Woods attend the Prediction in Ungauged Basins (PUB) workshop and contributed to the PUB report of the workshop.

1.6 Other activities at regional level

1.6.1 Institutional relations/co-operation

There is considerable contact between New Zealand and other UNESCO Member Countries in the Asia-Pacific region, principally through overseas development assistance and consulting. For example, the Tideda hydrological database management system has been or is being installed in various agencies in Australia, Cambodia, Indonesia, Malaysia, Vietnam, Cook Islands, Fiji, Samoa, Solomon Islands, Papua New Guinea, Vietnam and Vanuatu. Many such contacts have been enabled via the IHP, even though subsequent work has been in the context of bi-lateral assistance.

New Zealand Government Assistance In Development (NZAID) recognises the importance of effective water management in efforts to achieve sustainable development in the Pacific and look forward to continuing their engagement in the Pacific Type II Partnership Initiative on Sustainable Water Management.

Pacific Island Mentoring and Technical Assistance

NIWA staff were involved in liaising with, and mentoring, of staff of the various water resources agencies in the various Pacific Island nations throughout the year. This involved technical assistance with hardware and software systems and general advice on the installation and operation of hydrometric stations. A proposal is currently being considered by SOPAC / NZAID for the funding of this essential activity.

Cook Islands Ministry of Works

A request has been made from the Ministry of Works, Rarotonga, to price the construction of another weir and flow station in the large Avana catchment on the eastern side of the island. Also requested were two more automatic rainfall recorders for the top and bottom areas of the catchment. The work is being supported by Geoff Mavromatis, Team Leader of Lincoln International who are coordinating research studies in the same area.

NZ Hydrological Society Workshops

The following workshops are scheduled to be run in conjunction with the NZ hydrological Society's annual symposia on 20 November 2007 (above):

- Water Programme of Action & emerging fresh water issues (led by NZ Ministry for the Environment)
- Forest hydrology
- GIS and hydrology
- Water quality and water allocation in the horticulture industry
- Hydrological statistics

15th Regional Steering Committee Meeting

Attendance at the 15th RSC meeting in Manila from 19-23 November 2007 and the associated meetings.

2.2 Activities planned for 2008

Scientific activities planned at the national level are, as explained in Section 1.1.3, within the context of the research programme funded by the Foundation for Research Science and Technology (FRST). A significant proportion of this activity will be in areas that are included within the IHP, but is not explicitly implemented as a component of the IHP.

Future activities are expected to depend very much on decisions reached by the Regional Steering Committee, and we are committed to participate in its deliberations, with the intention of being involved in future scientific work at the regional level.

NIWA Courses

Further training courses for regional council and NIWA staff will be provided as follows:

- Hydrological data collection
- General environmental data logging
- Hydrological statistics
- ADCP flow measurements
- Advanced flow regime analysis

For a full list of courses refer to <http://www.niwascience.co.nz/edu/unitech>

These courses are also open to overseas participants.

Snow and Ice Monitoring Network

A new project, funded from NIWA's Strategic Capex Fund, has been initiated this year for the establishment of a snow and ice monitoring network to measure snow depth and mass, glacier thickness and meltwater outflow, and high-elevation climate data.

Snow and ice are New Zealand water resources that are likely to be subject to significant change over the next 20-100 years, depending on the pace of global climate change. Such changes will have significant impacts on the hydro-electricity, agriculture and tourism/skiing industries. The changes are likely to be increased rainfall and temperature, leading to possibly less snow and more rain, more river flow and less snow cover in winter, and possibly less river flow in spring. These projected changes in the amount and seasonal pattern of river flows have not been quantified in detail, and remain research questions. Such changes would be desirable for electricity generation (assuming current demand patterns are unchanged), but undesirable for irrigators and tourism/skifield operators.

In the first year of development of the NIWA Snow and Ice Monitoring Network, 3 lower elevation sites were established. These were located on existing infrastructure at Mt Cook (730m), Arthur's Pass (620m) and at the Chateau at Ruapehu (1120m). This year the plans are well underway for

the establishment of several high elevation remote alpine stations (elevation ranges from 1200-2400m) in various parts of the New Zealand mountains. Once established these sites will provide valuable real time observations of alpine climate, snow and ice in New Zealand. Besides the regular monitoring a field data campaign was held in September. During this campaign extensive measurements of snow density and depths were made in the Jollie catchment to improve process understanding and spatial variability.

Hydrological support programme proposal for the Pacific

During the 1st course of the Pacific Islands Hydrological Training Programme held in Suva in April/May 2004, it was identified that major constraints to effective operation for most countries were skills shortages, failure of equipment, inadequate resources for repair and servicing of instruments, and the lack of funds for software purchase and maintenance. These constraints were further evident during the 2nd and 3rd courses which were held in Suva during April / May 2005 and June 2006. It is obvious that many of these constraints have a massive negative effect on the availability of information on water in Pacific Island countries – but that they are individually minor issues that could be resolved by some carefully targeted, practical training and “collegial” support.

A project whereby NIWA provides hydrological database software maintenance, instrument and equipment repairs and maintenance, database management support, and an in-country technical colleague mentoring and a year-round technical support service, has been proposed jointly with SOPAC in collaboration with the National Hydrological Services (NHS's) in the Pacific. NZAID have indicated its support for such a programme which will provide continuity of assistance to NHS's and complement parallel bilateral water resources based aid projects. NZAID support is still to be finalised pending assessment of the need that is being carried out by the Pacific HYCOS implementation personnel. In the meantime the HYCOS program is providing some support so that a partial service can be maintained.

2.3 Activities envisaged in the long term

New Zealand, with large freshwater resources and the need to balance water use (particularly for irrigation) in agriculture and hydropower against the needs to maintain high quality aquatic environments for other industries and uses has been active in Hydrology and Ecohydraulics for many years. Activities associated with Hydrology and Ecohydraulics, introduced to UNESCO as part of IHP-5, have continued to evolve and develop. This has provided seamless integration from IHP-V, through to IHP-VII. This continuity, both by funding agencies in New Zealand and through UNESCO interest, is leading to significant technical and policy advances and the ability to evaluate new risks and opportunities affecting aquatic environments. This is expected to continue.

The latest initiative based on these IHP activities has been the release of a proposed National Environmental Standard and supporting documents in May 2008 by the Ministry for the Environment. This material will be subject to considerable public scrutiny and debate. Progress will be reported at the 16th RSC meeting and scientific conference held in Ulaan Baatar, Mongolia in October 2008 by Dr Ibbitt and Mr Jamieson

Continuation of the:

- NZAID funded Pacific Hydrological Training Programmes as required;
- NZAID funded monthly “Island Climate Update” publication with stronger links to end users.
- Monthly NZ “Climate Update” publication.
- Periodic “Water Resources Update” publication.

Commencement of the formal Pacific-wide hydrological support programme (if approved), as outlined in Section 2.2 above.