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## Second Meeting of the SOPAC Division Noumea, New Caledonia, 3-9 November 2012 (SOPAC-2)

AGENDA ITEM	TITLE
3	SOPAC HIGHLIGHTS AND EMERGING ISSUES
3.4	Technical Support Services 2011/2012 report
3.4.2	Technical Support Services 2012 Narratives (Information)

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### RESOURCE ECONOMICS

In addition to a number of economic analyses and papers released or developed during the year on behalf of SOPAC Division technical programmes, the Natural Resource Economics (NRE) Programme completed work in 2011 for IUCN on the economic dimensions of climate change adaptation in **Tuvalu**. Work also commenced on economic analysis of improved meteorological services for the World Meteorological Organization (WMO). This work will complement the work of the Ocean and Islands and Disaster Reduction programmes by informing the value of increased investment in these services through disaster preparation.

In addition to support to Division technical programmes, the NRE team continues to promote the development of effective policy using economics through:

- work as coordinator of the Pacific Resource and Environmental Economics Network (PREEN) which it co-founded in 2009 with IUCN and the then separate SPC. The team promotes the use resource economics for sustainable development and the sharing of experiences/ dissemination of information via the development of the PREEN newsletter and the SOPAC NRE web site (<http://www.sopac.org/index.php/natural-resource-economics-overview>). Two PREEN newsletters were released in 2011 and so far one has been released for 2012.
- Collaborative work with SPREP and GIZ on resource economic analysis initiatives. To this effect, NRE team is presently working with SPREP and GIZ and potentially other partners on the development of a reference guide for the conduct of cost benefit analysis of Pacific projects.

The NRE Programme also provides ongoing support to technical programmes in the development of proposals.

The NRE Programme in the Division is small and a considerable degree of it is conducted by the Overseas Development Institute (ODI) Fellow. 2012 sees the departure of the present ODI Fellow and the arrival of a 2012-2014 Fellow.

## Unscheduled Technical Support

The NRE Programme has provided ongoing support in the region in the form of the review of documents, input to regional project design, and input to the work of other resource economics programmes in areas of mutual interest. This includes work with SPREP, GIZ and other Division training workshops in the conduct of cost benefit analysis, review of working papers, support to other economics units and the design of future work. Unfortunately, the limited size of the NRE Programme – particularly in the face of recent cuts to operational funding for 2013 (of over a third) – means that the ability of the NRE Programme to continue to provide ongoing response to unscheduled requests is likely to be constrained in 2013.

## Emerging Issues

Climate change continues to feature strongly in the future work for the SOPAC Division NRE Programme. This includes present work on coastal management in **French Polynesia** and **Tonga** (see report of the Oceans and Islands Programme) as well as work being planned in food security related to climate change adaptation in Kiribati and the **Solomon Islands**.

The NRE Programme represents the smallest of the SOPAC programmes of work. In recent years, there has been an increasing recognition of the value of NRE to support natural resource policy development, project design and proposal development. As a result, there has been an increased number of requests for advice and support from the NRE Programme internally as well as from outside agencies. As indicated, the operational funding for the NRE Programme has been reduced by over a third in 2013 and this jeopardises the ability the unit to provide ongoing assistance to unscheduled requests. Given the value of NRE in ‘selling the science’ of the SOPAC work, sustainable funding for this unit will need to be revisited.

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## GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND REMOTE SENSING (RS)

### Summary

The working areas of GIS and RS support are (i) image data service with the sub-areas image data purchase and image data pre-processing, (ii) vegetation or land cover mapping, (iii) training, (iv) system installation and maintenance, (v) method development and (vi) information dissemination. Over the last year the main activities and time spent shifted from training to vegetation or land cover mapping. Activities carried out in the area of system installation and maintenance decreased, however, this was caused by staff movement. It is expected that the field “system installation and maintenance” will increase activities again as soon as a new person is recruited in charge of this area. The area “vegetation or land cover mapping” was handled under “data service” in the past. The amount of tasks have steadily increased during the last few years so that “vegetation or land cover mapping” is now handled as a separate working area within the GIS&RS section. The reduction of training tasks can be explained with the way training is delivered now. Selected officers from the Member countries are trained on-the-job where the training time cannot be fully separated from the actual working time. The more important focus in the past was to introduce the (at that time) new VHR image data and (at that time) new mapping methods, where two weeks training courses within the countries were appropriate.

### *Avenues of GIS&RS Support*

The goal of the GIS&RS service unit at SOPAC is to create, implement and support the utilisation of RS and GIS in the Pacific. These tools can improve the efficiency of managing and

planning in the natural resources sector; of state asset items; and disaster response. The tools are still not well established in Pacific Island Countries and need support.

### *Direct Support of GIS&RS Users in Member Countries*

The work towards the objective to create, implement and support the utilisation of RS&GIS in the Pacific is partly carried out directly towards the end user in a country. This service theoretically has to be covered by the country membership fee and not through projects, i.e. as a core regional service to Members.

Some international organisations such as UN-SPIDER, PCGIAP, UNDP regard the SOPAC Division as the regional GIS and RS service provider and information hub. Therefore the SOPAC Division continues as the regional member of the International Society for Photogrammetry and Remote Sensing (ISPRS).

The Division's GIS&RS service acts as focal point between the international satellite image data distributing agencies and the users in PICTs. This service is essential given that on one hand the data selling agencies do not want to deal with many different customers only purchasing image data once within 3 or 5 years; and on the other hand the customers do not know which data is available on the market, which type of image data is suitable for the job and which are the procedures to order the data. Here the Division's GIS&RS service provides the knowledge, hardware and software difficult to maintain in a Member country. This also applies for spatial data backup where (now) SPC provides the facility for the end user in a Member country, through the Division. Most spatial data are raster format based and require large databases and the understanding of new data formats, where a service has to be placed close to an ICT section of a regional organisation rather than in one particular country.

Conducting GIS&RS training workshops directly in Member countries mostly initiates the setup of new GIS&RS units in government departments; as well as the private sector and is another direct support to Member countries.

The installation and maintenance of GIS&RS systems or units within other organisations mostly acts directly between the Division's GIS&RS service unit and the client in a Member country, which are mostly utilities; however, in the last three years increasingly forestry and environment departments have requested this support.

### *Support through other Regional Organisations*

The GIS&RS unit implements and supports the utilisation of these tools by other regional organisations. Areas where the tools RS and GIS are not applied yet in the Pacific, such as in ocean monitoring, shipping vessel detection, require the introduction of the tools together with the responsible bodies. SOPAC's GIS&RS unit will carry out the service and will continuously implement parts of the facility in the other organisations and restrict the service to these elements which still have to be centralised. Division management will establish a stronger link between the GIS&RS service and the corresponding unit of the other regional organisations.

### *Support across SPC Divisions*

SOPAC's GIS&RS unit supports the implementation and utilisation of GIS&RS tools in other SPC divisions. The unit carries out all GIS&RS applications which economically cannot be implemented in the other divisions and establishes those that can run sustainably outside the central unit and supports these through maintenance and training. For example space hungry databases required for satellite images have to be in close proximity to the ICT service that can support it rather than duplicated in other divisions.

## Image Data Service

The data service includes activities where a GIS&RS service unit purchases, creates, stores or enhances spatial data.

### *Image Data Purchase*

The centralised image data purchase is a defined link of end users in Pacific Island Countries and image data selling companies. Image data selling agencies do not want to deal with many different customers only purchasing image data once in a while as the customers do not know which data is available on the market and do not know the procedures of data order. In addition, the Division gets an extremely good discount due to the pooled amount of image data purchased, and delivers the discount to the end user without any charge.

Image data purchase includes several tasks which require a specialised person such as:

- advice on cost effective availability of image data;
- suitability of image data for the particular application;
- image data purchase procedures including advise on minimum area, copy right issues and import regulations; and
- download service through SPC Internet access.

Image data orders in the reporting period (15 in total) included the following:

- GeoEye data 4 band bundle covering Vanua Levu in **Fiji** (not all data received yet)
- WorldView-2 coverage 8 band bundle part of western Viti Levu Fiji (provided by DigitalGlobe free of charge)
- WorldView-2 coverage 8 band bundle of Ba water catchment Viti Levu **Fiji** (all received and processed)
- WorldView-2 coverage of left parts of Viti Levu **Fiji** (ordered but not received yet)
- THEOS multi-spectral coverage of complete **Solomon Islands** (not all data received yet)
- THEOS multi-spectral coverage of Rangiroa **French Polynesia**
- WorldView-2 4 band bundle coverage of Lifuka **Tonga**
- WorldView-2 coverage 8 band bundle of Santo **Vanuatu** (all data received)
- WorldView-2 coverage 8 band bundle of **Pitcairn** (all data)
- WorldView-2 coverage 8 band bundle of **Tokelau** (all data received)
- WorldView-2 coverage 8 band bundle of Mangaia **Cook Islands** (all data received and processed)
- WorldView-2 coverage 8 band bundle of Mauke **Cook Islands** (all data received)
- WorldView-2 coverage 8 band bundle of Mitiara **Cook Islands** (all data received and processed)
- WorldView-2 coverage 8 band bundle of Choiseul **Solomon Islands** (data ordered but not received yet)
- WorldView-2 coverage 8 band bundle of Choiseul **Solomon Islands** (data ordered but not received yet)

### *Relations with Image Data Suppliers*

It is the duty of the Division's GIS&RS section to identify the best value for funds provided. The contact establishment is normally carried out during conferences where the image data suppliers are present in numbers; for example the (i) International Symposium on South East Asia Environment and Satellite Remote Sensing, March 2010 in Bali or Sentinel Asia Joint Project Team Meeting, July 2011 in Malaysia, the ESCAP Expert Group Meeting February 2012 in Bangkok or the ISPRS World Congress in Melbourne in August 2012. Several contacts were also made when data resellers visited the yearly Pacific Island GIS&RS User Conference in Suva.

Current image data suppliers include the following,

#### **DigitalGlobe**

DigitalGlobe is an American company operating three satellites providing very high resolution (VHR) image data (i) QuickBird, (ii) WorldView-1 and (iii) WorldView-2 where the last one provides additional spectral bands compared with all other VHR imaging satellites.

During the Pacific Islands GIS&RS User Conference two representatives of DigitalGlobe presented and established contacts. Normally VHR image data the GIS&RS unit purchased more cost effective through image data reseller such as Pacific Geomatics or MDA. Noticing the amount of data required for Pacific Island Countries DigitalGlobe provided special discount and SPC-SOPAC will become image data reseller for DigitalGlobe.

#### **GeoEye**

GeoEye is a company operating the two VHR resolution satellites (i) IKONOS and (ii) GeoEye. GeoEye's representative visited the GIS&RS User Conference in 2010 but the data delivery works through Pacific Geomatics and MDA. GeoEye has been bought by DigitalGlobe and from mid December 2012 GeoEye will run under DigitalGlobe.

#### **Pacific Geomatics**

In 2011 most of all image data the Division purchased was through Pacific Geomatics as the company mostly provided the best price offer. The link to Pacific Geomatics was established through personal contacts of one sales manager who managed special discounts when working for MDA and provided always better offer than MDA when moving from MDA to Pacific Geomatics. Since DigitalGlobe provides better discount for better quality data the Division only purchased image data is users insisted in GeoEye products where Pacific Geomatics still provided better quotations than others.

#### **Astrium**

Astrium is a company designing and building satellites and at the same time also operating satellites where following ones are of interest to the Division: (i) Pleiades providing VHR image data like QuickBird, (ii) TerraSAR-X and TanDEM-X two radar satellites providing 1m resolution radar data and soon digital surface models with 2m contour lines and (iii) satellites of the SPOT series collecting image data for 1:50,000 scale mapping.

During 2011 and 2012 the Division did not purchase image data from Astrium as SPOT was not competitive with THEOS of GISTDA and for Vanua Levu 1:10,000 scale mapping Pleiades data distribution was not ready yet (satellite launched late 2011) and for Viti Levu 1:10,000 scale mapping Astrium was much more expensive than competitors such as GeoEye or DigitalGlobe. The GIS&RS section is registered as part of the Pleiades user group and will get data free of charge which will be tested together with USP.

#### **MDA**

MacDonald, Dettwiler and Associates Ltd. Geospatial Services Inc. (MDA) bought RadarSat International satellite data service which marketed a wide range of different satellites. In 2010 most image data was purchased from MDA but the data selling management changed. In 2011 a representative visited the GIS&RS User Conference and promised competitive pricing but all quotations provided were underbid by other data providers. For the last requested quotation to provide VHR image data of Viti Levu MDA wrote that they do not want to bid anymore.

#### **GISTDA**

GISTDA (Geoinformation and Space Technology Development Agency) which is part of Thailand's Ministry of Science and Technology and located in Bangkok. the Division purchases multi-spectral image data from GISTDA for the mapping at 1:50,000 scale in the Solomon Islands. GISTDA offered the most cost effective data, however, the data capture is very slow which is possibly linked to very limited onboard space for data storage.

#### **SASMAC**

SASMAC (Satellite Surveying and Mapping Application Center) which is located in Beijing China. Image data from the Chinese ZY-3 satellite appear to be of better spatial resolution and lower price than THEOS data (according to our contact).

**KARI**

KARI (Korean Aerospace Research Institute), which operates the Korean satellite KOMPSAT-2 an alternative to IKONOS. The data has to be purchased through Astrium, as a direct link to KARI has not been established yet. This might change soon as KOMPSAT-3 has 0.7 metre resolution in panchromatic mode and 2.4 metre in multi-spectral mode, a direct competition to Pleiades.

**GAF AG**

GAF AG is satellite data re-seller for the Indian satellites (i) IRS-1C, IRS-1D and the Cartosat series. GAF AG also provides the link to the COSMO Skymed series, 4 radar satellites flying in tandem; which are supposed to record image data about 6 hours after order. During the flooding in Nadi (Fiji) in February 2012 the satellite activation did not work. DTM at 1:10,000 scale produced from Cartosat image data for Solomon Islands did not work either.

*Image Data Pre-Processing*

Image data pre-processing includes:

- image mosaicing where the image tiles are joined together;
- ortho-correction;
- atmospheric correction and haze removal where special software is required;
- geometric correction;
- object specific image contrast enhancement;
- pan-sharpening; and
- image conversion from 16-bit raw images to 8-bit GIS image backdrops.

*New Developments*

This section outlines some new data and software developments rather than method developments of the GIS&RS unit.

At the end of 2011 image data of high geo-accuracy (WorldView-2) suddenly showed a shift of 90 metres. The problem was identified as a missing activation of the high geo-accuracy of the data. All three satellites WorldView-1, WorldView-2 and GeoEye are equipped with advanced GPS systems and an advanced star tracker. Both instruments record the position of the satellite during the data capture at high accuracy and store the information in a special file. This file can only be activated if an **ortho-correction** is applied setting the data in relation with a DTM, where the DTM can be at 1:50,000 scale. After the process, the data is about 5 metre accurate without additional reference image point. The ortho-correction is now a standard procedure of the GIS&RS unit.

The GIS&RS also started at the end of 2011 to carry out the **pan-sharpening process in house** as this has two advantages: (A) Image data purchased of pan-sharpened images as readymade products does not allow any atmospheric correction. However, it is possible to do the atmospheric correction first and afterwards the pan-sharpening process if this is carried out in-house. (B) Purchasing bundle data is cheaper than purchasing readymade pan-sharpened data and it provides an additional advantage that several products can be made out of the same dataset: (i) pan-sharpened image combination in visible combination red, green, blue; plus (ii) combination green, red, near infrared called false colour combination; plus (iii) normalised vegetation index which is near infrared plus red divided by near infrared minus red.

WorldView-2 image data is now provided as **8 band bundle** product four more spectral bands compared with VHR satellite data of QuickBird or GeoEye. This enables additional products to the combinations explained above during pan-sharpened and vegetation index calculation process.

The **atmospheric correction** was not available for THEOS image data as the sensor parameter file was missing within ERDAS. The software dealer and developer in Germany added this to the software.

### *Results, Image Data Pre-Processed*

For the following areas in **Fiji** ortho-correction, mosaicing, atmospheric correction, pan-sharpening and data recalling was performed: for the Ba watershed, Vanua Levu 1/3, and the Rewa Delta.

For **Solomon Islands** (1/3 of the country so far) geometric correction, atmospheric correction, subset production and image enhancement was performed.

For Rangiroa in **French Polynesia** geometric correction, atmospheric correction and data rescaling was carried out.

For Mauke and Mitiaro in **Cook Islands** ortho-correction, atmospheric correction and pan-sharpening was performed.

For Lifuka in **Tonga** geometric ortho-correction and atmospheric correction was carried out.

During the process software had to be updated several times as satellite calibration files were missing. In addition a new version of the atmospheric correction software was supplied. This was enabled through the software provider free of charge; nevertheless, this was a time consuming process.

The person normally performing the image data pre-processing was on maternity leave and was replaced by an intern attachment requiring on-the-job training.

### *New Capacity Requirements Image Data Service*

The image data pre-processing requires a licensed version of ERDAS software where only three are available at the GIS&RS section; two of which are GIZ funded dedicated to GIZ funded computers. The work currently proceeds as overnight batch jobs are processed on all three computers. If there is any increase of image data pre-processing in the immediate future, the processing power would have to be increased.

Image data purchase and image data pre-processing was carried out by one position. This was split into two attachments. After the person holding the position returns from maternity leave she will need assistance by the attachment currently performing the image data pre-processing.

## **ii) Vegetation Mapping**

Vegetation mapping was covered under "image data service" in the past; however, given its rapid rise to prominence it is therefore reported now under its own section.

Image pre-processing and analysis is different between a) larger volcanic islands with mountains and relief related atmospheric disturbance and sun shadow effects; and b) flat atoll islands without major elevation but high contrast between land and water.

### ***Land Cover Mapping of Volcanic Islands***

Image pre-processing for Pacific volcanic islands requires atmospheric correction due to relief related atmospheric disturbance. Normally, the mapping scale is smaller (1:50,000) than on atoll islands (1:10,000) and the areas are larger to be covered by the mapping task. The latest development is a request to also map at 1:10,000 scale so that operational maps for Forestry and Agriculture could be formed and enabled to utilise the texture of VHR image data for coconut stratification.

### ***Land Cover Mapping Fiji (1:50,000)***

The Agriculture Department asked the SOPAC Division to assist the department in establishing a land cover layer which stratifies the non-forest area as far as possible, where the department expects (at least) the following classes:

- Sugar cane fields
- Pasture land

- Summary of different other crops
- Bare land

The Agriculture Department required land cover mapping for the agriculture census but this mapping was only carried out for selected 10 x 10 km areas. The department needed a complete coverage to monitor agriculture and pasture development. The baseline layers which will be created will also contain a vegetation index layer, which can be used in cases of drought or plant stress.

The mapping was based on ALOS multi-spectral image data with a resolution of 10 metre recorded in 2007. The project started in late 2011. GIZ through a GOPA consultant financed one officer for three months to guide the mapping, where a minimum two persons from the Agriculture Department were involved at any given time.

## Results

Viti Levu and Vanua Levu are mapped where 10 agricultural classes are delineated (much more than expected) and the boundary between forest cover and agricultural land is agreed between Forestry and Agriculture. The forest so far is stratified into natural rain forest, pine plantation, hardwood plantation and mangrove.

This is the first time in Fiji that a map shows the agriculture classes for all of Viti Levu and Vanua Levu. After the flooding it was possible to map all areas below ~ 15 metres elevation and calculate the hectare of possible loss per agriculture class; figures required by the SPC Land Resources Division.

### *Land Cover Mapping of Fiji (1:10,000)*

USAID supports with 4 million USD activities for food security for the countries Fiji, Kiribati, Samoa, Solomon Islands, Tonga, and Vanuatu. 610,000 USD are allocated for image data hardware and software and additional. Very high resolution image data has been ordered for Vanua Levu and Viti Levu and partly received for both islands. The mapping is based on visual interpretation and delineation in GIS environment. GIS officers from Forestry, Agriculture, Fiji Pine Limited and the Department of Energy are working jointly and adjust the interpretation.

## Results

Currently 13 different agricultural classes are delineated besides rainforest, mangroves, pine plantation and mahogany plantation. The forest cover will be stratified at a later stage into dry forest, wet forest, high forest and low lying forest. Possibly different densities will be separated as well.

One map sheet of the topographic map sheet series at 1:50,000 in Vanua Levu is covered with interpretation at 1:10,000 scale and five map sheets out of 16 in Viti Levu.

The data received in the west of Viti Levu were recorded shortly after the flooding. For the corresponding map sheets visible flood damage on vegetation was mapped as well.

### *Land Cover Mapping Solomon Islands (1:50,000)*

In the absence of any current land cover map it was decided to completely map Solomon Islands at 1:50,000 scale first before mapping selected areas at 1:10,000 scale. After this decision in Honiara multi-spectral THEOS satellite image data was ordered. A cost effective Thailand owned satellite which records in four bands, including the near infrared spectrum with 15 m resolution. So far only one third of the area has been received from the GISTDA, the data distributing agency.



The mapping so far was performed by a forester (Stanley Lesinenea, Forestry Department Solomon Islands) financed by GIZ project "Climate Protection through Forest Conservation in the Pacific Island Countries". He created the forest layer for: (i) Guadalcanal, (ii) Choiseul, (iii) Malaita and (iv) Isobel. He separated (a) forest, (b) mangrove and (c) non-forest areas. Whenever there were some little clouds he displayed the area in Google Earth interpreted accordingly from the THEOS image data. For these four islands the agricultural mapping can start now. The vector layers are available on the SOPAC server.

### ***Land Cover Mapping Solomon Islands (1:10,000)***

The land cover mapping in Solomon Islands at 1:10,000 scale will concentrate on Choiseul and Rennell. So far, only image data has been ordered. For these areas 8 band bundle data will be captured allowing optimal vegetation stratification.

### ***Land Cover Vanuatu (1:10,000)***

For the island Espiritu Santo WorldView-2 eight band bundle image data was ordered and partly pre-processed. The visual interpretation of the image data has not started yet.

### ***Land Cover Mapping of Low Lying Islands***

Vegetation mapping for low lying islands started as an initiative related to the FAO programme **Monitoring Assessing and Reporting (MAR)** in Tuvalu where the SPC Land Resources Division Programme Forest and Trees worked together with the SOPAC Division to plan future activities in this area. In 2009 a monitoring system was established in the Agriculture Department in Kiribati and initial training was provided through the SOPAC Division. The Agriculture Department worked together with the departments of Environment and Lands on the vegetation mapping task.

### ***Land Cover Mapping Kiribati***

Kiribati – like Tuvalu at a later stage – expressed more reasons to map the vegetation of their outer islands than just MAR. They explained the importance of mapping the coconut resource because accurate figures are required to attract bio fuel related projects. Spatial and statistical information of the coconut resource is also required to be able to start regeneration activities as most coconut palm stands are getting senile. Another important reason to map the vegetation is the food security of low lying islands where the Agriculture Department needs to know the available amount and condition of pandanus, coconut and bread fruit to support management of this natural resource. Finally the vegetation cover is supposed to be documented to be able to record any changes through a re-mapping at a later stage. It is presumed that the impact of climate change will be visible through vegetation changes which refer especially to mangrove vegetation.

One GIS officer (Kataebati Bataua from the Lands Department in Kiribati) financed by the Forest and Trees Programme at SPC Land Resource Division is carrying out the task for Kiribati and is assisting in training officers from Tuvalu.

All mapping is based on visual interpretation at 1:5,000 working scale. The mapping is based on geo-coded very high resolution image data. On screen delineation between different land cover types stratifies the area into:

- Forest (if available on low lying islands)
- Coconut palms dens
- Coconut palms semi dense
- Coconut palms scattered

- Mangrove
- Shrub
- Village area
- Bare land
- Water bodies

For coconut areas the number of palms per hectare was estimated using sample plots with a statistically sound distribution. The palms are marked in a GIS layer and semi automatically counted in the attached Access database.

## **Results**

All islands of Kiribati are mapped with very high resolution image data. For all island of Kiribati the number of coconut palms is counted from image data. The corresponding reports are available in the SPC virtual library.

### ***Land Cover Mapping Tuvalu***

Tuvalu, like Kiribati, is low lying where coconut palm cover together with pandanus, bread fruit and other vegetation is essential for the same reasons mentioned above.

Also the mapping was carried out with the same procedure. The work was financed by BMU supported GIZ Project "Climate Protection through Forest Conservation in the Pacific Island Countries".

## **Results**

So far the islands of Nanumea, Niutao and Vaitupu are mapped and reports of vegetation cover are compiled. The GIZ support is on-going and the land cover of further islands will be mapped.

### ***Land Cover Mapping Cook Islands***

In the islands Mauke and Mitiara of the Cook Islands group, invasive species in the form of climbers grew over existing vegetation. Through GEF funding Cook Islands asked the SOPAC Division to purchase VHR image data, which were pre-processed with resulting pan-sharpened image output in natural and false colour infrared. Cook Islands also financed through the same source two GIS officers who performed a visual image interpretation. It was not possible to map the amount of vegetation covered by invasive species as field sampling was not undertaken. Nevertheless, the team mapped the up-to-date vegetation and continued the mapping in Cook Islands with supporting field work.

### ***Forest Cover Change Mapping of Volcanic Islands***

The volcanic islands of Fiji, Samoa and Melanesia still have substantive forest cover. To apply for REDD+ it is essential to have quantitative figures of forest area change.

### ***Forest Area Change Mapping in Fiji***

Satellite image data from 1991, 2001 and 2007 was analysed during the years 2010 and 2011 where most of the work was completed in 2011. Final report compilation was completed in December 2011. The results are currently being prepared for a web display.

### ***Land Cover Change Mapping of Low Lying Islands***

Land cover change mapping of low lying islands is the next step following the land cover mapping. Providing quantitative (not only descriptive) data of land cover change allows to locate and to analyse the historical development which can be used to predict future development.

#### ***Land Cover Change Mapping in Kiribati***

For the islands of Kiribati historical vegetation maps were found based on aerial photography recorded in 1969. These maps were scanned and the resulting images of the maps were geometrically corrected to fit with a linear shift to the projection of the pan-sharpened very high resolution images. Then the change of vegetation was analysed through an overlay procedure which visualises the change and provides exact data of vegetation change, detailing which type of vegetation was converted to non-vegetation or a different vegetation type within this time span.

#### **Results**

The land cover change was mapped in the following islands: Makin, Butaraitari, Marakei, Tarawa, Maiana, Aranuka, Onotoa, Tamana and Arorae.

In eight of nine investigated islands the vegetation including mangrove cover seems to have increased; and only in Makin a slight decrease was noted.

#### ***Land Cover Change Mapping in Tuvalu***

Also for Tuvalu vegetation maps of the same origin were found and the overlay process was performed like in Kiribati explained in the chapter above.

#### **Results**

Land cover change mapping was completed for the two islands: Nanumea and Vaitupu.

#### ***Forest Change Detection in Eua, Tonga***

One GIS officer at the GIS&RS section is financed by GIZ project "Coping with Climate Change in the Pacific Island Region". He produced together with a forester from Tonga Forestry Department a forest cover map from aerial photographs recorded in 1991. Then he interpreted the 2005 QuickBird image layer and produced a forest cover map 2005. Both maps were then rasterised and compared through an overlay process.

### **iii) Training**

To conduct hands-on training courses was the main activity of the GIS&RS section 5 to 10 years ago. This was necessary to introduce GIS and very high resolution satellite image data interpretation replacing aerial photographs and hand drawn maps at that time.

Today training is mainly provided as training on the job at SOPAC Division where GIS officers do satellite image enhancement and interpretation under guidance and continue in the offices at home with remote assistance from Suva.

One two-week training course of the former type was delivered in August to 25 participants of SPC-LRD and 25 participants of the Fiji Ministry of Primary Industry (MPI). This course was funded by GIZ which also paid a consultant from USP to conduct the training with one staff of the GIS&RS unit as the GIS&RS unit did not have the funds and the full work capacity to do it. The target of the training was to improve the access to and capacities of national and regional

decision makers in SPC-LRD and Fiji MPI to use GIS and spatial information on agriculture, forestry and land use planning for their day-to-day work. As LRD and the ministry cannot afford standard software, open source software was introduced

By the end of the training all 50 participants, which divided into small groups, had the understanding of the potential of the tool GIS and were able to operate the basic functions of QGIS as the open source GIS software.

#### **iv) System Installation and Maintenance**

To develop the tools of GIS&RS it proved to be most efficient to connect units in the countries through local GIS user groups and concentrate the assistance on a few model GIS&RS units from where knowledge may be transferred to others. In most countries utilities have the most sustainable GIS applications.

An important task of the SOPAC Division GIS&RS service is therefore system installation and maintenance of model units and which then can be linked to other users in the countries. There is ready-made software for GIS employment in the utility sector; however, these systems are made for organisations that have larger groups of customers than a typical utility in the Pacific. The best and proven most sustainable GIS systems are established where in-house staff customise GIS and database software. In these cases maintenance and adaptation to new tasks can be carried out cost effectively and sustainably by staff on site. In cases where ready-made systems required maintenance by specialists from overseas the cost and benefit correlation was not acceptable and systems were not supported by the management.

It is essential that the 6-month vacant position in the unit dedicated to this service be filled.

#### *RS/GIS Technical Support to Solomon Islands Electricity Authority (SIEA).*

Enhancement of Solomon Islands Electricity Authority (SIEA) GIS and the revival of the GIS technical users group. The SIEA GIS became non functional after its main GIS operator and GIS assistant left within 6 months of each other. There was a request to save as much data as possible and to reactivate the GIS functionality.

#### **Activities:**

- (i) Locating and backing up SIEA GIS Data. (ii) Training 3 SIEA staff in the application of power utility GIS using MapInfo and Quantum GIS (QGIS), the Free Open Source Software (FOSS) alternative. (iii) Implementing a Corporate GIS server using FOSS (Linux, PostGIS/PostgreSQL, and Quantum GIS (QGIS)) to centralise and share GIS data over the SIEA computer networks. (iv) Meet with Solomon Islands GIS technical users group and discuss way forward.

#### **Results:**

- (i) SIEA GIS Server in operation with centralised data shared on corporate network, backed up with a working copy at SOPAC Division GIS archive. (ii) Revival of the Solomon Islands Technical GIS users group which has been dormant for some time. (iii) Awareness of Solomon Islands GIS users about the FOSS tools and technology being used and currently under development here at SOPAC Division RS/GIS and Technical Support services.

#### *Guiding Trainee Attachment*

The GIS&RS section is currently short staffed; and it is important to train younger staff to be able to increase the workforce. The GIS utility specialised officer took this task on-board for one trainee, who is working now very effectively in the image pre-processing.

**Activities:**

(i) Data collection procedures using Trimble GPS, (ii) Data processing, database management, archival procedures and tidy up GIS-Server (iii) Using Free and Open Source Software (FOSS) Linux and QIS for utility GIS application (iv) Report Writing.

**Results:**

(i) Proficiency in using Trimble GPS rover units, Trimble Pathfinder Office, data dictionary, differential corrections and data transfer (ii) Proficiency in using MsAccess software, linking to MapInfo, data migration from spread sheets and flat files to a database format, logical data framework storage, data cataloguing, cleaning and archival of GIS-Server. (iii) Proficiency in Linux, Quantum GIS (QGIS) with connection to PostGIS Server and analysis tools for utility GIS. (iv) Trainee completed an official report on work done during the attachment period.

**v) Method Development**

A central GIS&RS service also has the task to carry out method development and adaptation. Methods of GIS and RS application, which work well in Europe or United States, face different conditions in Pacific environment such as high mobilisation costs for air borne systems, limited reference points in outer islands, difficult projects in use, etc. The methods have to be adapted to Pacific conditions.

***Establishing Water Catchment Monitoring System in Solomon Islands***

The GIS&RS section is developing a water catchment monitoring system for a catchment in Solomon Islands on Guadalcanal. The project is supposed to be a demonstration project and the methods developed will be scalable and transferable to other catchments in the Pacific. The project is funded through Taiwan. Land cover was digitised and several layers were installed. The work on the project was interrupted several times; but is still on-going.

***Establishing a Coconut Resource Inventory Design***

FAO will support the GIS&RS section with funds to establish and test the design of a coconut resource inventory. Three islands of **Kiribati** are selected to conduct field work 1) Abemama, 2) Abaiang and 3) Christmas Island. FAO needs an inventory design for other Pacific Island Countries to monitor the coconut resource and to enhance the resource by eliminating senile coconut palms through mobile sawmills which will create funds for coconut palm regeneration.

The areas of the islands were mapped using multi-spectral IKONOS image data. They have been re-mapped during 2012 using pan-sharpened GeoEye image data. For all islands in Kiribati the coconut palm counting has been conducted and corresponding reports are available in the SOPAC Division virtual library.

An instruction book has been developed to measure and estimate the palm: (i) age, (ii) height, (iii) diameter, (iv) volume, (v) yearly coconut production, (vii) insect infestation by stick insect (*Graeffea crouanii*) and rhinoceros beetle (*Oryctes rhinoceros*), (viii) Pacific tall or hybrid.

The database including the code to calculate volume/hectare, yearly production per hectare, etc. is established and tested through a test plot.

***Customising QGIS Software***

Currently there are no funds available to purchase software for the different sections of SPC-LRD. The Forest and Trees section is an exception through JICA funding. GIS open source software is one solution to establish GIS units with limited funding.

Quantum GIS open source GIS software is available and now permits the important function of linking external databases to spatial data of the GIS. The missing point is the possibility to customise the GIS which is essential to enable a GIS untrained person to utilise the system. Python is another open source software which can be used for the customisation.

The customisation is developed, implemented and the application is tested.

### *Establish Link between Raster and Vector Data*

Image delineation at the GIS&RS section is normally carried out in vector GIS environment MapInfo, ArcGIS, QGIS where image backdrops are utilised for on screen digitising. The area analysis and overlay analysis is performed in raster GIS environment as raster data allow a much faster processing; however, the conversion of vector data to raster data was complicated and time consuming. The result of raster data analysis has to be exported to a relational semi-manual database and therefore also time consuming.

The problem of vector to raster conversion is solved through an ArcGIS extension package.

The problem of automatic area analysis transfer from ERDAS to a relational database is yet to be resolved.

### **vi) Information Dissemination and Networking**

The SPC SOPAC Division is tasked to support Pacific Island Countries in the GIS and remote sensing; according to a mandate given by CROP. The SOPAC Division is also the regional member of ISPRS. With these two mandates the SOPAC Division has to link:

- GIS&RS users within the Pacific;
- users of the Pacific with the international level, where organisations such as ISOC, ISPRS, PCGIAP, UN-SPIDER, etc. can provide assistance; and
- GIS&RS activities of SOPAC to other initiatives within regional organisations.

### *Contribute to the Planning and Organisation of the GIS&RS User Conference 2011*

The Regional GIS and Remote Sensing User Conference started nearly 10 years ago as an initiative between USP and Fiji Lands Department. Over the years this originally national conference has evolved into the most important regional conference, where GIS and RS users on technical level exchange ideas and get information from software, hardware and image data selling companies. Currently the Conference is mainly organised through the Division as it is an ideal platform to distribute the latest developments regarding satellite image data, GIS&RS application methods, hardware and software. The conference report is compiled by the Division and made available on the Internet to download. The Conference took place from 29<sup>th</sup> November to 2<sup>nd</sup> December 2011 in the SPC Lotus Building in Nabua. The Conference had the theme “*Data Sharing, Better Mapping*” and was fully attended even during the last half day there were big number of participants.



Pacific Islands GIS&RS User Conference 2011 participants

Prior to the start of the Pacific Islands GIS&RS User Conference more than 200 individuals had subscribed to attend. Of these more than 150 actually appeared at the conference. Presentations were made by representatives from Kiribati, New Caledonia, Papua New Guinea, Samoa, Tonga, Vanuatu and also from Australia, New Zealand, Hawai'i, Canada, USA. A number of other national representatives were attending the Conference as participants.

A number of organisations had representatives at the Conference or presented through others. These included other regional agencies apart from the Secretariat of the Pacific Community, namely, Secretariat of the Pacific Regional Environment Programme (SPREP), Pacific Islands Chapter of the Internet Society (PICISOC) and the University of the South Pacific (USP). The national agencies were Taukei Land Trust Board (TLTB), World Conservation Society (WCS), Fiji Sugar Corporation (FSC), Telecom Fiji Limited (TFL), Airport Fiji Limited and the Biosecurity Authority Fiji. The following regional and international companies and agencies were present or presented: Electric Power Corporation of Samoa (EPC), Solomon Islands Electricity Authority (SIEA), Telecom Services and Kiribati Limited (TSKL), MacDonald Dettwiler and Associates Ltd (MDA), New Zealand Aerial Mapping Limited, Pacific Geomatics, Infoterra GmbH and DigitalGlobe International. Software and hardware companies presented and displayed their products and services included Eagle Technology (ESRI), Geosystems NZ Ltd, Lukemine Enterprises. Finally consultant companies participated such as GNS Science, Air Worldwide, Information Technology Service.

With 15 presentations about remote sensing data set a new record for coverage of this area. Also forestry, agriculture and environment sectors were covered with 10 presentations also a new record. Mixed presentations and GIS in education covered 7 presentations. Utility applications were covered with 5 presentations, slightly less than previous years. Open source platforms were covered by 4 presentations and GPS applications were also covered by 4. Pacific islanders presented less on the use of GIS or RS and the number of participants from outside the Pacific who presented increased.

The following seven topics were discussed during the discussion session:

- What USP should teach regarding GIS&RS and Data sharing
- Vegetation Mapping Pacific Island Countries
- Disaster Application of GIS and RS
- Utility GIS Application
- Open Source GIS, RS and Database Software and GIS Web Applications
- DTM Creation and Editing
- What GIS can do for climate change debate

This year the discussion was recorded with two cameras and will be reported in detail. These records can be utilised as basis for GIS and RS development.

#### *Maintain the e-mail List GIS-PacNet*

Since mid of the nineties the e-mail distribution list is available as a SOPAC help function for the Pacific. The original idea was mainly the support of GIS and RS related questions and problems. Today seldom GIS related question are raised and answered but the list is often used to distribute news of new developments, new data or events in the area of GIS&RS.

It takes 5 to 10 minutes on a daily basis to screen messages and clean the list from Spam which is normally handled by the person also responsible for image data purchase.

The GIS-PacNet mailing list is hosted at the PICISOC website and was shut down for several weeks by SPC ICT Noumea at the beginning of 2012. The GIS&RS section of SOPAC Division recovered most of the original subscribers and reactivated the list. During the last weeks the list got very active and will very likely reach the same number of participants it had before.

### *Maintain and Develop GIS and RS Related Websites*

There are two websites, which are maintained by SOPAC Division: a) the division's own website and b) the SIG GIS&RS website of PICISOC.

The units pages had to be re-established after the SOPAC Division website re-organisation. The following parts had to be re-built and the work is still ongoing:

- Satellite image data available for Pacific Island Countries,
- Display of reference image points,
- Instruction papers for GIS and RS applications,
- Link to demo GIS units,
- Important articles describing methods or GIS, RS and GPS applications,

The PICISOC base website had serious problems related to servers in SPC Noumea and was out of function for several months. Given the Pacific Islands GIS&RS User Group Conference pages are an important part of the GIS&RS section's web present at the PICISOC website; it has had to be re-established at its webpages on the SOPAC Division site. All other GIS&RS related parts of PICISOC will be also established at the SOPAC website.

### *Support GIS&RS User Group Meetings*

The Fiji GIS&RS User Group started to meet in 1991 when the Fiji Forestry Department established their GIS and did not want to be isolated from other development. These meetings proved to be an essential tool to share knowledge between technicians and to avoid duplication of work. The meetings in Fiji also guide and stimulate decision makers, which led in Fiji to a meeting at decision maker level a day after the User Group Meeting.

The SOPAC Division continues to encourage other countries to follow the Fiji example and also create monthly meetings of GIS&RS technicians where normally the utility GIS staff take the leading role. Fiji again has a leading role in GIS development with other countries therefore observing Fiji. This is the reason that the SOPAC Division continues to support the Fiji User Group Meetings and ensures that the minutes of the meeting are distributed in the Pacific through GIS-PacNet.

There was no GIS&RS User Group Meeting this year in Fiji due to several reasons. The situation has been discussed and will be changed through the SOPAC GIS&RS section which will initialise the meetings by conducting the first two meetings together with USP.

### *The Pacific Islands GIS&RS Newsletter*

The Pacific Islands GIS&RS Newsletter has a history dating back to 1993. It is the only publication where Pacific GIS or RS officers publish their applications. At its peak more than 400 prints were produced, however, in Pacific Island Countries the number of readers was much higher as one hardcopy newsletter was read by many.

The newsletter has not been compiled for two years for many reasons. Now a new team has been formed and it is expected that the first new print will be out before the next GIS&RS User Conference.



## **DATA MANAGEMENT**

### **Compendium**

The second half of 2012 began the assembly of the Country Compendiums of the Project. A huge factor in this enablement is completion of all desktop research on metadata for each of SOPAC's member countries including Associate Members and Donor Members of Australia and New Zealand; the provision of proper storage space for the large maps and charts and proper work stations for data entry. In addition the photo database was also built which facilitated the bringing together of the final dataset of the division into a formal repository.

An intern was recruited to work dedicatedly in reviewing the huge collection of photos of the division and recording metadata entries on these individual photos. Metadata entry is fully underway.

Two additional interns, both nationals from Kiribati was also recruited – one specifically to work on the Kiribati Country Compendium and the other for GeoNetwork metadata entries of large format maps and charts and also to assist with the photo registration. The training database was completed in the first half of the year.

In terms of the digitization of the large format maps and charts, scanning completed to date are the datasets of the following countries: Federated States of Micronesia, Nauru, Palau, Guam, Kiribati, Papua New Guinea, Marshall Islands, and Niue. The second half of the year will be spent on metadata entries of these datasets as well as that which will be scanned in the second half of the year.

Simultaneous with the above exercise is the review of the file shares of the division, particularly for documents and data products that should be captured in the Compendium. All the different datasets are converted into portable document format and stored in the Compendium server for its assembly on the Compendium Console and for final packaging for each member country.

### **Continual Systems Development Support for Programmes**

Data Management Section of Technical Support Services provides systems development and software support services to all divisional technical programmes.

#### *SOPAC Corporate System*

The SOPACCORP integrated system has been functioning without any issues throughout the year. Some major modifications to a few of its modules were carried out in order to satisfy SPC requirements. The latest changes to be carried out were on the travel module to reflect the recent changes in SPC travel policy. Other enhancements were carried out as per user/programme requests.

The photo database mentioned above in the compendium section was a new module attached to this integrated system and is used by the Compendium team to upload the SOPAC photo collection as part of the compendium work. As of September 2012, more than 15,000 photos have been categorised and registered.

#### *Software Training for Tuvalu personnel*

A Tuvalu personnel, Lomaloma Pepine, was attached to the section for a month in June for advanced training in VB.NET and SQL. She was initially attached to SOPAC as graduate

student trainee two years ago. During this training period she was able to develop a working prototype of a Births, Deaths and Marriage registration system. It is her goal to assist the Tuvalu Government to develop and implement a similar working system for them.

### *Consolidated Virtual Library*

Data Management section, in conjunction with Publications and Library section, designed, developed and deployed a consolidated virtual library system which combines the legacy SOPAC Commission and newer SOPAC Division digital documents under a single searchable web based system.

Additionally, the section resurrected Koha Integrated Library system by converting data from the division's legacy library system, in conjunction with SPC Library Section, with the aim of having a singular integrated library system across all SPC divisions. The unified Koha Library system is currently in testing phase by SPC Noumea and Suva library staffs, with the goal of having the system made available to staff by December 2012.

### *Consolidated Search*

SOPAC division holds various different data stores containing documents and digital assets in diverse systems such as Virtual Libraries, Electronic Document Management Systems, Pacific Disaster Net, Pacific Water documents, Trip Reports repository, SOPAC Corporate databases, SOPAC website etc. To enable staff to easily locate documents, a unified web portal was developed and deployed which streamlines search across all the non-spatial repositories in the division.

### *Virtualized Environment Adoption*

SOPAC division's internal web and database applications were migrated onto a new Virtualized Server Environment. This on-going migration of services and data from older physical servers would enable ICT to have a smaller energy footprint, on-demand provisioning of server resources, and better disaster recovery measures, in addition to many other benefits.

### *Geospatial Data Sharing*

To facilitate greater sharing of geo-spatial tabular data, a web-based database was developed in conjunction with the division's GIS/RS unit and Land Resources Division, which aims to provide a platform for seamless data sharing and collaboration by converting uploaded Microsoft Access databases into a web database system, and providing a user-interface for registered users to interact with, update and export tabular data.

To further align the geospatial data systems with the rest of the division, the Data Management Section will implement a secondary deployment of the Pacific Risk Information System platform within Noumea campus, to enable easier access and use of the PCRAFI data by Statistics for Development Programme (SDP)

Additionally, geo-referenced satellite image data received for Pacific Island Countries are often not correct and have to be verified and geometrically corrected. An online repository, called Pacific Geospatial Reference System, was developed which holds Reference Image Points for Pacific Island Countries, to properly utilise satellite and aerial imagery data as backdrops in Geographic Information systems and processes which is correctly geo-referenced.

### *SOPAC Geospatial Operating System Distribution*

While there has always been significant interest in using Free and Open Source Software (FOSS) for geographical information operations and tasks within both the SOPAC Division and GIS units in member countries, the upfront commitment required, in terms of time and skill-sets, made further exploration and migration unfeasible. Seeing a need for a preconfigured, and hence easy to get started with, Linux distribution for GIS power users who are non-Linux experts, SOPAC division has precompiled and packaged the most commonly used GIS tools for desktop and web on a single distribution. There have been 2 releases of this distribution as of August 2012, and users have been engaged through the 2011 Pacific Islands GIS/RS User Conference, an in-country training session in Solomon Islands, and Pacific Islands GIS/RS mailing lists.

### *PCRAFI Support*

Data Management Section provides development and support role to Disaster Reduction Programme Pacific Catastrophe Risk Assessment and Financing Initiative in the form of deploying and supporting the Pacific Risk Information database system on open source geospatial components.

Taking into account the low bandwidth environment in the PICs, which hinders responsive display for interactive maps held within the PCRAFI data systems in SOPAC, an offline version was developed for distribution to users. The offline version is currently undergoing further refinements and testing.

### *Compendium Support*

Data Management Section has been providing ongoing systems development support to the Compendium data cataloguing initiative. In 2012, a project management tool was deployed where compendium staff and managers can track task status, resource allocation etc.

### *Website and Intranet Portal Prototype*

In 2011, the need to evolve the Division's web presence further surfaced, primarily driven by the desire to bring to the fore information on the many other important frontiers of work that in the current web platform remain "under stated". There was a consensus within the division, that KRA and project based information was not getting the visibility required, and therefore made navigation and location of information difficult.

A working group was formed within SOPAC division, consisting of Data Management, Technical Support Services personnel, and suitable representation from each programme (2 to 3 staff per programme) to implement a suitable alternative.

Furthermore, in the staff survey conducted in 2011, a clear need was identified to improve communication lines across programmes and staff. A mechanism was required that improved the flow and access of internal information across the division. To this end, an open source intranet portal was trailed out which aimed to enable staff to collaborate easily and share information both within and outside the division's network.

In September 2012, a web presence working group was formed with SPC IT Section, SPC Publication Section, SOPAC Data Management Section, SPC Statistics for Development Programme and Land Resources Division, with the goal of having a unified organisation-wide web presence overhaul. The base test site is to be made available by January 2013.

### *Open Source Engagement*

SOPAC Division continues to engage with the open source community by publically publishing the source code of many systems development projects undertaken within the division. This gives the division an opportunity to contribute back to the open source community, from which a large number of systems within the division are built upon.

Source code sharing ensures a development project's longevity and survivability as external resources (such as developer time) can be engaged to provide support and expansion from the community, as and when required, in the long-term.

### *Support to Pacific GIS/RS User Conference*

Data Management section supports and provides service to the upcoming 2012 Pacific GIS/RS User Conference in the form of development of a conference web site and a online registration database system.

### *References*

Virtual Library	<a href="http://ict.sopac.org/library">http://ict.sopac.org/library</a>
Koha Integrated Library System	<a href="http://koha.sopac.org">http://koha.sopac.org</a>
Consolidated Search	<a href="http://ict.sopac.org/search">http://ict.sopac.org/search</a>
GIS/RS Tabular Data Platform	<a href="http://ict.sopac.org/qisdb">http://ict.sopac.org/qisdb</a>
Pacific Geospatial Reference System	<a href="http://ict.sopac.org/pgrs">http://ict.sopac.org/pgrs</a>
SOPAC GIS Operating System Distribution	<a href="http://ict.sopac.org/qisos">http://ict.sopac.org/qisos</a>
Pacific Risk Information System	<a href="http://paris.sopac.org">http://paris.sopac.org</a>
Compendium Support	<a href="http://ict.sopac.org/compendium">http://ict.sopac.org/compendium</a>
SOPAC Website Prototype	<a href="http://ict.sopac.org/project">http://ict.sopac.org/project</a>
Open Source Code Repository	<a href="http://github.com/sopac">http://github.com/sopac</a>
Pacific GIS/RS User Conference	<a href="http://picgisrs.appspot.com">http://picgisrs.appspot.com</a>

### **Network and Communications**

Major work was done in this area to allow our the SOPAC Division's network to align itself with that of the main SPC network communications infrastructure .

#### *Helpdesk Change*

- Change of Helpdesk system to SPC Cerberus Helpdesk in February.
- Daily checklist of ICT services is now done to identify and resolve issues early.
- Notification of infrastructures changes is done to reduce helpdesk issues.
- Helpdesk is now used to assist in KPI for ICT staff performance.

#### *Email & Web Filtering*

- All outbound / inbound email is now filtered for spam under SPC. This was implemented in July.
- Cache & Web filtering is also implemented to improve usage and performance.

### *PABX Upgrade*

- Implementation started in July 19th and our new phone was cut-over on the August 8<sup>th</sup>.
- PABX infrastructure is standardized and integrated with that of SPC.
- SOPAC extensions are now on 36xxx (xxx is the extension number)
- SOPAC users are now able to call or send a fax to any other SPC branch users and vice versa at no cost to the organization.
- Change of Telecom analog direct lines to digital PRI
- Redundant Telecom lines are now in use between Nabua campus and SOPAC.
- SOPAC users also have their own direct dial-in e.g. 3249xxx where xxx is extension no.
- 3 Party Conference is now available for all users and training is scheduled for users by end of September.

### *Cabling Upgrade & Fibre Upgrade*

- New data & voice cabling was completed in August 10<sup>th</sup>. Total 446 new outlets runs were created for SOPAC users (to replace the old ones)
- Additional Fiber cables was installed between the SOPAC Division main offices and Electronic Lab and also the Water building.
- CAT6 cables were used to replace the CAT5 ones. This increased the bandwidth capacity to 10Gbps (from 1Gbps).
- The old cabling & cabinets will be removed after the cutover to the new cabling.

### *Server Room Rénovation*

- The Server Racks were realigned to allow better utilization of space and air-cooling.
- Additional rack space for PABX was created, proper cabling & UPS racks, Floorboards were strengthen to cater for additional/future weight of equipment, ceiling lighting was improved, removal of unused side cabinets to created more space.
- Renovation is to be completed by September 2012.

### *Domain Migration*

- Integration of the following infrastructures into SPC included the DNS, DHCP, Gateway Completed. This was completed in May 2012.
- Schedule of Domain & Email migration Scheduled for the 4<sup>th</sup> Quarter of 2012.

## PUBLICATIONS AND LIBRARY

### Library Services

The following were undertaken during the period Sept 2011- Aug 2012 by the SPC Geoscience Library (SOPAC Library). These include the regular library work as well as special projects that were completed or are still underway.

- Cataloguing backlog and new items; barcoding new items processed . Statistics given below.
- Under the AusAID funding for the Pacific Marine Libraries Twinning Project; Training was provided which included internship mostly detailing library work of Interlibrary loans, Cataloguing, Research, WEB2.0 training. Building a Blog to showcase and promote the resources of a library in a more interactive way, Networking with Libraries in Australia - Libraries in this programme included Great Barrier Reef Marine Park, James Cook University and Geoscience Australia Doc. Fisher Library
- Taking part in discussions with CROP agency libraries for Koha in the region (USP, PDN, SPC)
- Networking included attending the USP Electronic repository opening at USP, attending a lecture for Information Literacy promotion in libraries at the American Resource Center
- Attending the EDRMS presentation by Robert Appel
- Photo repository brainstorming discussions
- Appointed to the Membership Committee as PIRG (IAMSLIC Pacific Islands Regional Group) - duties include looking after the membership of this group

Statistics for Reporting Period:

Purchases of Books and Subscriptions = 3  
 Library orientation = 4  
 Research requests = 102  
 General library use requests = 87  
 Internet Downloads = 32  
 Library room used as a meeting room = 139 times  
 Interlibrary Loans = 23  
 Cataloguing backlog and new items processed = 71

Special Projects:

- SOPAC Compendium – preparing documentation for storage unit for archives, follow up on data transfer to current media formats, meeting and procedure contributions, checking floating databases/archives, overlooking library component of compendium, compiling bibliographic lists for country collections from the library. Overseeing the building of the Archives storage space with Sailesh Kumar Sen. Working on labelling procedures for Archival maps and charts
- SOPAC Division Virtual Library - Assisting Lala Bukarau (Publications Adviser) on the testing of functionalities of the virtual library
- SOPAC Closed collection catalogues and listings have been completed; awaiting Publications backlog of reports to be processed and then cataloguing of these items into the Closed collection will be brought to a close.
- SOPAC active catalogue migration to SPC Koha – 3<sup>rd</sup> phase has been completed by Sachindra Singh (Systems Developer) with minor work left to be done by him. This has been opened to Mary Clare (SPC Librarian) to test and critique

## **Publications Service**

Annex 1 lists most of the report products cleared through the SOPAC Division publications service undergoing either editorial or graphic arts processing or both.

### ***New SOPAC Division Virtual Library***

Last year (the first year of operation of the SOPAC Division within the SPC), we began the design and operation of a new Division virtual library following the example of what had been generally viewed by all that access SOPAC-produced reports as 'best practice'. The operational refinement for a simple system to provide access to reports produced by the Division as they emerge has been completed. There remains the small aspect of improving the design of the icons. While the portal is not fully in the public domain (<http://ict.sopac.org/library/>) it is already picked up by any web-based search engine. It is used at this stage as an administrative tool to assist the publications section in keeping track of published reports centrally; as well as to provide staff access to report products of their work. SPC ICT and Publications are in the throes of planning the revamp of the SPC-wide web site and the final mode of deployment of the Division virtual library will depend on the outcome of that organisation-wide exercise. The Division virtual library may also be used by other divisions of SPC as a model for providing access to their products, within the framework of the SPC website access protocols.

### ***Support for SOPAC Divisional Meetings***

The Publications and Library services has had a traditional secretarial role during Commission days in assisting the Directorate of SOPAC with servicing an annual meeting for reporting to Members on work programme implementation and planning and budgeting for the next year's plan of work. This role has been in the areas of meeting papers preparation and publication and rapporteurship at the meeting proper. Meeting papers preparation and publication includes collating of inputs from technical programme directors into the Director's reporting papers to Members; editing and formatting of papers; and publication of meeting records in hard and/or soft copy and online. Implicit in 'publication' is the distribution and access to these records in answer to inquiries from within and without the Division.

In closely monitoring the various roles played by the Publications and Library Team since the merger, particularly in the lead up to, during and after the first Division meeting it is apparent that many of the corporate Commission roles played by for example the Adviser will further change when there is a new Director of Division and/or a new P&L Adviser (Technical Editor).

The current model of administrative support by the Publications and Library service to the Director of Division with respect to annual meeting papers is a relic of the SOPAC Commission days (and particularly the RIF) and will undermine technical delivery in the new Division if retained. The assistance to the Director of Division being currently carried out by the Adviser is an executive function and should be returned to the office of Director, when the new incumbent takes up office.

Nevertheless, orderly and meticulous (not to mention honest) record keeping is a hallmark of a technical organisation that will stand on and by the data and information it collects and interprets to enlarge the body of knowledge to which it contributes. Therefore it is advised that the SOPAC Division retain the practice of keeping good records; for posterity. This reputation has been the driver behind the SOPAC Compendium Project that is currently being implemented at the Division by the Publications and Library and Data Management services to implement a digital collation of the data holdings of the suspended Commission; and therefore improve its security and accessibility.

## **SPECIAL PROJECT: SOPAC COMPENDIUM**

The SOPAC Compendium Project is being implemented in the conjunction with the Division's data management section given the critical digitisation aspect of securing what was largely a hardcopy collection. Therefore this section should be read in conjunction with the report from the Data Management service (Paper SOPAC-2/3.4.3).

The grant from Australia (AUD150.000) received in June 2011 greatly facilitated the engagement of student research assistants, the full complement numbered six students; largely taken from the USP pool of graduates out of its GIS and remote sensing programme. In addition a Project Officer closely supervised the interns with respect to daily operations and a graphic artist was assigned to the Project from the Publications and Library Services team dedicated to the large-format scanning (a total of 8 team members).

The greatest challenge for the Project has been motivating the team of researchers to stay focussed and inspired by an exercise that is particularly monotonous; not to mention the volume of material to process and the constraints in physical as well as virtual space that the team was expected to work with at the beginning; and even in 2011 when dedicated hardware was purchased to facilitate the digital collation, the Project struggled to get unfettered access to it due to teething issues with respect to the merger of SOPAC into SPC.

That said, the team is pleased to confirm the completion of all the country-specific research. What this means is that according to the records of Commission annual board meetings; references to existing technical material generated for each Member country have been captured. This would be the basis for identifying those referenced products in all the material being digitally captured and described; be it a report, image (airphoto or map), even a dataset. The collection has been organised under categories formulated according to how Member country users of the information have requested the material from the old and new SOPAC.

In mid-August construction of a climate controlled and more spacious office/archive facility to eventually house the closed SOPAC Commission collection (including the SOPAC petroleum data currently occupying rented space in Canberra) was completed. This has provided some relief from the drudgery imposed on the team of researchers; and the work of revising and cleaning of the datasets is continuing from a space more conducive to productivity. While research has been completed, the scanning of all large-format hardcopy material (being the slowest part in the process) is yet to be completed. Cleaning and refining of the metadata entries that describe the digital products so that search engines pick them up is a major undertaking that will most likely continue beyond the life of the Project. The team is also assisting the Geonetwork team (OIP data management portal) reconcile the live (Geonetwork) and archival (Compendium) digital collections. Into the future, it is envisaged that Geonetwork will be the main portal through which the SOPAC Compendium closed collection may be accessed through various access protocols that will be defined later.

It should be noted that text (metadata) descriptions of the material being organised digitally are authored by the student researchers themselves; and requires some technical understanding and appreciation of the information contained in the material. The accuracy of these descriptions is critical to an efficient retrieval system; which we observe as already operational judging by the frequency of requests received for access. On average, the number of requests has settled to about 5 per week asking for a password to view the collection – this is from a peak earlier in 2012 of 10 requests in a day. Requests for use of the original data in any way shape or form is currently assessed on a case-by-case basis and includes permitting by Members before release.

During the reporting period, Kata Duaibe, Project Officer, left for a position at UN Women. The following student interns departed the Project – Loraini Baleilomaloma for further studies (Belgium), Eferemo Kubunavanua for longer-term position at the Forum Secretariat; Sanivalati Tubuna for a longer-term position at SPC's own SEPPF unit; and Manish Singh, also for further studies (Australia). Graduate researchers currently engaged in the Project are: Sally Rimon, Lodovika Tofinga, Thomas Toba, Emma King, Amali Shaw and Rave Tuihea; the latter two sharing the supervisory role that was carried out by Kata Duaibe until mid August 2012.



The Data Management (DM) and Publications and Library (PL) services are targeting June 2013 for when the bulk of the digitising and collation processes should be concluded. Dedicated cleaning and quality assurance is underway and expected to continue until the end of 2013; at which point the SOPAC Division DM & PL services can take up those aspects in the routine monitoring and maintenance of these information systems.

The SOPAC Compendium Project has given the SOPAC Division a “best shot” chance at putting the Commission records in order for the new custodians at the greater SPC; and we wish to place on record our sincere appreciation to the Australian Government; and its many *fair dinkum* officials here in Suva, Fiji (the location of the SOPAC Division); as well as those in Australia and elsewhere, who have been unstinting in assisting the team at the Division in carrying out this exercise. Also, the Fiji Government continually facilitates the process by providing accommodation for the Division within its Mineral Resources Department premises; with the current Director, Malakai Finau, expressing particular interested in the processes and eventual product of the digital collation.

At the Second SOPAC Division meeting, to be held in Noumea in November (2012), a demonstration Compendium Collection for a Member Country will be available for viewing; as well as an informal video of the progress of implementation. The team is in consultation with the Regional Media Centre for an official video to launch the country collections; timed for the end of the project; or the latter part of 2013.

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**ANNEX 1 – SOPAC Division reports and publications, 2011 (as at 31 August 2012)****Published Reports**

*Documents created for the widest possible dissemination promoting SPC and its Members; and publishing work Programme results*

25	WHO/SPC-SOPAC Division Joint Contribution Report PR25 – Pacific Drinking Water Safety Planning Audit Guide/Matt Molloy (Consultant), Tasleem Hasan (SPC), Kamal Khatri (WHO), John Dennis (Consultant)
26	Abstracts of Papers presented at the 28 <sup>th</sup> STAR Session 2011 (Compilers – John Collen (Chair of STAR) & Lala Bukarau (Publications & Library, Technical Support Services)
27	Country Reports on SOPAC Division Work Programme implementation 2010/2011 prepared for SOPAC-1 and CRGA 41, October-November 2011/SOPAC Division (Available on request)
28	SOPAC News, April-September 2011/Lore Ratuyawa [compiler] (Publications & Library, Technical Support Services)
29	Economic Report – Papua New Guinea investment in disaster risk management/Samantha Cook (Disaster Reduction Programme)
31	Record of the First SPC Applied Geoscience and Technology Division Meeting (SOPAC-1), 17-21 October 2011, Nadi, Fiji Islands (Compiler – Lala Bukarau, Publications & Library, Technical Support Services) [CD Only]
32	IUCN/SPC Joint Contribution Report – Pacific Resource and Environmental Economics Network (PREEN), Newsletter, Issue 05, December 2011
33	Economic Report – Fiji investment in disaster risk management/Samantha Cook (Disaster Reduction Programme)
34	Activities Report – Marine survey and mapping activities 2011 – report to the South West Pacific Hydrographic Commission, 11th IHO SWPHC Conference, Brisbane, Australia, 15-16 February 2012/Jens Krüger & Salesh Kumar (Ocean and Islands Programme)
35	Technical Report – FSM Petroleum Corporation Yap terminal geotechnical investigations/Robert Smith & Andrick Lal (Ocean and Islands Programme) CONFIDENTIAL
36	Technical Report – Multibeam bathymetric and seismic survey for port development, Naduri, Vanua Levu, Fiji Islands, 5-16 October 2011/Robert Smith (Ocean and Islands Programme) CONFIDENTIAL
37	Why we need hydrological data (Pacific Hydrological Cycle Observing System (HYCOS))/Peter Sinclair & Amit Singh (Water and Sanitation Programme)
38	Technical Report – Rapid drought assessment Tuvalu, 13 October – 8 November 2011/Pete Sinclair (SOPAC, WSP), Fereti Atumurirava (LRD), Josaia Samuela (PHD)
39	Snapshot 70, Disaster Reduction Programme, August 2011/Stephanie Zoll (Disaster Reduction Programme)
40	Snapshot 71, Disaster Reduction Programme, September 2011/Stephanie Zoll (Disaster Reduction Programme)
41	Snapshot 72, Disaster Reduction Programme, October 2011/Stephanie Zoll (Disaster Reduction Programme)
42	Snapshot 73, Disaster Reduction Programme, November 2011/Stephanie Zoll (Disaster Reduction Programme)
43	UNEP/SPC Joint Contribution Report – Freshwater under threat, Pacific Islands, Vulnerability Assessment of Freshwater Resources to Environmental Change (RESTRICTED – see UNEP location for publication)/ David Duncan (Water and Sanitation Programme)
44	Technical Report – Republic of Marshall Islands Majuro Atoll water quality analysis 2011 (RESTRICTED)/Tasleem Hasan (Water and Sanitation Programme), Abraham Hicking (RMIEPA)
45	Annual Report – SPC-SOPAC GIS and Remote Sensing Section from November 2010 to September 2011/Wolf Forstreuter (GIS & Remote Sensing Section/Technical Support Services)
46-66	Technical notes on Land cover type mapping utilising various satellite imagery for the following islands of the Republic of Kiribati – Tarawa, Abaiang, Abemama, Banaba, Beru, Onotoa, Tamana, Arorae, Christmas, Enderbury, Kanton, Kuria, Makin, Manra, Marakei, Nikunau, Orona, Starbuck, Tabuaeran (Fanning), Teraina (Washington)/by Wolf Forstreuter (GIS & Remote Sensing Section/Technical Support Services), Taato Murdoch and Kataebati Bataua (Kiribati) – full listing available online and from the Division
67	GEF Pacific IWRM Project Meeting Report – First meeting of the Regional Steering Committee and Inception Workshop, Nadi, Fiji Islands, 14-18 September 2009/SOPAC-GEF-IWRM (Water and Sanitation Programme)
68	GEF Pacific IWRM Project Meeting Report – Second meeting of the Regional Steering Committee, Koror, Republic of Palau, 19-23 July 2010/SOPAC-GEF-IWRM Team (Water and Sanitation Programme)
69	GEF Pacific IWRM Project Meeting Report – Third meeting of the Regional Steering Committee, Rarotonga Island, Cook Islands, 25-31 July 2011/SOPAC-GEF-IWRM (Water and Sanitation Programme)
70-81	GEF Pacific IWRM Demonstration Project National Mid-term reports for the participating countries – Cook Islands, Federated States of Micronesia, Fiji Islands, Kiribati, Marshall Islands, Nauru, Niue, Palau, Samoa, Solomon Islands, Tonga, Tuvalu
82	Technical Report – Singlebeam bathymetry survey, Mangaia Island, Cook Islands – A geospatial framework for climate change adaptation in the coastal zone of Mangaia – (RESTRICTED)/Saless Kumar, Jens Krüger,

	Zulfikar Begg (Ocean and Islands Programme)
83	Technical Report – Real Time Kinematic Topography Survey, Mangaia Island, Cook Islands – A geospatial framework for climate change adaptation in the coastal zone of Mangaia – (RESTRICTED)/Herve Damlamian, Jens Krüger, Ashishika Sharma, Salesh Kumar, Avitesh Ram (Ocean and Islands Programme)
84	Simple introduction to cost-benefit analysis (Prepared for SPREP PACC Cost-Benefit Analysis Workshop: Food Security Pilot Demonstration Projects, Suva, 24-27 January 2012)/Paula Holland (Natural Resource Governance, Technical Support Services)
85	Snapshot 74, Disaster Reduction Programme, January-February 2012/Stephanie Zoll (Disaster Reduction Programme)
86	SPC-EU EDF10 Deep Sea Minerals (DSM) Project – Proceedings of the Tonga National Deep Sea Minerals Stakeholder Consultation Workshop, Moulton Hall, Nuku'alofa, Tonga, 1-3 February 2012 (PREPRINT VERSION)/Hannah Lily, Akuila Tawake (SOPAC Division, Ocean and Islands Programme), Rennie Vaiomounga (Tonga)
87	SPC-EU EDF10 Deep Sea Minerals (DSM) Project (Brochure 7) – Tonga deep-sea minerals potential/Akuila Tawake (Ocean and Islands Programme)
88	SPC-EU EDF10 Deep Sea Minerals (DSM) Project (Brochure 8) – Samoa deep-sea minerals potential/Akuila Tawake (Ocean and Islands Programme)
89	SPC-EU EDF10 Deep Sea Minerals (DSM) Project (Brochure 9) – Kiribati deep-sea minerals potential/Akuila Tawake (Ocean and Islands Programme)
90	SPC-EU EDF10 Deep Sea Minerals (DSM) Project – Proceedings of the Kiribati National Stakeholder Consultation on Deep Sea Minerals Workshop, Mary's Motel, Tarawa, Kiribati, 15-21 September 2011 (PREPRINT VERSION)/Vira Atalifo, Akuila Tawake (SOPAC Division, Ocean and Islands Programme), Tearinaki Tanielu (Kiribati)
91E	SOPAC News, October-December 2011/Lore Ratuyawa [Compiler] (Publications & Library, Technical Support Services); Bulletin d'information de la SOPAC, Janvier-avril 2012/Lore Ratuyawa (Publications & Library, Technical Support Services)
91F	
92	Snapshot 75, Disaster Reduction Programme, March 2012/Stephanie Zoll (Disaster Reduction Programme)
93	SPC/WMO/EU/UNESCO Joint Contribution Report – Catalogue of Rivers for Pacific Islands/Peter Sinclair, Amit Singh and others (Water and Sanitation Programme)
94	Multibeam bathymetric and seismic surveys for port development, Valaga Bay, Savusavu, Vanua Levu, Fiji/Robert Smith (Ocean and Islands Programme)
95	Snapshot 76, Disaster Reduction Programme, April 2012/Stephanie Zoll (Disaster Reduction Programme)
96E	SOPAC News, January-March 2012/Lore Ratuyawa [Writer/Compiler] (Publications & Library, Technical Support Services); Bulletin d'information de la SOPAC, Janvier-avril 2012/Lore Ratuyawa (Publications & Library, Technical Support Services)
96F	
97	SPC-EU EDF10 Deep Sea Minerals (DSM) Project (Brochure 10) – Fiji deep-sea minerals potential/Akuila Tawake (Ocean and Islands Programme)
98	SPC-EU EDF10 Deep Sea Minerals (DSM) Project (Brochure 12) – Republic of Marshall Islands deep-sea minerals potential/Akuila Tawake (Ocean and Islands Programme)
99	SPC-EU EDF10 Deep Sea Minerals (DSM) Project – Proceedings of the Samoa National Deep Sea Minerals Stakeholder Workshop, Samoa Convention Center, Apia, Samoa, 8 March 2012 (PREPRINT VERSION)/Vira Atalifo, Akuila Tawake (SOPAC Division, Ocean and Islands Programme), Lameko Talia, Faainoino Laulala (Samoa)
100	Technical Report – dredging assessment survey, Buresala jetty, Ovalau, Fiji Islands (RESTRICTED)/Robert Smith (Ocean and Islands Programme) – prepared on contract to the Public Works Department
101	SPC-EU EDF10 Deep Sea Minerals (DSM) Project – Proceedings of the Nauru National Stakeholder Consultation on Deep Sea Minerals Workshop, Parliament Buildings, Yaren District, Nauru, 5 October 2011 (PREPRINT VERSION)/Vira Atalifo, Akuila Tawake (SOPAC Division, Ocean and Islands Programme), Mike Aroi (Nauru)
102	Snapshot 77, Disaster Reduction Programme, May 2012/Stephanie Zoll (Disaster Reduction Programme)
103	SPC-EU EDF10 Deep Sea Minerals (DSM) Project – Proceedings of the Cook Islands National Deep Sea Minerals Stakeholder Consultation Workshop, AOG Hall, Takuvaine, Rarotonga, Cook Islands, 11 April 2012 (PREPRINT VERSION)/Hannah Lily, Akuila Tawake (SOPAC Division, Ocean and Islands Programme), Darryl Thorburn, Paul Lynch, Ben Ponia (Cook Islands)
104	SPC-EU EDF10 Deep Sea Minerals (DSM) Project – Proceedings of the Fiji National Deep Sea Minerals Stakeholder Consultation Workshop, Novotel Suva, Lami Bay, Fiji, 28 March 2012 (PREPRINT VERSION)/Vira Atalifo, Hannah Lily (SOPAC Division, Ocean and Islands Programme), Malakai Finau (Fiji Islands)
105	SOPAC Data Release Report, Rangiroa French Polynesia/Salesh Kumar, Jens Kruger (Ocean and Islands Programme)
106	Multibeam bathymetry survey of Rangiroa, French Polynesia/Salesh Kumar, Jens Kruger (Ocean and Islands Programme)

107	Economic Report – Republic of Marshall Islands investment in disaster risk management/Samantha Cook (Disaster Reduction Programme)
108	Snapshot 78, Disaster Reduction Programme, June 2012/Stephanie Zoll (Disaster Reduction Programme)
109	IUCN/SPC Joint Contribution Report – Pacific Resource and Environmental Economics Network (PREEN), Newsletter, Issue 06, July 2012
111	Pacific-ACP States Regional Legislative and Regulatory Framework for Deep Sea Minerals Exploration and Exploitation/SPC-EU EDF10 Deep Sea Mineral Project, Ocean and Islands Programme (Principal Author – Hannah Lily)
112	Rapid Assessment of Shoreline Erosion in Omekang, Ngermeaus and Ngerkesill Islands, Rock Islands, Palau, July 2012/Arthur Webb (Ocean and Islands Programme)
114-116	Technical notes on vegetation change detection analysis 1969 to 2011 for the following islands of the Republic of Kiribati –Aranuka, Maiana, Onotoa/by Wolf Forstreuter (GIS & Remote Sensing Section/Technical Support Services), Kataebati Bataua (Kiribati)
117-137	Technical notes on land cover type mapping utilising Geo Eye image data for the following islands of the Republic of Kiribati – Abaiang, Abemama, Aranuka, Beru, Birnie, Butaritari, Caroline, Christmas, Flint, Mackean, Maiana, Malden, Marakei, Nikumaroro, Nonouti, Onotoa, Rawaki, Tabiteuea, Tamana, Tarawa, Vostok/by Wolf Forstreuter (GIS & Remote Sensing Section/Technical Support Services), Kataebati Bataua (Kiribati)

### Graphic Reports

*Documents prepared primarily with graphic elements. This category to include maps (and charts); image backdrops; posters; billboards, banners (signage) etc.*

[This series was rejigged during the latter part of 2011, and the whole listing is presented again to ensure accuracy in updating records]

1	Poster: Be Water Wise – Every Drop Counts – Do Your Part!/Tasleem Hasan (Water and Sanitation Programme)
2	Poster: Proper Household Water Storage and Handling – Do Your Part!/Tasleem Hasan (Water and Sanitation Programme)
3	Poster: Join us in the celebration of World Water Day 2011/Tasleem Hasan (Water and Sanitation Programme)
4	Poster: Technical Backstop for Sustainability – National Water Testing Laboratory in the Republic of Marshall Islands/Tasleem Hasan (Water and Sanitation Programme)
5	Poster – Pacific Catastrophe Risk Assessment and Financing Initiative – a joint initiative between World Bank, Asian Development Bank, and SPC/SOPAC co-funded by the Government of Japan and the Global Facility for Disaster Reduction and Recovery (GFDRR)/Disaster Reduction Programme
6	Poster – Safer School Combined Tsunami Drill in Suva (in conjunction with the Government of Fiji)/Disaster Reduction Programme
7	Poster – Assessing the socio-economic value of water related climate change adaption projects in Funafuti (in conjunction with IUCN and AusAID)/Federica Gerber (Natural Resource Economics, Technical Support Services), Water and Sanitation Programme
8	Poster – RTK GPS topographical survey in Tongatapu – Capacity Building for Tsunami Risk Assessment in Southwest Pacific Phase 3 (in conjunction with the Government of Tonga and AusAID)/Herve Damlamian, Ocean and Islands Programme, Disaster Reduction Programme
9	Poster – sopc-gis-os – Open Source Geographical Information Systems supported by Applied Geoscience and Technology Division (SOPAC) of Secretariat of Pacific Community (SPC) (displayed at the GIS/RS User Conference 2011)/SOPAC Division
10	Survey Plan of Yap Bulk Plant Site – FSMPC, Yap State, Federated States of Micronesia (Accompanies PR35 – FSM Petroleum Corporation Yap Terminal Geotechnical Investigations, Federated States of Micronesia/Robert Smith, Andrick Lal (Ocean and Islands Programme) CONFIDENTIAL
11	Detail Survey Plan of Yap Bulk Plant Site – FSMPC, Yap State, Federated States of Micronesia (Accompanies PR35 – FSM Petroleum Corporation Yap Terminal Geotechnical Investigations, Federated States of Micronesia/Robert Smith, Andrick Lal (Ocean and Islands Programme) CONFIDENTIAL
12	Topographical Survey Plan of Bulk Plant Site – FSMPC, Yap State, Federated States of Micronesia (Accompanies PR35 – FSM Petroleum Corporation Yap Terminal Geotechnical Investigations, Federated States of Micronesia/Robert Smith, Andrick Lal (Ocean and Islands Programme) CONFIDENTIAL
13	Detail Survey Plan of Yap Bulk Plant Site [showing combined topographic and bathymetric survey data] – FSMPC, Yap State, Federated States of Micronesia (Accompanies PR35 – FSM Petroleum Corporation Yap Terminal Geotechnical Investigations, Federated States of Micronesia/Robert Smith, Andrick Lal (Ocean and Islands Programme) CONFIDENTIAL
14	Naduri Coastal Bathymetry Map – Vanua Levu (Accompanies PR36 – Multibeam bathymetric and seismic survey for port development, Naduri, Vanua Levu, Fiji Islands, 5-16 October 2011/Robert Smith (Ocean and Islands

	Programme) CONFIDENTIAL
15	Naduri Coastal Sidescan Mosaic Map – Vanua Levu (Accompanies PR36 – Multibeam bathymetric and seismic survey for port development, Naduri, Vanua Levu, Fiji Islands, 5-16 October 2011/Robert Smith (Ocean and Islands Programme) CONFIDENTIAL
16	Seismic Track Plot Map – Vanua Levu (Accompanies PR36 – Multibeam bathymetric and seismic survey for port development, Naduri, Vanua Levu, Fiji Islands, 5-16 October 2011/Robert Smith (Ocean and Islands Programme) CONFIDENTIAL
17	Top Bedrock Contour Map – Vanua Levu (Accompanies PR36 – Multibeam bathymetric and seismic survey for port development, Naduri, Vanua Levu, Fiji Islands, 5-16 October 2011/Robert Smith (Ocean and Islands Programme) CONFIDENTIAL
18	Top Bedrock and Seismic Track and Sidescan Mosaic Map – Vanua Levu (Accompanies PR36 – Multibeam bathymetric and seismic survey for port development, Naduri, Vanua Levu, Fiji Islands, 5-16 October 2011/Robert Smith (Ocean and Islands Programme) CONFIDENTIAL
19	Cook Islands, Mangaia Island, coastal bathymetry and topography, November 2011/Jens Krüger (Ocean and Islands Programme)
20	Location map for sound velocity profiles, 'Eua Platform, Northern Shelf of Tongatapu, April 2011 (accompanies PR22 – Multibeam bathymetric survey of the Northern Shelf of Tongatapu – Eua Platform, Tonga)/Robert Smith (Ocean and Islands Programme)
21	Multibeam track plot survey lines, 'Eua Platform, Northern Shelf of Tongatapu, April 2011 (accompanies PR22 – Multibeam bathymetric survey of the Northern Shelf of Tongatapu – Eua Platform, Tonga)/Robert Smith (Ocean and Islands Programme)
22	Bathymetry of the Northern Tongatapu-'Eua Platform, Tonga, April 2011 (accompanies PR22 – Multibeam bathymetric survey of the Northern Shelf of Tongatapu – 'Eua Platform, Tonga)/Robert Smith (Ocean and Islands Programme)
23	Bathymetry of Manihiki Lagoon (Product of the Cook Islands Government with technical assistance from Secretariat of the Pacific Community (SPC) under Applied Geoscience and Technology Division (SOPAC) 2012)/Robert Smith (Ocean and Islands Programme)
24	Map Sheet – multibeam bathymetry Valaga Bay, Savusavu, Vanua Levu, Fiji Islands (accompanies SOPAC Division Published Report 94) RESTRICTED/Robert Smith (Ocean and Islands Programme)
25	Map Sheet – side scan mosaic Valaga Bay, Savusavu, Vanua Levu, Fiji Islands (accompanies SOPAC Division Published Report 94) RESTRICTED/Robert Smith (Ocean and Islands Programme)
26	Map Sheet – geology of Valaga Bay (after P.J. Woodrow 1976), Savusavu, Vanua Levu, Fiji Islands (accompanies SOPAC Division Published Report 94) RESTRICTED/Robert Smith (Ocean and Islands Programme)
27	Map Sheet – single channel seismic reflection profile Valaga Bay, Savusavu, Vanua Levu, Fiji Islands (accompanies SOPAC Division Published Report 94) RESTRICTED/Robert Smith (Ocean and Islands Programme)
28	Map Sheet – contour map of interpreted top of bedrock Valaga Bay, Savusavu, Vanua Levu, Fiji Islands (accompanies SOPAC Division Published Report 94) RESTRICTED/Robert Smith (Ocean and Islands Programme)
29	Map Sheet – Buresala jetty bathymetry post dredging, Ovalau Island, Lomaiviti, Fiji Islands (accompanies SOPAC Division Published Report 100) RESTRICTED/Robert Smith (Ocean and Islands Programme)
30	Map Sheet – Buresala jetty bathymetry pre-dredging (data from Fiji Hydrographic Service), Ovalau Island, Lomaiviti, Fiji Islands (accompanies SOPAC Division Published Report 100) RESTRICTED/Robert Smith (Ocean and Islands Programme)
31	Map Sheet – Buresala jetty proposed 5-m basin, Ovalau Island, Lomaiviti, Fiji Islands (accompanies SOPAC Division Published Report 100) RESTRICTED/Robert Smith (Ocean and Islands Programme)
32	Photo Collage for Oceans Day Forum in Rio + 20 (Requested by RH)/Compiled by Sailesh Kumar Sen (Publications & Library, Technical Support Services)
33	Cable Route Survey Map – bathymetry reduced to LAT using Suva tide gauge (map coordinates Fiji Map Grid), Laucala Bay, Suva, Fiji Islands (RESTRICTED)/Robert Smith (Ocean and Islands Programme)
34	Jens Kruger – Habitat map of Muri Lagoon, Cook Islands

### Internal Reports

*Documents created predominantly for internal purposes, which include many that will remain confidential to SPC and its Members*

About 100 internal reports were produced in the reporting period. For a complete listing please write to the Division.

## **Graphic Artists Desk**

The heaviest users of the Graphic Arts capacity at P&L are projects; which inevitably have dedicated "VISIBILITY" allocations in Project funds to ensure public and adequate attribution for donors on the products of projects they fund.

In the reporting period about 50 items were processed directly at the Graphic Artists desk without reference to the editorial process or any technical report being produced; being primarily answering to Project-funded promotional purposes respecting donors or the subject areas of the projects. These products consisted of:

21 Posters

5 major publications

9 small-ticket items (e.g. 4<sup>th</sup> DRM Platform umbrella design)

8 newsletters

8 brochures

Main projects requesting were:

EU EDF9 B ENVELOPE PROJECT

EU DEEP SEA MINERALS PROJECT

AusAID PACIFIC ADAPTATION STRATEGY ASSISTANCE PROGRAMME

GEF PACIFIC INTEGRATED WATER RESOURCES MANAGEMENT