

INCEPTION WORKSHOP REPORT

**COPING WITH CLIMATE CHANGE IN THE PACIFIC ISLANDS REGION
(CCCPIR)**

GTZ project no. 07.2192.8-001.00

**SERVICE PACKAGE 2:
DEVELOPMENT OF CLIMATE CHANGE DATABASES**

January 2011



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Abbreviations and acronyms

ACCPIR	(Pacific-German regional programme on) Adaptation to Climate Change in the Pacific Islands Region
ADB	Asian Development Bank
AusAID	Australian Agency for International Development
BOM	(Australian Government's) Bureau of Meteorology
CC	Climate change
CCU	Climate Change Unit (of the MLSNRE Tonga)
CEPACT	Centre for Pacific Crops and Trees
CLIMAP	(ADB) Climate Change Adaptation Programme for the Pacific
CROP	Council of Regional Organisations in the Pacific
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CV&A	Community Vulnerability and Adaptation Assessment
CZM	Coastal Zone Management
DBMS	Database Management System
DoE	Department of Environment (Fiji)
DoF	Department of Forestry (Fiji)
DTM	Digital Terrain Model
EU	European Union
EVI	Environmental Vulnerability Index
FAO	Food and Agriculture Organisation of the United Nations
FFA	Forum Fisheries Agency
FLIS	Fiji Land Information Systems
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GIS	Geographical Information System
GO	Governmental Organisation
GOPA	Gesellschaft für Organisation, Planung und Ausbildung mbH
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
IAS	Institute of Applied Sciences (USP)
ICT	Information and Communication Technology
IKM	Information and Knowledge Management
IPCC	Intergovernmental Panel on Climate Change
ITC	Information Technology Centre
LBR	Land Based Resources
LRD	Land Resources Division (SPC)
LWRM	Land and Water Resource Management

MAFFF	Ministry of Agriculture, Food Forests and Fisheries (Tonga)
MAQFF	Ministry of Agriculture, Quarantine, Forestry and Fisheries (Vanuatu)
MECC	Ministry of Environment and Climate Change (Tonga)
MIS	Management Information System
MLNR	Ministry of Lands and Natural Resources (Vanuatu)
MLSNRE	Ministry of Lands, Survey, Natural Resources and Environment (Tonga)
MPI	Ministry of Primary Industries (Fiji)
NACC	National Advisory Committee on Climate Change (Vanuatu)
NAPA	National Adaptation Programme of Action
NCCSAP	National Climate Change Strategic Adaptation Plan
NGO	Non-Governmental Organisation
NMS	National Meteorological Services
NRM	Natural Resource Management
OECD	Organisation of Economic Co-operation and Development
PACC	Pacific Adaptation to Climate Change Project
PACE-SD	Pacific Centre for Environment and Sustainable Development (USP)
PCCSP	Pacific Climate Change Science Program
PIC	Pacific Island Country
PICT	Pacific Island Countries and Territories
PRISM	Pacific Regional Information System
SFM	Sustainable Forest Management
SLM	Sustainable Land Management
SOPAC	Secretariat of Pacific Islands Applied Geoscience Commission
SP	Service Package
SPC	Secretariat of the Pacific Community
SPC-LRD	Secretariat of the Pacific Community - Land Resources Division
SPREP	Secretariat of the Pacific Regional Environment Programme
SPSLCMP	South Pacific Sea Level and Climate Monitoring Project
ToR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of South Pacific
V&A	Vulnerability and Adaptation Assessment
WB	World Bank

1. Introduction

The Pacific-German regional programme Coping with Climate Change in the Pacific Island Region (CCCPIR) aims to build and strengthen the capacities of Pacific member countries and regional organizations, to adapt to, and mitigate climate change impacts in the agriculture, forestry, and land management sector. The programme is initially based with the SPC Land Resources Division (SPC-LRD) in Suva, Fiji and focuses on activities in Fiji, Vanuatu, and Tonga¹.

The overall objective of the programme is as follows: *“The capacities of member countries of the SPC to cope with the adverse effects of climate change and to avoid deforestation are strengthened, as a fundamental element for sustainable management of land based natural resources”*

GOPA is responsible for the implementation of Service Package 2 (SP2) - Setting up climate change databases in Fiji, Tonga and Vanuatu (Output 6, O6) and at SPC–LRD (Output 3)

With regard to SP2 the GTZ TOR specify the following principles for designing and establishing climate change databases:

- All databases should be based on demand arising from the overall needs for climate change adaptation within the context of the SPC/GTZ programme (parallel structures should be avoided)
- Should build on and strengthen any existing database where appropriate
- All databases must be designed economically efficient, easy to apply (not too technically complex), and be easily accessible to targeted user groups
- Responsible partner institutions should define and allocate budgets for its maintenance and functioning (after its launching)

From the 15th – 30th November 2010, a two-week inception mission was carried out by the GOPA team in Suva, Fiji Islands based on a preparatory stocktaking exercise in the period from 20/09/2010 - 01/10/2010.

The mission was split in two parts, (i) a two-day inception workshop and (ii) individual regional stakeholder consultations.

The main target group during the workshop were regional and national counterparts of the ACCPIR Programme working in the land-based resource sector namely SPC-LRD, and governmental decision makers including the national line ministries of Fiji, Vanuatu and Tonga. The workshop was also attended by representatives of SPC, SOPAC and

¹ As of January 1st 2011 the Pacific-German regional project has expanded to cover twelve Pacific Island Countries and a broader scope. The name of the project has changed from Adaptation to Climate Change in the Pacific Island Region (ACCPIR) to Coping with Climate Change in the Pacific Island Region (CCCPIR). GTZ has also undergone a restructuring and as of January 1st 2011 is known as GIZ. This report refers to a workshop conducted in November 2010 when the older terms applied but they have been changed to GIZ and CCCPIR to be consistent with the project going forward.

SPREP who provided valuable inputs with background information taken from their involvement in climate change and environmental information and database- and information and knowledge management. The main target group during the individual stakeholder consultation were the different thematic working groups within SPC-LRD dealing with climate change issues as well as representatives from SPC, SPREP, SOPAC and USP. The individual interviews were organised on a basis of a questionnaire and performed in a face to face mode.

The GOPA team wants to use this opportunity to express his sincere gratitude to the staff of SPC and GTZ for their valuable support and the pleasant cooperation. The team also wants to thank the workshop participants for their keen interest in the topic of the workshop and their active contributions.

2. Purpose of the Inception Mission

The purpose of the inception mission was

- to prepare and conduct a joint inception workshop for Service Package 2 (SP2) with the GTZ project team, SPC-LRD, governmental decision makers including the national line ministries and departments of Fiji, Vanuatu and Tonga and CROP agencies such as SPREP and SOPAC.
- to screen how stakeholders perceive and understand climate change, which problem complexes they identify in regard and/or associate to climate change in the certain countries/regions.
- to continue the assessment of existing databases, data gaps, user needs via a series of subsequent face-to-face interviews.
- on the basis of the achieved knowledge to define the design concept for supporting climate change database development.

3. Inception workshop

3.1 Participants of the Inception workshop

Participants of the workshop are those that are directly engaged in the ACCPIR implementation relating to the development of climate change and other databases within the land-based resources at the national, regional and international level. These include the GTZ project team, SPC-LRD, governmental decision makers including the national line ministries of Fiji, Vanuatu and Tonga and CROP agencies such as SPREP and SOPAC. (See list of participants in Annex 2)

3.2 Key topics covered in the Inception workshop

The following chapters will cover all the presentations held during the inception workshop and will follow the structure of the workshop agenda (see Annex 1)

3.2.1 Finding a common language - Climate change - “what are we talking about?” (Prof Dr Jürgen P. Kropp)

During his presentation Dr Kropp first explained the scientific basis for climate change information and clarified various terms in order to generate a common understanding among workshop participants. He explained the difference between climate and weather and provided a short insight into the difference between natural geo-historic climate change and how the human induced climate change can be distinguished. The basic foundations of the greenhouse effect were briefly discussed and he showed that the most of the physical baseline knowledge about this issue is more than 100yrs. old. With a simple model considering the fundamentals of atmospheric physics it was shown how the observed changes of the last 100yrs can be supported by the model calculations.

Subsequently Dr. Kropp discussed how climate projections for the next 100yrs regarding a potential climate development were performed. Especially the uncertainty related to certain climate scenario runs was discussed. It was highlighted that there exist two main sources of uncertainties:

- (i) those related to the different emphasis of physical processes in the certain IPCC models and
- (ii) those related on the development of humankind itself based on driving forces like population, economy, technology, energy and land use.

The latter is much larger than the first one and consequently must lead to a broader possibility space of potential future climate developments, which directly affects decision making within climate change mitigation and adaptation. Climate change scenarios are not concrete forecasts but a selection of possible future scenarios depending on political decisions of the present.

In the following part of his presentation Dr Kropp explained the political dimensions of climate change and the related 2 °C target to current emission profiles of developing and industrialised countries and emphasised the need for very ambitious reduction targets for all countries. If these are not met the demand for adaptation to climate change will increase tremendously. Climate change directly threatens the successful

achievement of the Millennium Development Goals (MDGs) and adaptation alone will not be the solution but part of it.

In his final part Dr Kropp showed with the help of climate impact analyses related to sea-level rise, desertification, precipitation changes, etc. which specific regions or sectors will need to adapt and to what extent. Sea level rise for instance will not be evenly distributed globally and the Pacific Island region for example will face a higher sea level rise as the Caribbean Island states. Therefore regional, national or local climate impact analyses are the basis for sound decision making in order to become more climate resilient. He finished with the statement that impact analyses are a precondition for efficient climate change adaptation and that in regard to this at least a rough deterministic understanding of these processes by decision makers is necessary. The latter of course will enforce the data needs.

At the end of his presentation he provided the following final take home messages:

- International cooperation in climate related issues is mandatory, nobody can assess and manage the problems alone
- Decision makers need to learn to cope with uncertainties on potential future climate scenarios, because they will ever remain
- Not all of the current environmental problems are caused by climate change, but by anthropogenic mismanagement (overutilization) of natural resources
- Impact analyses can pave the road towards a more sound decision making but primarily political action is needed

3.2.2 Overview of Environmental and Climate Databases in the Pacific Islands Region (Ms Makelesi Kora-Gonelevu, Dr Wolf Forstreuter)

Part I – Summary of the Stocktaking Mission at SPC-LRD and Fiji under SP2 (Ms Makelesi Kora-Gonelevu)

Ms Makelesi Kora-Gonelevu summarized the major findings of the stocktaking exercise under SP2, which was conducted with SPC and Fiji stakeholders in the period from 20/09/2010 - 01/10/2010. In addition stocktaking questionnaires (see Annex 5) have been distributed to the stakeholders of Vanuatu and Tonga, who summarized their answers in short country presentations which were held during the inception workshop (see chapter below).

SPC-LRD Level:

At SPC-LRD, very sector specific environmental databases such as the *CePaCT Accessions Database* (MS Access) containing a climate change ready collection of drought resistant varieties are in place. SimCLIM <http://www.climsystems.com/simclim/> as an integrated climate modelling software assessing climate change impacts and adaptation has been used to a limited degree to support climate proofing in the LBR sectors. Together with GTZ, SPC-LRD procured licenses and carried out trainings in

Tonga and Vanuatu. However modelling outputs have been proven to be unreliable due to a low quality of input data.

SPC-LRD Forest and Trees (FAT) together with SOPAC are developing a database to illustrate vegetation cover of low lying islands to document the current stage of vegetation cover and to visualize climate change impacts on indicator vegetation such as mangroves.

Major user needs at SPC-LRD:

- Tools for vulnerability assessment, vulnerability reduction and climate change adaptation (best) practices within the land management sector
- Information on suitable climate resilient plant varieties
- Digitized spatial information on coastline change monitoring
- Digitized spatial information on vegetation change monitoring

National Level (Fiji)

At the national level, several (MPI, DoE) specific databases such as the *AgriMarket Database* are used but have no link to climate change adaptation. In addition various national institutions host sector specific datasets: The Water Authority of Fiji (WAF) together with Fiji Weather Bureau and Mineral Resources Department (MRD) – holds information of flow gates and rain fall stations, including current and historical records. Data related to land classification, present land use is allocated at the Land and Water Resource Management Division (LWRM) of MPI, tabular and spatial datasets about forest cover at the Fiji forest department.

Major user needs at national level:

- Tools to identify climate change impacts (risk profiles) on LBR covering crop production, land- and water management
- Best practices for climate change adaptation in land management on district level
- Completing land use mapping (on district level) and digitizing old maps

Conclusion from the stocktaking mission

- There is a general lack of data and information sharing on regional and national level and stakeholders tend to create sector specific isolated datasets / information sources
- The majority of stakeholders requested specific tools that can be used to predict the impact on climate change on different LBR sectors
- With regard to the potential database design under SP2, the majority of stakeholders favoured a centralised database solution (e.g. a meta database or

webportal solution) pointing to and building on existing systems to ensure sustainability and actuality

- The upcoming database design process should take into consideration the issue of data source reliability, data maintenance, capacity building requirements and budget allocations for future maintenance.
- Linkages and synergies between this project and other initiative such as the SPREP Climate Change Portal, the AusAID Pacific Climate Change Science Programme (PCCSP) and ADB/WB Hazard Mapping Project should be used.

Part II – Experiences of SOPAC with spatial databases with relevance to climate change adaptation (Dr Wolf Forstreuter)

In his presentation Dr Wolf Forstreuter focused on the current status of regional spatial databases and datasets with relevance to climate change.

Under the EDF 9 SOPAC supported the development of **GIS mapservers** in 14 PICTS based on open source software. The EDF 9 Mapservers hold interactive maps, by which the viewer can select different map data layers in order to view or to zoom into a particular area of interest. All this is done while interacting with the web page and a map image that is repeatedly updated. This programme is different from static maps due to its web-based application which allows creating user-specific interactive maps. The mapservers contain spatial and tabular data and integrated datasets. This ambitious project however was ultimately not successful mainly due to its technical complexity for maintaining the systems. In Tonga where the mapserver is located at the Lands Department the hard disk was corrupted and all data was lost. The server is currently hosting the Ministry's webmail and there are hopes to revive the map server. In Vanuatu the map server is located at the Department of Lands but has not been operational since 2007. In Fiji the map server is located at the Mineral Resources Department (MRD) and has been out of operation for 2 years. SOPAC is currently liaising with Lands Department regarding the data to be transferred from MRD to the Lands Department.

SPC-LRD Forest and Trees together with SOPAC are currently developing an **MS Access database** showing the vegetation and land cover of low lying islands to document the current stage of vegetation cover and to visualise climate change impact on indicator vegetation such as mangroves.

In addition mapping activities have started under the **Land Cover Type Mapping Project** in Kiribati utilizing Quickbird and IKONOS satellite images. Most islands of Kiribati are mapped and the maps and reports are available to the public.

Other spatial datasets with relevance to climate change adaptation at SOPAC include soil and geological maps (currently in the process of digitization), satellite image data, historical aerial photographs (scanned and rectified), shallow water bathymetry and deep sea survey data.

Dr Forstreuter identified the following technical bottlenecks of past database projects (based on SOPACs experience)

- Information systems in the Pacific have been generally more vulnerable due to specific environmental conditions. If no adequate protection measures are in place, the survival of hardware such as computers, CDs/DVDs etc. is shorter in the Pacific due to corrosion caused by the Pacific climate.
- In the past data transfer and exchange via internet was unreliable due to a low bandwidth in the majority of partner countries. Especially large data volumes had to be exchanged by sending external hard drives via mail.

Therefore centralised datasets (located at and managed by regional organizations such as SOPAC) bear a significantly higher chance to manage and update data sustainably.

3.2.3 Short Country Presentations (country representatives)

Vanuatu Group:

Representatives of Vanuatu divided their presentation into three parts:

- Part 1: Climate Change-related Database Management Systems (DBMS)
- Part II: Climate Change-related GIS Databases and Data
- Part III: Country needs

Part 1: Climate Change-related Database Management Systems (DBMS)

Several sector specific CC-related DBMS or relational DBMS (RDBMS²) are currently available or under development.

Water Sector

The Water Department hosts two DBMS

- a **Water Resource Inventory System (WRI)** is currently under development to assess water quantity with a first prototype operating by early December and another yet-to-be developed system pertaining to Water Quality.
- a **Water Quantity Sub-system** contains information mainly related to rural settlements. It comprises 3 sub-systems namely i) water systems in Vanuatu and settlements they service, ii) water supply systems types (Direct Gravity Feeds, pumped supplies, hand pumps and rainwater tanks) and iii) water sources existing for settlement use.

Land Use/Policy & Decision Making

Lands Department hosts four cadastral DBMS with information on leases and customary land but no direct relation to climate change:

- **e-Registry** contains information related to lessor, lessee, lease type, lease term, lease documents etc...

² A short definition of an RDBMS is a DBMS in which data is stored in the form of tables and the relationship among the data is also stored in the form of tables.

- **e-Survey** contains information related to old lease title no., area of lease, etc...
- **Vanuatu Lease Audit Management System** contains information related mainly to breaches of lease provisions (such as illegal foreshore development, building without a permit, illegal clearing along a river bank etc...)
- **e-Customary Land Tribunal** contains information related to land tribunal decisions, council of chiefs and tribunal judges, custom owners, customary boundary info, custom land sketch maps or survey plans

All DBMS mentioned above have no dedicated servers to effectively host and interlink sub-systems but are currently standalone solutions, running on individual computers. They were developed using PHP, HTML and Javascript and run on Apache HTTP Server with the database layer built on MS Access or MySQL.

Meteorology/Climatology

The Climate Division of the Vanuatu Meteorological Service (VMS) uses the following databases and software programmes.

- **ClimSoft** stores all weather/climate elements including rainfall, temperature (grass minimum, dew point, maximum, minimum), cloud cover, sunshine hours (radiation), evaporation, atmospheric pressure, relative humidity, wind, visibility etc. ClimSoft database was introduced into Vanuatu during an AusAid funded initiative. It was originally developed by Zimbabwe & Kenia Meteorological Service in Cooperation with UK MetOffice, using PHP and runs on an Apache Server with the database layer built on MySQL and is available now in version 2.
- A specific **E-Monthly Register** covers daily registers all weather elements which are after quality checks incorporated into ClimSoft

Part II: Climate Change-related GIS Databases and Data

- The **Vanuatu Resource Information System (VANRIS)** was initiated by AusAid in late 1995 within the Vanuatu Land Use Planning Project as an effort to strengthen land use planning and natural resources management capabilities. It contains geo-information related to transportation, land and coastline management (incl. information on soil, topography and vegetation). VANRIS is out of date as it was last updated in 1999. It also contains digitizing errors and over-generalization of data. VANRIS was successful in sharing information/accessing the data but stopped because people with the relevant expertise to manage the system moved to other positions..
- The **Ministry of Lands' in-house GIS data** comprises cadastral GIS databases for Vanuatu (with links up to the Ministry of Lands RDBMSs), but also information on conservation/protected areas for most parts of Vanuatu, water quality testing sites and water quantity sites (which can be linked up to WRI RDBMS). It also contains energy GIS data related to solar power, wind power, hydropower sites

- The Australian Defense Fund (ADF) supported in 2008 the development of **updated GIS data** which has partly replaced the outdated VANRIS data. However no database or server has been established to centrally host all geoinformation efficiently. GIS data developed under the ADF covers the following sectors: transportation links, coastline, land elevation, bathymetry, general land use data, urban planning data (settlements), plantations, vegetation and crop planting areas, hydrographic features and other physical features.
- **Vanuatu Population Geographical Information System (PopGIS)** is based on an MS Access database and Mapinfo Tab file format and is installed on single computers. It holds demographic information collected during population censuses and uses spatial data to display this information.
- **Forest Resource Information System (FRIS)** (Vanuatu Department of Forests VDoF) contains confidential information on Vanuatu's commercial timber species and timber volumes available in each Resource Mapping Unit (RMU) in Vanuatu. Data was last updated during the 1993 National Forest Inventory. The FAO Strengthening Monitoring, Assessing and Reporting on Sustainable Forest Management (MAR on SFM) project is currently reclassifying vegetation maps of Vanuatu, which will require more funds for ground truthing.
- **Geoportal UNC** combines the Google Map Server with spatial resolved data from certain sectors & countries and (<http://grimm.univ-nc.nc/geoportal>) is currently developed by the Research Institute for Development (IRD) and the University of New Caledonia (UNC) in cooperation with the Lands Department to replace VANRIS and to interlink GIS data from various governmental and non-governmental agencies in Vanuatu. The system will interlink GIS data from these agencies but data control and data origin will remain on their servers. As a precondition a data sharing framework needs to be put in place before this system can be implemented. The system is only available in French.

Part III: Country needs

The Government of Vanuatu is proposing the following concept under the SP2 component of the ACCPIR programme to meet their country needs:

- The system should
 - quickly and easily point Vanuatu stakeholders to relevant climate related information (data, documents, reports etc, or in other words information about impact analyses).
 - be online
 - build on the existing SPREP systems for environmental information.
 - contain metadata/links to data locations rather than containing own data

- have a simple and user friendly interface that even the most basic computer user can navigate
 - build on and accommodate existing data management and storage systems (not reinvent the wheel)
 - consider the possibility of sharing objects (rather than raw data) to preserve and protect intellectual property
 - be built and designed alongside with Vanuatu counterparts to secure ownership and sustainability
 - be linked into regional support structures at SPC/SPREP for sustainability
- Training and capacity building on how to use (and maintain/update) the system shall be provided
 - The further development of a draft data sharing agreement currently being negotiated among Vanuatu stakeholders shall be provided by advise on institutional and technical issues involved with sharing or releasing often sensitive information.
 - Support to help departments to interpret data with relevance to climate change adaptation.
 - Long-term support will be needed to assist government officers on data/information input into the system that is eventually developed.

Tonga Group:

Tonga Meteorological Service (TMS) indicated that there is currently no database for climate reports existing in Tonga. Climate and meteorological data is currently archived on Excel spreadsheets. A new climate database for TMS will be installed by CSIRO in early 2011 under the PCCSP Project funded by the Government of Australia (AusAID). Urgent needs of TMS include:

- Digitization of data which is still in paper format
- Another in-country location to store climate data (as a backup system) to prevent loss of historical data
- Training in data homogenization (data correcting)

The Tongan PSC and MECC identified the following datagaps:

Lack of digitized and updated

- Meteorological data including information on rainfall and temperature patterns as well as cyclone events
- Vulnerability data and maps (impact analyses)
- Information on disaster mitigation strategies

- Information on sea-level rise (tidal gauge)
- Forest coverage maps

The lack of IT- and data analytical skills was identified as the major institutional capacity constraint.

3.2.4 General Approaches and Experiences: The Development of Climate Change Databases (Prof Dr Jürgen P. Kropp)

In his second presentation Dr. Kropp explained the difference between pure databases and information tools. While databases are mainly addressing experts who have the capacities and the scientific skills to handle and to interpret complex data the information tools are more devoted to semi-experts. This means that work regarding data interpretation and combination has been done already. The output of such a procedure is a climate vulnerability or impact map which is used for decision support.

Dr Kropp introduced a set of briefly explained examples, how difficult it can be to derive suitable knowledge for decision making from climate and other data. This was discussed e.g. for human health and the water sector. The examples showed that decision makers always have to deal with uncertainties and have to think in bandwidths. Due to organisational problems, information is often not shared between stakeholders creating a duplication of efforts and additional costs. Many stakeholders are also facing capacity constraints in order to handle and interpret large data sources.

In a subsequent part of his presentation Dr. Kropp showed how difficult it is to deal with extreme events – such as storm risks for forest ecosystems - one issue which is often on the top level agenda of stakeholders. In this context it is important to note that climate extremes (long term) are different than weather extremes (short term) summarized by the slogan “climate is what we expect and weather is what we get”.

In the final part of his presentation Dr Kropp gave an overview on existing international climate information systems covering:

- Adaptation Atlas (<http://www.adaptationatlas.org/>)
- SERVIR (<http://www.servir.net/>)
- Adaptation Learning Mechanism (ALM) (<http://www.adaptationlearning.net/>)
- Climate Adaptation Knowledge Exchange (CAKE) (<http://www.cakex.org/>)
- weADAPT (<http://www.weadapt.org/>)
- WB Climate Change Data Portal (<http://sdwebx.worldbank.org/climateportal>)
- ci:grasp (<http://cigrasp.pik-potsdam.de>)

The scope and content of the **ci:grasp** platform (Climate Impacts: global and regional adaptation support platform) as a current joint project between PIK and GTZ was explained in detail. Main features include

- i) an interactive world map,
- ii) an adaptation database,
- iii) a glossary of climate terminology,
- iv) climate stimuli, impact and emission maps,
- v) climate diagrams and
- vi) content management system (CMS) tools.

The setup of the platform is based on impact chains to structure problem complexes and the thinking of users and to identify possible intervention points. The impact chain approach was visualized by an example on sustainable urban planning in Hyderabad, India showing the logical set up and complexity of impact chains.

For each database concept a survey about user needs, capacities and problem perception is one mandatory element for a successful data management. The key statement and take home message was that data per se explain nothing but has to be interpreted. Data will be used in any case related to concrete questions.

3.2.5 Specific examples of Environmental Databases and Database systems: Experience and Best Practices (SPREP, SPC-LRD, SOPAC)

SPREP (presented by Peter Murgatroyd)

SPREP divided their presentation into i) a description of past experiences with environmental and climate change information projects in the Pacific and ii) the current development of the Pacific Climate Change Portal.

Part i) Past experiences:

Based on their working experience throughout the Pacific in the last three decades SPREP has identified the following key problems for informed decision making within climate change adaptation:

- Environmental and climate change **information is often scattered** and not shared or integrated among key stakeholders.
- As a result, initiatives on cc-information management are often **duplicating efforts** leading to a cc-information overload. New climate change tools and resources are developed instead of promoting the existing ones.

- The key stakeholders (information users) comprising policy makers, scientists, meteorological officers, coastal managers and NGOs are very diverse with **multiple information needs**.

Despite various past initiatives the following environmental and cc-related information/data needs are still prevailing:

- Access to climate and ocean data
- Spatial information for the region
- Forecasting and modeling tools
- Access to “lessons learned” including research outputs, case studies, practical guidelines, project information, traditional knowledge and practices of adaptation in the past

Currently a number of **resource access points** are available throughout the Pacific for obtaining climate information. They include the following:

- SPREP - Pacific Islands Global Climate Observing System (PI-GCOS): <http://pi-gcos.org/>
- NOAA/SOPAC: Pacific Island Global Ocean Observing System (PI-GOOS): <http://www.pi-goos.org/>
- Pacific Islands Ocean Observing System (PI-OOS): <http://www.soest.hawaii.edu/pacioos/>,
- Pacific Islands Climate Prediction Project (PI-CPP) : <http://www.bom.gov.au/climate/pi-cpp/index.shtml>
- NOAA - Pacific ENSO Applications Climate Center : <http://www.prh.noaa.gov/peac/>
- NOAA – Pacific Islands Climate Change Virtual Library : http://pigcos.soest.hawaii.edu/piccp/joomla/index.php?option=com_content&view=frontpage&Itemid=1
- NOAA / Pacific Climate Information Service (PaCIS) : <http://www.ideademo.org/pacis/index.php#dataServices/noaaPartners>
- BOM Australia - South Pacific Sea Level & Climate Monitoring Project: <http://www.bom.gov.au/pacificsealevel/index.shtml>
- SPC - Land Resource Division : http://www.spc.int/lrd/index.php?option=com_content&view=section&layout=blog&id=12&Itemid=19&lang=en
- SPC Coastal Fisheries Programme <http://www.spc.int/coastfish/en/projects/climate-change.html>
- SPREP - Pacific Regional Environment Programme Climate Change Portal: http://www.sprep.org/climate_change/

- SPREP - Pacific climate change resources directory
<http://www.sprep.org/publication/climate.asp>

Part ii) Development of the Pacific Climate Change Portal

Based on the multitude of the above mentioned cc-information sources, SPREP initiated the development of an integrated inter-agency **Pacific Climate Change Portal** that provides access to relevant information resources in a format meeting the information needs of the users. User groups of the portal will include SPREP, SPC/SOPAC, Pacific Forum, NOAA, East-West Centre, WWF Pacific, WMO Pacific, UNESCO Pacific, PI-GCOS, PI-GOOS, PacIOOS, Australia–Pacific Climate Adaptation Platform and others.

A **scoping study** commenced in December 2010 and will be completed by 30th April 2011. By December 2010 a SPREP knowledge management officer will be appointed to coordinate the activities under the study. The study will develop an inventory of existing websites (including portals and portlets) with information relating to climate change in the Pacific and an analysis of interoperability and compatibility, and identification of institutions and organizations with relevant datasets, products and services. Furthermore it will carry out an assessment of those other websites, portals and portlets, including portals being proposed or that are under development, to gather lessons learned and to make recommendations for the most appropriate options for a Pacific Climate Change Portal.

Based on the inventory the study team will develop a proposal for investigating and identifying possible partnerships with other international portal projects of a similar nature and will formulate a set of high-level objectives that define the operational structure of the portal. A series of feasible conceptual design options for the portal will be developed to meet these identified objectives. The first results of the study will be presented at the Climate Change Roundtable in March 2011.

SPC-LRD (presented by Ms Anju Mangal)

SPC-LRD presented its experience with information and knowledge management within the LBR sector also covering climate change related aspects. In addition lessons learned in the process of setting up specific databases and recommendations for the setup of future databases have been shared with the workshop participants.

Information and Knowledge Management: In 2006 GTZ supported SPC-LRD in developing an IKM strategy. The objective of the strategy development comprised an assessment of the current data and information management and access across SPC-LRD the identification of difficulties and shortcomings. Under the IKM a LRD intranet portal, a systematic reorganization of shared folders, as well as a naming convention for documents and was introduced.

Experiences with specific databases: At SPC-LRD several very sector specific databases are used and managed by the thematic teams such as the Pacific Islands Pest List Database, <http://pld.spc.int/pld/> (PIPLD) which records the distribution of plant pest in the Pacific or the World Animal Health Information Systems, <https://www.oie.int/wahid> which records animal disease distribution. The SPC-LRD Centre for Pacific Crops and Trees (CePaCT) is managing a MS Access accession

database and is in the process of establishing a climate ready collection and screening their crop collection for certain climate resilient traits.

Lessons learned:

- **Data sharing agreements** (covering memoranda of understanding) including trust and the willingness to share data and information are an important precondition for developing any database and information system
- Countries have to maintain their **ownership** of data
- **Data maintenance and update** is a constant effort in which national stakeholders need continuous support by SPC-LRD
- High and regular **staff turnover** is a constant risk to the sustainability of a database
- The majority of stakeholders are facing **technical constraints** such as internal IT issues and a low internet bandwidth
- Several stakeholders are facing clear **capacity constraints** (training and human resources)
- Technically complex databases make it difficult for stakeholders to retrieve and maintain data
- The **reliability of data sources** needs to be secured

Recommendation:

SPC-LRD recommended that a one-stop shop for all existing databases/portals would be needed.

SOPAC (presented by Dr Russell Howorth)

Dr Russell Howorth gave a comprehensive overview on SOPACs experience in data and information management. SOPAC has gained significant experience over the last decades in developing and running environmental databases. The most relevant for climate change adaptation are the following:

- GeoNetwork database, developed by FAO, WFP and UNEP. <http://geonetwork.sopac.org/geonetwork/srv/en/main.home>
- Pacific Disaster Net (PDN) (with assistance from OCHA, UNDP and IFRC), a web portal and database system designed to be the largest and most comprehensive information resource for Disaster Risk Management for the Pacific Island Countries. <http://www.pacificdisaster.net/pdn2008/>.
- Pacific Hydrological Cycle Observing System (HYCOS) Web Portal <http://www.pacific-hycos.org/>
- The EU EDF 9 Mapserver. <http://www.sopac.int/mapserver> .

The following lessons learnt within SOPAC projects and programmes shall be taken into account when developing a database:

- **Quality:** A database contains hard numbers not a collection of soft information. In order to maintain data quality database managers have to know exactly where the data is coming from and why and how it was collected.
- **Scale:** These numbers need to be presented in a manner in which they can be used; the **question of scale** is important: Do I need data for the country as a whole, an island within a country, a community on an island?
- **Time:** For the interpretation and monitoring of environmental changes of the past and potential developments in the future a time series of data (historical data and data intervals) are needed
- **Format:** Spatial databases/geographic information systems are needed by the stakeholders nowadays in order to allow an easier interpretation of data and information – “We’re past the days of tables”. Past experience in the partner countries has shown that there only need for one national GIS system (not one for each department/ministry) that has all the layers necessary for different purposes;
- **Information sharing:** Better ways, tools and procedures are needed to share information. However, the current and future generations within the Pacific will overcome this problem because they grow up in a rapidly changing environment regarding information and communication technologies;
- **Human capacities:** A sufficient number of trained people are needed who can look after the database and keep it up to date; they have to have the relevant capacity to use the database and share information; The EU EDF 9 Mapserver Programme is a very good example where sufficient capacities were not available to maintain a complex system.
- **Remote sensing data:** Each country doesn’t need the capacity to buy satellite images and rectify them to overlay with geographic maps. Countries primarily need access to the technical people in regional organizations like SOPAC who have the relevant technical knowledge and who can provide advice;
- **Sustainability:** What is needed in PICTs is sustainability; so far most database interventions have been project or programme-based, which have clear time limits, come and go and often fail in the long run; Countries need to be in a position to run these programs themselves after international funding stops.
- **Use of outputs:** Setting up databases or environmental tools does not guarantee reliable outputs. The development of the Environmental Vulnerability Index (EVI) for all island countries is a very good example where enormous amounts of data have been collected – covering approximately 55 environmental variables but the EVI failed due to unreliable results.

3.2.6 Group work: Setting the stage for climate change database development, needs, and gaps

Group 1: Regional Working Group (SPC-LRD, SPREP, SOPAC)

The data gaps and user needs on regional level have been summed up as follows:

1) Data gaps

- No comprehensive information on climate change adaptation practices (especially agriculture) is available
- Data on livestock GHG emissions is not available (strictly speaking beyond the scope of SP2)
- Digital terrain models (DTMs) are needed to monitor potential changes of coastlines

2) Capacity gaps

- At present no IT full time position is existing at SPC-LRD level. SPC-LRD currently has no capacities to maintain the cc-database
- Staff turnover is a considerable risk for the sustainability of a database
- CC-issues have to be incooperated into the LRD national activities (this is covered by the cc mainstreaming activities of the SPC/GTZ ACCPIR Programme)

3) User needs

- A solid information basis or “indicators” for proper political decision making (DRM, food security) and change management is needed. For this purpose first of all accessibility to information (including geoinformation) has to be improved.

4) Focal point

- It was suggested that SPC-ICE would be the focal point for the regional cc-database solution.

Recommendations by the working group:

- SPC-LRD needs to be technically and institutionally strengthened in order to take a lead role in information and data management for Pacific Island Countries and Territories (PICTs)
- The scope of the cc-database should focus on LBR data as initially planned under the GTZ ACCPIR Programme.

Group 2: Vanuatu

The data gaps and user needs on regional level have been summed up as follows:

1) Data gaps

- There is a lack of recent environmental data (e.g. geoinformation) and some existing specific databases such as VANRIS are out of date
- There is a lack of specific digitized environmental data (e.g. on water resources) which is still recorded manually
- Data sharing agreements within and between governmental and non-governmental agencies are not existing at present.
- Some databases and systems of the past such as the Forest Resource Inventory System have been poorly planned designed leading to the introduction of repetition, redundancies and errors within databases.
- Existing databases and information sources are not interlinked systematically. They are often located on stand-alone computers rather than servers

2) Capacity Gaps

- Key stakeholders face a lack of existing IT positions to manage and maintain a database.
- Key stakeholders face a lack of IT skills – If agencies have IT officers they often lack intermediate to advanced IT skills.
- The governmental IT services are too centralized – many Governmental agencies depend on the IT Unit at Ministry of Finance for IT services. The problem is that they are understaffed and service too many governmental depts.
- Sustainability issues – Many systems created for governmental agencies lack sustainability as they are usually the product of donor-funded projects. When the project finishes, getting support from that governmental agency to sustain the system can be problematic. One example is the AusAID funded e-registry system at Lands Dept which was built on a system called “saperion” but due to a lack of funding, the system was discontinued.

3) User needs

- Existing stand-alone databases such as the Lands Dept’s Survey, Registry, Planning, Valuation and Customary Land Tribunal Databases need to be interlinked.
- Database managers (IT staff) have to be nominated and trained to maintain and update the cc-system.
- A user friendly application is needed that effectively links up data from heterogenous sources.
- GIS data has to be created and updated to support decision-making e.g. soil data, flood prone areas, hazard maps.

- The respective hardware will be needed to host the system
- Specific software licenses will be needed, e.g. ArcGIS. However, where possible and appropriate, applications should be based on open source software. E.g. the servers should run on Linux.
- A data sharing framework needs to be formulated.
- Additional climate change related data such as coastal morphology data should be created (comment: currently done by SOPAC)
- CC-research has to be supported (comment: currently done by USP)

4) Focal point

- NACC was identified to be the national focal point

Recommendations by the working group:

- A web-based system shall be built which points to climate change information and data locations (meta-database concept) and interlinks them (via governmental intranet and internet)
- Data should remain decentralized on the servers of the respective data owners

The following image is illustrating the recommendation by the Vanuatu working group:

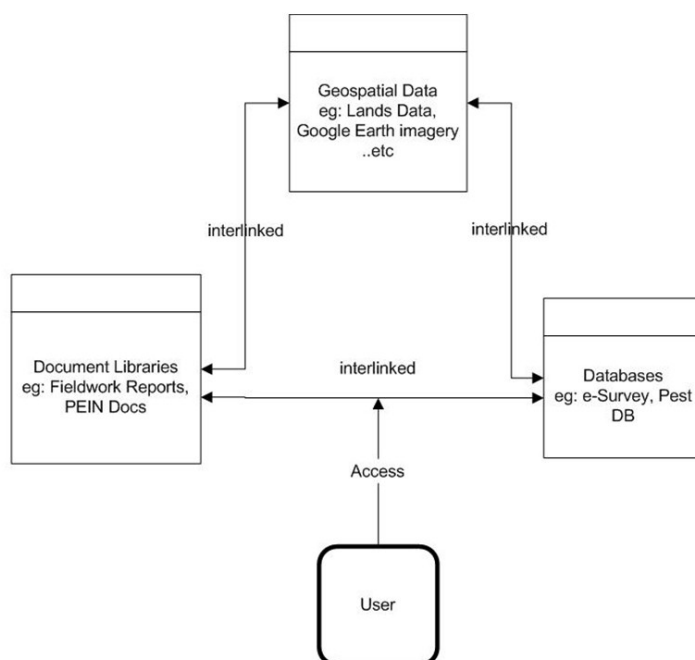


Figure 1: Recommendation by the Vanuatu Working Group to set up a climate change database

Group 3: Tonga

1) Data gaps

- There is a lack of digital geoinformation data on land classification (rural, urban areas), cadastre, forest and land cover, marine and terrestrial biodiversity data
- There is a lack of interlinking the above mentioned data

2) Capacity Gaps

- There is a lack of methodological data collection and analytical skills
- Key stakeholders face a lack of IT skills.
- Data sharing was identified as a major bottleneck. Different agencies hesitate to share their information and data, also due to bad experiences in the past.

3) User needs

- Climate change vulnerability and risks maps
- Land/crops suitability maps
- Landuse/zoning maps
- Health's advise on climate change adaptation
- Information on weather events

4) Focal point

- No clear focal point has been defined. However it is evident that MECC, TMS, MAFFF and MLSNR will be the main user group. In addition the Public Health Division, Public Utilities and the Civil Society was mentioned as the target group.

Recommendations by the working group:

- Spatial mapping of Tongan islands (in 5-year intervals) will be needed

Group 4: Fiji

1) Data gaps

- There is a lack of information and data sharing and accessibility across different sectors
- Data is often not digitized
- Available maps and other information sources often are not correctly interpreted according to user needs
- There is a lack of information on forest and land cover change (comment: not specifically related to cc-adapation but part of the GTZ REDD component)
- There is a lack of information on soil properties, soil erosion risk and vulnerability.
- Information on climate change impacts is needed
- There is a lack of data / information standards/formats (partly due to no existing homogeneous database system)

2) Capacity Gaps

- There is currently a lack of potential responsible staff (database managers)
- There is a lack of data analyzing skills data

3) User needs

- Converting maps, graphics into data by digitizing; noting the dates of printing or plotting with the tabular attached Impact analysis
- Several initiatives are currently contributing to existing mapping systems like coastal management system, early warning system, disaster management system, mangrove management system. Information on the work of these initiatives is needed
- Strong regional support will be needed to covering capacity building and the introduction of appropriate technologies such as high resolution remote sensing data, utilization of PlantGro software

4) Focal point

- A focal point group should be established that reports to the National Environmental Council (NEC) through the National Climate Change Country Team (NCCCT)

Recommendations by the working group:

- An information portal was identified as the best solution to link existing websites
- Impact chains on climate change might be a suitable tool for structuring and systemizing climate change information

3.3 Key findings from the Inception Workshop

The following table is summarizing the key findings of the workshop based on user needs and respective recommendations of the regional and national key stakeholders:

	Regional Group	Vanuatu Group	Fiji Group	Tonga Group
User Needs (technical)	Improved access to cc-adaptation practices and tools	Access to existing national and international databases and information on climate (data, documents and reports)	Tools for identifying climate change impacts on LBR (especially crop production, land- and water management)	Database for meteorological / climatological reports
		Links to regional support structures (e.g. SPC, SPREP)	Improved access to cc-adaptation information on regional and national level and best practices (esp. in the land management sector)	Digitized meteorological data
	Digital spatial information to monitor coastline and vegetation changes (DTMs)	Creation and updating of GIS data (e.g. soil data, flood prone areas, hazard maps)	Digitization of old land use maps	Digitized climate change vulnerability data and maps
		A simple and user friendly interface suitable for basic computers		Information on disaster mitigation sand cc-adaptation strategies (with focus on agricultural, land use and health sector)
User Needs (institutional)	Full time IT position to manage the DB	IT position	Database manager (IT position)	
		Trainings on IT skills		Training on IT skills
			Training on data analysing	Training on systematic data collection and analytical skills
Recommendation	A "one stop shop" leading to existing databases and portals	A web-based system containing links to relevant climate change related information (GIS data, databases and document libraries)	An information portal to link existing websites	
	A system with a sectoral focus on LBR		A system that should follow an cc-impact chain structure	
			A regional system to backup all data at SPC/SOPAC	

In regard to the results of the inception workshop the following points seems to be essential:

- The majority of stakeholders were rather interested in short-term related and practical solutions to support disaster risk management and cc-adaptation planning issues within the LBR sector rather than in long-term climate change related developments
- Nobody of the stakeholders requested in particular specific climate change data or climate scenarios
- The user needs are partly general (e.g. improving access to existing information and data sources) but sometimes very specific (e.g. digitizing of vulnerability maps) based on very particular interests making it hard to set-up an integrated database concept
- Lack of data sharing willingness, IT positions and IT and data interpreting skills have been identified as the most important risks under SP2
- Almost all national institutions do not have the adequate in-house capacities to handle, interpret, and maintain large data sources
- Most stakeholders raised the issue of inhomogeneous data and non-existing standards for data collection schemes

4. Inception Mission (consultation of regional stakeholders)

4.1 Stakeholders met during the inception mission

The stakeholder consultation focused on the regional level covering all thematic working groups of SPC-LRD working in cc-related sectors as the intermediary but also other SPC divisions and CROP agencies such as SPREP and SOPAC and USP. (See Annex 3)

4.2 Key findings from the Inception mission

4.2.1 Existing data portals and databases

On regional level several data portals/databases with climate change related information, e.g. managed by SPREP, SPC, SOPAC or the Pacific Disaster Centre have already been established. In addition, sector specific databases, either regional such as the SPC-LRD CePaCT database, containing a “climate ready” crop collection or national specific databases such as Vanuatu’s Water Resource Inventory (WRI) System are under development.

This chapter covers the most important portals/databases on regional and international level. A comprehensive selection of existing international climate change and environmental information systems (networks / websites / portals and databases) relevant to the Pacific context can be found in Annex 4.

Several regional initiatives/projects are following an approach of information sharing and distribution which is directly related to the scope of setting up climate change databases under SP2 :

Regional

- SOPACs *Pacific Disaster Net and IM for DRM* (<http://www.pacificdisaster.net/pdn2008/>) a web portal and database system) which has already been implemented

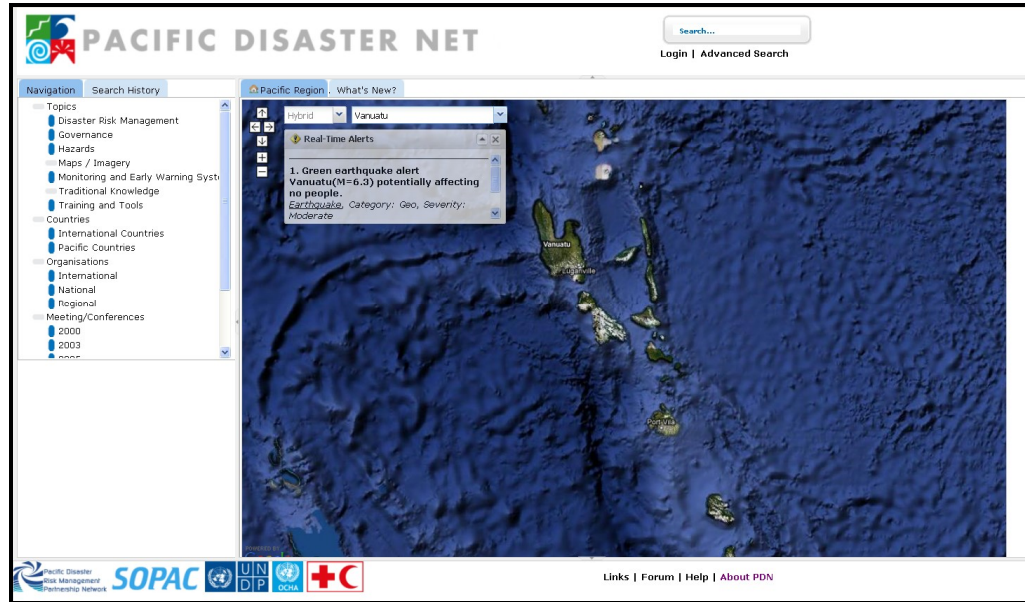


Figure 2: SOPACs Pacific Disaster Net (PDN)

- SOPACs *Pacific Hydrological Cycle Observing System (HYCOS) Web Portal* (<http://www.pacific-hycos.org/>) which has already been implemented
- SPREPs *Climate Change Data Portal* (http://www.sprep.org/climate_change/index.asp), a web portal, which is currently under development. A scoping study will commence in December 2010 and will be completed by 30th April 2011.
- BOM-CSIRO - Pacific Climate Change Science Program (PCCSP) <http://www.cawcr.gov.au/projects/PCCSP/> is currently working with 14 PICTs in developing the following systems until mid 2011:
 - 1) *Climate Data for Environment (Clide)* is digitizing climate data records
 - 2) *Climate Data Portal*, a web-based portal to upload and map station climate data
 - 3) *Tropical Cyclone Portal*, a web-based portal to improve the access to tropical cyclone data
 - 4) *Climate Futures*, a webbased tool for accessing climate projections (18 GCMs)

In addition, the following regional initiatives/projects have the potential to provide valuable lessons learnt in setting up a web-based database under SP2 :

- SPC-LRD has already established an information portal (*intranet portal* implemented under the IKM strategy) including a CMS system, which allows to exchange data and documents with other organizations.
- SPREP *Pacific climate change resources directory* <http://www.sprep.org/publication/climate.asp> : a website with information on international and regional climate change web resources, documents, reports and lessons learned

- SPREP *Pacific Environment Information Network (PEIN)* http://www.sprep.org/projects/irc_pein.htm : a web portal with information on cc-initiatives such as: Pacific Islands Global Climate Observing System (PI GCOS), Climate Prediction Project (PI CPP), Pacific Island Global Ocean Observing System (PI GOOS), Pacific Islands Ocean Observing System (PACIOOS).
- SOPAC *GeoNetwork* database, <http://geonetwork.sopac.org/geonetwork/srv/en/main.home> is an online information facility and was developed by FAO, WFP and UNEP. It focuses on ocean data and relevant products, such as coastal topography datasets and maps, sea level data
- CSIRO/National Institute for Water and Atmospheric Research (NIWA) - Climate Early Warning System component of the GEF project 'Integrating Climate Change Risks in the Agriculture and Health Sectors in Samoa'. <http://www.niwa.co.nz/>.
- USP in cooperation with international institutions such as Max Planck Institute (MPI) Germany is currently building up a *Climate Change Academy* for the South Pacific.
- The USP *Pacific Centre for Environment and Sustainable Development Programme (PACE-SD)* <http://www.usp.ac.fj/index.php?id=570/> which will run until 2015 will in particular address climate change impacts in agriculture, fisheries, tourism, human health, and forestry. Under this program USP is also developing an ICT strategy. The USP will start with explicit teaching schedules strengthening expert capacities for the South Pacific.

International

In the following the most important international information resources are presented. A detailed selection can be found in Annex 4

- The *UNEP/WCMC Global Island Database (GID)* <http://gid.unep-wcmc.org/index.html>: a web-based database covering thematic maps i.e. on sea surface temperature, carbon stocks, biodiversity etc.



Figure 3: UNEP/WCMC Global Island Database (GID)

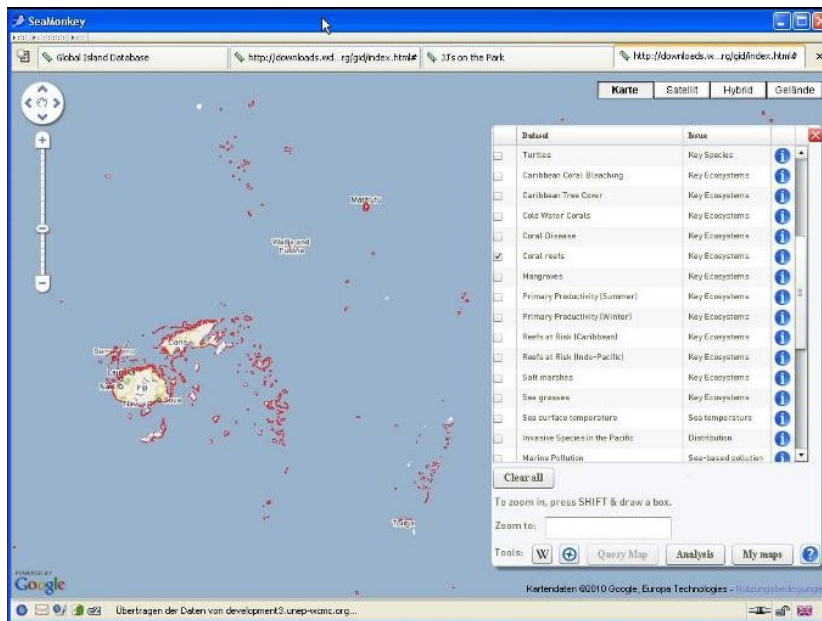


Figure 4: UNEP/WCMC Global Island Database (GID)

- The *IPCC Data Distribution Centre* <http://www.ipcc-data.org/>: Provides climate observations, as global mean time series and gridded fields, climate model projections and simulations: monthly means and climatologies (decadal and 30-year means), socio-economic data, and environmental data and scenarios.

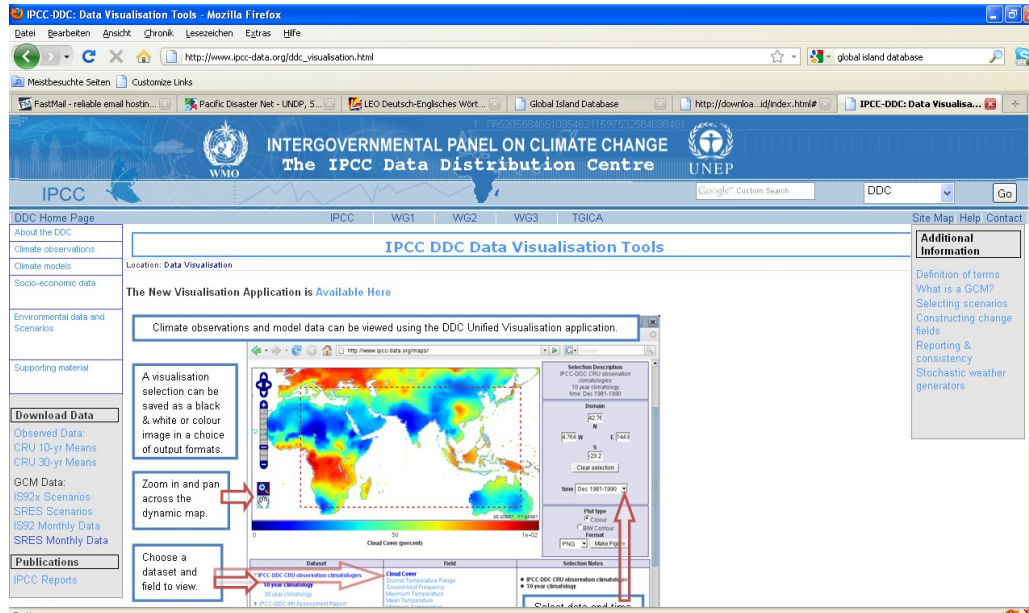


Figure 5: IPCC Data Distribution Centre

4.2.2 Existing barriers for developing and implementing database solutions

During the mission the following institutional, content related and technical barriers have been identified which will affect the set-up of a database structure:

Institutional barriers

- There are clear **human capacity constraints**, especially on national level, for hosting and maintaining a database of information system. Moreover there exists a lack of specific expertise, i.e. IT skills but also on how climate impact assessments can be performed. Even where data is stored efficiently (e.g. the Fiji land information council provides policies for data storage) and easily accessible by all interested parties, interpretation of the data is a problem. Here education and training is needed to build-up this capacity. This is of course a long-term process which goes beyond the scope of SP2 (e.g. can be done by IHF stipends, cooperation with USP and strengthening capacities there). Overall a considerable capacity gap exists in various terms, i.e. **i) infra-structure, ii) expertise to handle and interpret data adequately, and iii) insufficient human resources** in general for maintenance, lack of data sharing or exchange agreements.
- As a further problem **staff turnover** in regional and national institutions was mentioned several times making clear that existing expertise or building up expertise is not sufficient bringing an integrated data base approach really to a success.

- There is a **lack of data sharing** which have to do with country specific policy making (“knowledge is power”) but also data confidentially. Here the implementation of a good governance strategy is needed, in terms of a general openness to share knowledge, data and information, this cannot be fully achieved from outside, but supported with technical advice. The simple establishment of a database will not solve this issue. There exists a need to come to a political framework between organizations and governments which opens the view and convince people about the potential benefits of data sharing.
- There is a **lack of institutional linkages**. As one example not all stakeholders needing climate information are in regular exchange with the regional MetServices which have very long times series on weather data, which can be used for statistical analysis.
- Moreover the **mandates for data collection** and the responsibility for existing collection programs run under different institutional responsibilities. For example environmental protection is under the mandate of SPREP, while land based resource sectors (land use, plant health, GIS) run under the rooftop of SPC/SOPAC. Both institutions have been identified to be a potential host for a future integrated web frame comprising all existing data and information sources on climate change adaptation. In particular this leads already to a duplication of efforts, because SPREP and also SPC are developing “databases” in terms of so-called information portals.

Technical barriers

- **Baseline data** for decision making (such as vulnerability maps, DTM, soil- or vegetation maps) are often **unavailable or outdated**. The Vanuatu Forest Resource Information System for instance is based on outdated forestry data from 1993. Specific intergrated modelling systems for assessing climate change impacts and adaptation like SimCLIM failed due to lack of existing baseline data, leading to unreliable results. In some sectors, data is still recorded manually rather than in a computerized database. Several data and information sources haven’t been digitized yet and are only available in paper format.
- Several ambitious **database initiatives from the past** such as EDF 9 Mapserver or the Vanuatu Resource Information System (VANRIS) failed due to their technical complex setup which also requires a relatively high and constant input of human and financial resources that often goes beyond the capacities of countries.
- **Harmonized data collection strategies (standards)** are often available on international level (i.e. WMO data collection standards) but are not implemented on regional or national level. Data collection standards are needed as a precondition to make such a sophisticated climate change database platform a success.

- Data information systems in the Pacific are generally more **vulnerable due to specific environmental conditions**. The survival of hardware such as computers, CDs/DVDs etc. is shorter in the Pacific due to corrosion caused by the Pacific climate. This e.g. can be overcome by an AC equipped central server room.
- **Data storage is often decentralized** on stand-alone PCs and only accessible by one person or different data are stored in different locations (e.g. various ministries etc.). Data backup systems are often not in place.
- Due to scattered and decentralized data (e.g. on individual PC or laptops), **data collection is very time-consuming** - including intensive travelling - and inefficient

4.2.3 Identified user needs

During the consultation meetings certain data needs have been frequently defined which are essential for an informed and sustainable decision making. These requests which are explained in the following underpin also that what was mentioned above:

General User Needs

- The majority of stakeholders mentioned that, when it comes to short-term and medium-term planning and decision making, an **information system covering climate change relevant information on land based resources** is needed instead of a pure climate change database.
- The majority of stakeholders mentioned that it would be worth to have a **central data server** which can provide information on land based resource and environmental data including climate change, because data sharing/exchange from decentralized servers via internet is too inefficient and travelling for collecting the data individually and throughout the Pacific is too expensive and time consuming. A central data server would also enhance data accessibility.
- Besides the implementation of a database or information system, **training** interventions or programmes in data /information management and input have been frequently suggested by stakeholders. Moreover even data experts request for training on how to perform impact studies.

Specific User Needs

- **Geoinformation:** Soil maps, land use maps and a highly resolved digital terrain models are the basis for vulnerability maps and mandatory for a sound decision making within the LBR sector. Several organizations, however are currently working in this area; Air Worldwide with SOPAC has developed crop vulnerability maps for 15 PICTs under the ADB/World Bank Crop Classification project. In addition SOPAC and SPC FAT are currently conducting a vegetation mapping of low lying islands. However, in order to provide real support and the basis for a future sustainable planning, actual and high resolution data would be needed; a LIDAR mission in order to collect data for a DTM and on land use and change would be ambitious but relevant in the long run instead of putting current information sources and duplicating already existing efforts.

Once this data will be available in the future, it can be integrated into a centrally managed database concept which could really work as an information focal point. Furthermore there exists the urgent need to include information from regional and national MetServices as well making them a key stakeholder of this project.

- **Existing databases:** Several stakeholders mentioned a need for supporting existing databases to prevent a duplication of efforts. The SPC-LRD Genetic Resource team for instance mentioned that additional technical support for managing and upgrading

the CePaCT database would be needed, which goes beyond the scope of SP2. Nevertheless a rapid check of existing regional database made clear that they either not provide data access or that they provide only information about a very restricted area (e.g. rainfall data)

- **Assessment and modeling tools:** There is a need for specific, reliable and workable tools i.e. for vulnerability assessments or climate modeling on national scale. Existing tools such as SimCLIM or SOPAC's Environmental Vulnerability Index partly led to wrong results due to insufficient baseline data or wrong assumptions.
- **Access to case studies and adaptation projects on local level:** Many stakeholders mentioned that the access to case studies and climate change adaptation projects especially on local level has to be improved. Many organizations such as IUCN MESCAL (mangrove management), AusAID CCARC are implementing climate change related activities i.e. on coastal management, disaster risk reduction and management on community and local level.

5. Conclusion

- Regional and national stakeholders within the Pacific primarily expressed the information need to handle short- to medium term environmental management problems (vulnerabilities) within the LBR sector. Long-term climate change related issues play only a minor role in day to day decision making and is not on the short-term agenda of most stakeholders, especially on national level.
- National stakeholders expressed their wish to manage their own decentralized database systems, but in all cases they raised the issue that they neither have the human, technical and scientific capacities nor the IT-infrastructure to maintain such systems. This was also the main reason why complex data management projects or programmes on national level failed in the past. Decentralised systems are therefore not useful, because this multiplies the effort for data maintenance, collection, standardisation, and interpretation. SPC/SOPAC, USP and SPREP also have the relevant inhouse human and technical capacities to build up and maintain the system.
- The general user need to improve stakeholders access to national, regional and international data sources can be solved rather quickly. Several initiatives by regional stakeholders such as the SPREP Climate Change Portal, USP PACE-SD Programme and the BOM-CSIRO Pacific Climate Change Science Programme (PCCSP) with a similar scope on climate information are currently under development and synergies needs to be created to avoid the duplication of work.
- Some of the above mentioned specific user needs, especially on generation and management of geoinformation (e.g. vulnerability maps) require significant input in data collection and digitization and thus can only be addressed by medium to long-term strategies and project interventions, which goes beyond the scope of SP2. In fact, several international donor financed initiatives at SOPAC are currently working in this specific issue.
- A sophisticated climate information system or database (e.g. such as ci:grasp) cannot be created under the limited timeframe and staff input of SP2. A major obstacle is the very heterogeneous and partly limited availability of technical and human resources in the Pacific. Since regional organizations and the administrative resources of PICTS are much smaller than, for instance in Europe a long-term strategy is needed. This includes the solution of certain i) technical challenges (e.g. an appropriate AC room for server and storage systems due to the short survival of hardware in the Pacific climate) and ii) institutional challenges (e.g. the guarantee that the hosting institution can finance people having expertise in environmental data management and maintenance).
- The permanent risk of staff turnover – which is beyond the control of the ACCPIR programme – is posing a threat to the sustainability of a sophisticated system. Discussions with stakeholders from SPC, SOPAC and SPREP clearly indicated that

especially national stakeholders will be reluctant to use such a sophisticated system but are rather looking for a user friendly version which is easy to apply.

- In order to make a data base system a successful undertaking in the long run, several preconditions would have to be clarified and fulfilled in advance. The most important precondition is an inter-institutional and inter-governmental data sharing agreement setting a frame for data exchange and standardisation. Data sharing agreements can only be developed and ratified by the governmental decision makers and cannot be developed externally.

6. Recommendation

Based on the above mentioned key findings and conclusion the GOPA team proposes to develop an integrated meta-database solution (“Pacific Metaframe for Environmental Data – PacMED”) within the 15 months time horizon under SP2. This solution is simultaneously fulfilling the needs of regional and national stakeholders to link and access climate change related information and data within the land-based resource sector. The advantage of this concept is that it can be rapidly implemented when a comprehensive screening for information sources on national and regional level has been finished and realistically be achieved considering the limited staff and time input under SP2.

The following figure is illustrating the potential set-up of the system:

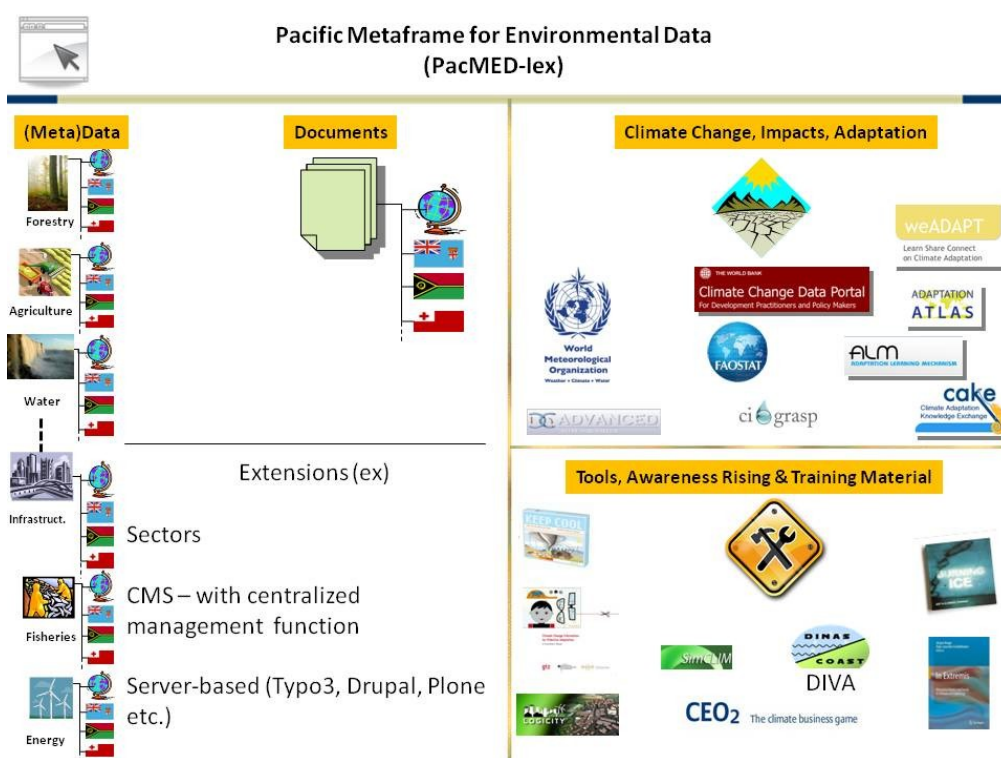


Figure 6: Potential set-up of the PacMED meta-database

The meta-database would cover the following kinds of metadata³:

- existing external and internal climate data sources e.g. FAOstat, World runoff Center, IPCC Data Distribution Centre including a short description on the interpretation of data
- existing cc information (reports, articles, etc.)
- climate modeling and vulnerability assessment tools such as SimCLIM, DIVA, LPJml, RegCM3, Mike21 PRECIS, FORSEE including a short assessment of the tools in terms of data sources and user capacities required to use the tools
- existing cc-adaptation (climate proofing) projects in the project relevant sectors

Meta-data would be organized according to sectors (forestry, agriculture, water resources and climate issues⁴.) with a subdivision into countries (Fiji, Vanuatu, Tonga, regional). The meta-database should include a glossary clearly defining terminologies.

In contrast to the SPREP Pacific Climate Change Portal, which is currently under development this meta-database would focus on climate change information within the land based resource sector.

The meta-database would be hosted by SPC-LRD being the regional counterpart of GTZ in the ACCPIR Programme, but it would be managed and updated jointly by the regional and national key stakeholders (national focal points) under SP2. The advantage of this approach would be that SPC/SOPAC having the relevant human and technical capacities would secure the sustainability of the meta-database, while all key stakeholders are actively involved in the content related aspects. However, SPC/SOPAC should seek for synergies with SPREP and USP preferable in a way of a formal agreement on data exchange and use.

In a second step potential extensions of the meta-database should be assessed:

- A **Content Management System (CMS)** will allow users to take part in the information collection, they can add documents and data to the system and in this sense the content of the system is significantly broadened. Setting up a CMS will imply the definition, setup and implementation of a coherent data collection, standardization and input strategy.

³ It will be needed to make clear which resources and tools are free of charge and which ones are commercial

- A **Climate Change Manual** will show users where climate data can be assessed and how these data needed to be interpreted in the decision making context. It should provide a very basic teaching in regard how to perform impact analyses and an overview of common modeling tools and what is needed to use them.
- Alternatively a **Climate Change Online-Helpdesk** how to handle data and making suggestions for adequate tools to analyze information could be established.

For these extensions it is suggested to seek the support from credible experts and from science, thus it would be recommended to actively involve USP.

7. Way forward

As the next step the GOPA team would propose another consultation and stocktaking mission on national scale covering Fiji, Vanuatu and Tonga early in the second quarter of 2011.

The purpose of the mission will be

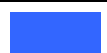
- i) to propose the meta-database concept to the key stakeholders,
- ii) to verify the databases, portals and information systems mentioned during the inception mission in order to assess (i) data coverage (time) (i) the data itself (organization, accessibility) and (iii) resolution (space),
- iii) to assess the integration potential of these information and data sources under one "meta-database".

The output of the mission will be a comprehensive action plan for database design.

On the following page a tentative plan of operation is summarizing the proposed activities under SP2:

⁴ Scenario data, information about climate impact and vulnerability analyses, helpdesk on how to use climate scenarios in a policy and decision making context.

Activities	2010	2011												2012			GOPA Team			
	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	TL	CI	DB1	DB2
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16				
ANALYSIS PHASE																				
1 Preparation of the inception report incl. a first cc-meta-database concept idea	■																x	x		x
2 National consultations / Screening and collection of relevant regional and national meta-data-sources (Fiji, Vanuatu and Tonga)				■	■												x	x	x	
DESIGN PHASE																				
3 Development of a detailed meta-database concept including regional and national metadata (Fiji, Vanuatu and Tonga)					■	■											x	x	x	
4 Assure that the right hardware and software is in place (SPC-LRD server) / assessment of SPC IT infrastructure (=host of webserver)						■														x
5 Design of the meta-database (webdesign)							■	■	■											x
IMPLEMENTATION PHASE																				
6 Feeding in of relevant information (links, tools, documents)									▤	▤	▤	▤	▤							x
7 Train SPC staff on meta-database management, updating and maintenance (1 training course at SPC)															■					x
8 Launch of the meta-database & presentation to the public in 3 national workshops/alternatively 1 regional workshop															■		x	x	x	x
																	1PM	3PM	6PM	3PM



= full time



= part time

TL = Team Leader CI = Climate Information Expert

DB1 = Database Expert (int.)

DB2 = Database Expert (nat.)

Annex

Annex 1: Inception Workshop Agenda

AGENDA

Service Package 2 - Development of Climate Change Databases - Inception Workshop -

Time-span:	18-19 November 2010
Venue:	Holiday Inn, Suva Fiji Islands

Purpose of the workshop

- participants have gained an overview of implementation method as specified in GOPA's Technical Proposal
- participants have shared experiences and lessons learnt from existing climate change related databases and datasets on land based resources
- participants have agreed on the objectives, strategy and expected outputs of SP2 and have agreed on a common strategy to measure project's progress;
- participants have specified their user needs and have agreed on the scope of climate change databases
- participants have agreed on a steering structure for each project country to implement project activities under SP2.
- participants have specified specific work plans - including activities and staff assignments for subsequent country missions under SP2

Participants

Participants of the workshop are those that are directly engaged in the ACCPIR implementation relating to the development of climate change and other databases within the land-based resources at the local, regional and international level. These include the GTZ project team, SPC-LRD, governmental decision makers including the national line ministries of Fiji, Vanuatu and Tonga and CROP agencies such as SPREP and SOPAC. Resource persons from GOPA and SPC/GTZ will be available to facilitate discussions and provide technical advice on a range of issues identified through the Inception workshop process.

DAY ONE: THURSDAY 18 NOVEMBER 2010

08:00 – 08:30	Registration
08:30-09:00	Opening Session
	Opening Prayer
	Welcome by SPC-LRD – <i>Mr Inoke Ratukalou</i>
	Representative of the GTZ – <i>Dr Hermann Fickinger</i>
	GOPA – <i>Team</i> : Objectives of the Inception Workshop (<i>GOPA Team-Mathias Bertram</i>)
09:00 – 09:45	Climate Change – what are we talking about?
09:45 - 10:00	General discussion and Q&A Session
10:00 – 10:15	<i>Coffee Break</i>
10:15 – 11:15	Overview of Environmental and Climate Databases in the Pacific Islands Region (<i>GOPA Team - Ms Makelesi, Dr Wolf Forstreuter</i>)
	Short Country Presentations: current status of climate change and other databases, Tonga and Vanuatu (<i>Country Representatives</i>)
11:15 – 11:30	General Discussion and Q&A Session
11:30 – 12:30	Approaches and Experiences: The Development of Climate Change Databases (<i>GOPA Team - Dr Jürgen Kropp</i>)
12:30 – 13:00	General discussion: Q&A
13:00 –14:00	<i>LUNCH</i>
14:00 - 15:00	Environmental Databases and Database systems: Experience and Best Practices
	<i>SPC-LRD- Ms Anju Mangal</i>
	<i>SPREP – Mr Peter Murgatroyd</i>
	<i>SOPAC – Dr Russell Howorth</i>
15:00 – 15:30	<i>Coffee Break</i>
15:30 – 17:30	Defining the scope of climate change databases, needs, and gaps (Part 1): Country Break-Out Sessions – guiding questions will be provided to each country to facilitate discussions (<i>SPC/GTZ and countries, GOPA Team</i>)
17:30	Close of Session
	(<i>GOPA Team- Mathias Bertram</i>)

DAY TWO: FRIDAY 19 NOVEMBER 2010

- 08:30 - 09:00 **Recap and Summary of Day 1 sessions**
(GOPA Team- Mathias Bertram)
- 09:00 – 10:00 **Defining the scope of climate change databases, needs, and gaps (Part 2):** Country Break-Out Sessions – guiding questions will be provided to each country to facilitate discussions *(SPC/GTZ and countries, GOPA Team)*
- 10:00 -10:30 *Coffee Break*
- 10:30 – 13:00 **Group presentations on the scope of climate change databases, needs, and gaps**
(Country representatives)
- 13:00 – 14:00 Lunch
- 13:30 – 14:30 **Presentation and discussion of work plans**
(Break-out groups)
- 14:30 -15:00 *Coffee break*
- 15:30 – 16:30 **Way forward: preparation for in-country visits/consultations by the GOPA team**
(GOPA Team)
- 16:30 – 17:00 **Recap, Summary and Close of the Inception Workshop**
(GOPA Team- Mathias Bertram)

Annex 2: List of Participants

LIST OF PARTICIPANTS
INCEPTION WORKSHOP SP2 IN SUVA, FIJI
FROM 18 TO 19 NOVEMBER 2010

NAME	DESIGNATION	CONTACT
VANUATU		
1. Mr Eric Vurobaravu	Database Manager Department of Lands	PMB 9090 Port Vila VANUATU Tel: (678) 22892/ Fax: (678) 27708 Email: kvurobaravu@vanuatu.gov.vu
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38. Mr. Mathias Bertram	Climate Change Expert	GOPA Email: mathias.bertram@gopa.de

Annex 3: List of Stakeholders met during the Inception Mission

List of consulted stakeholders

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1.	Mr Inoke Ratukalou	Acting LRD Director	Land Resources Division Secretariat of the Pacific Community (SPC) Suva, Fiji Email: inoker@spc.int
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Annex 4: Selection of existing international climate change and environmental information systems (networks / websites / portals and databases)

Selection of existing international climate change and environmental information systems (networks / websites / portals and databases)

Information Systems	Weblink	Content
ADAPT World Bank	http://sdwebx.worldbank.org/climateportal/	ADAPT is part of the WB Climate Change Data Portal and is specifically tailored to project managers' needs by providing user guidance on risk avoidance and potential adaptation options. It brings together the expanding database of information on climate variability and change. The tool is initially being designed and implemented in Excel but will later be converted to a web-based script. The tool also points project designers towards resources – relevant projects, technical literature, and experts – that may be helpful in moving toward the next step in due diligence.
Adaptation Learning Mechanism	www.adaptationlearningmechanism.net	Global Knowledge Sharing Platform. The ALM is mapping good practices, providing information, building knowledge and networks on climate change adaptation
Agricultural Economics Database	http://www.cabi.org/ProductAndServices.asp	The Agricultural Economics Database provides access to international scientific literature relating to economics of agriculture and forestry, rural development and rural sociology. Contains more than 400,000 abstracts and citations, with 18,000 records added annually. Containing over 30 years of research from over 75 countries it provides an ideal source for government agencies, corporations, development consultants, professionals, and students involved with the socio-economic aspects of agriculture, forestry, and rural development.
Asia Pacific Gateway to Climate and Development	http://www.climateanddevelopment.org/	A platform to assist countries to make concrete efforts to address climate and development.
Asia Pacific Network on Climate Change	http://www.ap-net.org/	A knowledge- based on- line clearing house for Asia Pacific region on climate change issues, providing a platform for policy dialogues and consultation within the region.
Capacity Strengthening of Least Developed Countries for Adaptation to Climate Change - CLACC.net	http://www.clacc.net/	A tool to strengthen the capacity of organizations in poor countries and support their initiatives in sustainable development through the network of fellows.
CARE International Poverty, Environment & Climate Change	http://www.careclimatechange.org/	The PECCN is a CAREled 'community of practice' which consists of hundreds of professionals from CARE and partner organizations committed to addressing the challenges of environmental change from the perspective of the world's poorest and most

Network (PECCN)		vulnerable people.
Center for International Earth Science Information Network (CIESIN)	http://www.ciesin.columbia.edu/sub_guide.html	Cover a huge range of data, from the fields of agriculture, biodiversity & ecosystems, climate change, economic activity, environmental assessment & modeling, environmental health, environmental treaties, indicators, land Use (LU)/ land cover (LC) and LU/LC change, natural hazards, population, poverty, remote sensing for human dimensions research
Climate Adaptation Knowledge Exchange - CAKE	www.cakex.org	Climate Adaptation Knowledge Exchange (CAKE) is aimed at building a shared knowledge base for managing natural systems in the face of rapid climate change. CAKE is intended to help build an innovative community of practice. It helps users to get beyond the limitations of their time and the unwieldy thicket of books, papers and articles by vetting and clearly organizing the best information available, building a community via an interactive online platform, creating a directory of practitioners to share knowledge and strategies and identifying and explaining data tools and information available from other sites.
Climate and Disaster Governance	http://www.climategovernance.org/	CDG is investigating opportunities for integrating climate change adaptation and disaster risk reduction at the national and subnational level.
Climate Change Data Portal, World Bank	http://sdwebx.worldbank.org/climateportal/	The WB Climate Change Data Portal is intended to provide quick and readily accessible climate and climate-related data to policy makers and development practitioners. The site also includes a mapping visualization tool (webGIS) that displays key climate variables and climate-related data.
Climate Change Explorer Tool: A WikiAdapt Tool	http://wikiadapt.org/index.php?title=The_Climate_Change_Explorer_Tool	Aims to facilitate the gathering of climatological information and its application to adaptation strategies and action.
Climate Impacts: global and regional climate adaptation support platform (ci:grasp)	http://ci:grasp.pik-potsdam.de	Hosted at Potsdam Institute for Climate Impact Research, based on a map server showing greenhouse gas inventories, certain impacts. It combines forcing factors, impacts and adaptation via impact chains. Data access currently not possible, but interactive, i.e. adaptation measure can be feed in, local climate scenario inter-comparisons are possible and will be displayed via Walter diagrams. Currently under development, next step will include regional assessment studies, Aims to provide standardise data and map resources, based on standardised assessment strategies
Coastal Resources related sites	http://www.ncl.ac.uk/tcmweb/tcm/czmlinks.htm	A selection of particularly useful web sites focusing on coastal management or of potential interest to coastal managers are listed below.
Community Based Adaptation	http://community.eldis.org/c	A shared online resource designed to bring together and grow the CBA community. It provides a site for the

Exchange	bax/	exchange of up to date information about community- based adaptation, including news, events, case- studies, tools, policy resources, and videos.”
CRiSTAL	http://www.cristaltool.org	A Community-Based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL), designed at integrating risk reduction and adaptation strategies into development projects and strategies. CRiSTAL helps stakeholders to 1) systematically understand the links between local livelihoods and climate, 2) assess a project’s impact on community-level adaptive capacity, and 3) make adjustments to improve a project’s impact on adaptive capacity. CRiSTAL promotes the development of adaptation strategies based on local conditions, strengths and needs.
Development Partners for Climate Change (DPCC)	http://www.pacificdisaster.net/dpccmatrix/login/index	Part of the Pacific Disaster Net. An online network and “partnership matrix” for climate change related donor interventions in the Pacific.
Digital Terrain Model	http://www.dgadv.com/srtm30/	A free digital terrain model. SRTM30 Download Site By David Gil, vertical resolution 30m (for Pacific, 240MB)
Disaster Reduction and Climate Change Infolink	http://www.unisdr.org/eng/riskreduction/climatechange/rdccchinfoink405eng.htm	Newsletter on disaster reduction and climate change issues produced by the Inter- Agency Task Force Working Group on Climate Change and Disaster Reduction (cochaired by UNDP and WMO with the support of the UN/ISDR secretariat)
EM-DAT Database	http://www.emdat.be/datab ase	International Disaster Database, broad coverage of data on environmental disasters
FAO Land Use Database	http://faostat.fao.org/site/377/default.aspx#ancor	Comprises a huge amount of data on forestry, trade on agricultural products, prices. In a similar way for fisheries
Frontline Knowledge Explorer: A WikiADAPT Initiative	http://wikiadapt.org/index.php?title=Experiment_in_coproducing_knowledge	Shares first-hand experience from CCA practitioners, decision makers and other relevant stakeholders.
GeoNetwork database	http://geonetwork.sopac.org/geonetwork/srv/en/main.home	The network allows the sharing of geographically referenced thematic information between different organizations i) to improve access to and integrated use of SOPAC scientific information, ii) to support decision making in the Pacific region, iii) to promote multidisciplinary approaches to sustainable development and iv) to enhance understanding of the benefits of geographic information
Global Climate Change Adaptation Network – WikiADAPT (UNEP)	http://wikiadapt.org/index.php?title=Global_Climate_Change_Adaptation_Network	UNEP’s “multifunctional Global Climate Change Adaptation Network (“the Network”) is proposed for mobilizing the resources of relevant regional centers and ground networks to enhance key scientific, technical and most importantly institutional capacity for adaptation in a synergic and coherent manner.
Global Island	http://gid.unep-	UNEP Project particularly devoted to Island states (not

Database	wcmc.org/index.html	exclusively for the Pacific). Map Server is implemented
Global Soil Data	http://daac.ornl.gov/SOILS/guides/igbp-surfaces.html	Gridded global soil data, with a resolution of 0.08x0.08 degree, Global Gridded Surfaces of Selected Soil Characteristics (IGBP-DIS)" data set contains 7 data surfaces: soil-carbon density, total nitrogen density, field capacity, wilting point, profile available water capacity, thermal capacity, and bulk density.
International Construction Database	http://library.dialog.com/bluesheets/html/bl0118.html	International Construction Database covers worldwide technical literature on civil engineering, urban and regional planning, architecture, and construction. Sources are scanned for ICONDA by international organizations in 14 countries. Sources include over 600 periodicals, books, research reports, conference proceedings, business reports, theses, and non-conventional literature.
IPCC Data Distribution Centre	http://www.ipcc-data.org/	Provides climate observations, as global mean time series and gridded fields, climate model projections and simulations: monthly means and climatologies (decadal and 30-year means), socio-economic data, and environmental data and scenarios.
Linking Climate Adaptation (LCA) Network	http://community.eldis.org/LCA/	The LCA Network is a community of over 900 practitioners, stakeholders, researchers and policy-makers exchanging information on climate adaptation research and practice around the globe via the Networks email list."
ORCHID	http://www.adaptationlearning.net/guidance-and-tools/opportunities-and-risks-climate-change-and-disasters-orchid	This process-based tool is designed to be a light touch screening process for donor programmes. The process utilises quantitative inputs climate science which are applied to the risk assessment of programmes usually at wide scales, and using directional trends rather than discrete figures. The tool utilises project documents and interviews with project staff as well as past trend in vulnerability and disaster risk. ORCHID aims to raise awareness of climate risk management and future climate change among staff, to stimulate dialogue with donor partners, to integrate disaster risk reduction and climate change adaptation policies and activities.
Pacific Climate Change Portal	http://www.sprep.org/climate_change/pigcos.htm	Hosted by SPREP, comprises a variety of project descriptions, but currently no data.
Pacific Climate Information System	http://www.noaaclimatepacific.org	Hosted by NOAA/USA, provide several data or meta data (marine), partly in a very coarse resolution, e.g. 10 degree bins, includes also data for the US, link collection leading to other information sources
Pacific Disaster Net (PDN)	www.pacificdisaster.net	Launched in 2008, this site is for information sharing amongst stakeholders in disaster risk management but also climate change adaptation in the Pacific. Maintained by SOPAC with assistance from OCHA, UNDP and IFRC

Pacific Environment Information Network (PEIN) – regional portal facilitated by SPREP	http://www.sprep.org/projects/irc_pein.htm	A website containing links to environmental and climate change resources in the Pacific hosted on the SPREP Library and IRC website.
Pacific Hydrological Cycle Observing System (HYCOS) Web Portal	http://www.pacific-hycos.org/	The Pacific HYCOS web portal is designed to assist the water agencies in 14 Pacific island countries further develop their knowledge and understanding by strengthening their resources and technical capacity to collect hydrological data and carry out water resource monitoring.
Pacific Islands Climate Change Virtual Library	http://docs.lib.noaa.gov/vlib/PICCP/	The Pacific Islands Climate Change Virtual Library provides web accessible climate information and products such as adaptation guides, case studies, and decision support tools relevant to Pacific Island coastal managers.
Pacific Islands Global Ocean Observing System	http://pi-goos.org/	Marine focus, aims to collect data on water quality, reefs, fish, tides. Currently not data retrieval possible
Pacific Rainfall Data Base	http://pacrain.evac.ou.edu	Hosted by the University of Oklahoma/USA, time series data, partly on monthly data, time series have different length, latest entry Nov. 2010, aim to standardise data, data can be retrieved.
SERVIR	http://www.servir.net/en/	SERVIR is a regional visualisation and monitoring system for Mesoamerica and Africa that integrates satellite and other geospatial data for improved scientific knowledge and decision making by managers, researchers, students and the general public. SERVIR addresses the nine societal benefit areas of the Global Earth Observation System of Systems (GEOSS): disasters, ecosystems, biodiversity, weather, water, climate, oceans, health, agriculture and energy. Here, “climate” covers not only current weather conditions but also climate change projections.
Small Islands Developing States Network	http://www.sidsnet.org/	The primary goal of SIDSnet is to support the sustainable development of SIDS through enhanced information and communication technology (ICT).
TerraViva Geoportail	http://geoserver.isciences.com:8080/geonetwork/srv/en/main.home	Huge map source on certain hazards (e.g. cyclone risks, climate, biosphere, etc).
The Climate and Development Knowledge Network, DFID	http://www.dfid.gov.uk/GloballIssues/HowwefightPoverty/ClimateandEnvironment/ClimateChange/ClimateNetwork/	Network to have better access to high quality research and information on climate change and development. The network is currently in development phase.

<p>Vulnerability and Adaptation Resource Group (VARG)</p>	<p>http://www.climatevarg.org/</p>	<p>An informal network of bi- and multilateral institutions. "It's mission is to facilitate the integration of climate change adaptation in the development process through the sharing, assessment, synthesis, and dissemination of existing knowledge and experience."</p>
<p>weADAPT</p>	<p>www.weadapt.org</p>	<p>weADAPT provides support for adapting to climate change, both on its own and as part of broader development processes, by pooling expertise from a wide range of organisations that contribute to adaptation science, practice and policy. weADAPT provides guidance by pooling expertise from a wide range of organisations that contribute to adaptation science and practice.</p>
<p>World Biodiversity Database</p>	<p>http://nlbif.eti.uva.nl/bis/index.php</p>	<p>The database is a continuously growing taxonomic database and information system that allows you to search and browse a number of online species banks covering a wide variety of organisms. The species banks accessible through the WBD offer taxonomic information, species names, synonyms, descriptions, illustrations and literature references, as well as online identification keys and interactive geographical information systems. The database currently includes 25493 unique taxa, plus 4149 synonyms. The online publication of several projects.</p>

Annex 5: Stocktaking Questionnaire

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on behalf of



Adaptation to Climate Change In the Pacific Islands Region (ACCPIR)

Service Package 2: Development of Climate Change Databases

ICT Questionnaire

Objective of this technical assistance

To develop and establish climate change databases for land-based resources - covering the *agriculture sector, forestry sector, land use* and a strong relationship to *water catchment* and *use of water issues* - on national level (Fiji, Vanuatu and Tonga) and regional level (SPC-LRD) as climate change information and communication tools for capacity development and decision making.

It is important to understand which information is carried by climate change scenarios and how they can be used for a decision making process. In particular the following questions have the aim to focus on adaptation. It should be clear that adaptation to a changing environment is a rather trivial issue. Humankind needed to do adapt itself to a changing environment during history. Adaptation to climate change is different from that and focuses on change management. Change management needs to assess future options for human activities under accelerated climate change. In this context decision making under uncertainty is important and should be one outcome of the learning process (capacity building).

Stakeholders

- SPC-LRD,
- governmental decision makers including the national line ministries of Fiji, Vanuatu and Tonga,
- CROP agencies such as SPREP, USP, SOPAC,
- NGOs, civil society, local communities, and the private sector,
- programmes/projects financed by GEF, UNDP, AusAid, ADB, CIDA, EU, etc.

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Purpose of this questionnaire:

- to collect information on existing climate change related data and databases covering land based resources (sectors which are especially risk prone to climate change).
- to assess existing climate change related data and databases, data gaps as a baseline for determining the scope of the regional and national climate databases in the upcoming inception workshop on climate change databases in November.

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Climate Change Adaptation Tools and Datasets

1. Please state all existing climate change/- related databases, datasets and tools you have in your department/institution. Please provide the relevant information in the boxes below. If the database is online please include url. (include names of web server, map server or database server, content management system)

	Database Name	Database software	Platform	Purpose	Url	Nature of data stored	Information generated
1.							
2.							
3.							
4.							
5.							

2. Do these databases integrate with other remote databases? If yes, please state them.

	Database Name	Remote database name/location	Organisation that hosts remote database
1.			
2.			
3.			
4.			
5.			

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Geographical Information System (GIS)

Climate change/- related databases, datasets often have a spatial component such as a land use maps, or even vulnerability or risk maps.

3. Please state all existing GIS software you have in your department/institution? Please provide the relevant information in the boxes below.

	GIS Database Name	GIS software	Platform	Data set	Format	Purposes related to climate change
1.						
2.						
3.						
4.						
5.						
6.						

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Climate Modeling Software/Climate Scenarios

4. Please state all existing climate modeling software e.g SIMClim, Climex which you are using in your department/institution? Please provide the relevant information in the boxes below.

	Data modeling software	Platform	Data set	Format	Purposes related to climate change
1.					
2.					
3.					
4.					
5.					

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5. What data sets relating to climate change adaptation do you have in your department? Please tick the appropriate data type and fill in the relevant data.

Areas related climate change	Format	How recent is the data?	Source	Who manages the data?
<input type="checkbox"/> Climate information (general) / climatology and meteorology (e.g. the IPCC scenarios)				
<input type="checkbox"/> Forestry				
<input type="checkbox"/> Agriculture and agroforestry				
<input type="checkbox"/> Water resource management				
<input type="checkbox"/> Disaster risk management				
<input type="checkbox"/> Rural land use planning and sustainable land management				
<input type="checkbox"/> Coastal management				
<input type="checkbox"/> Other if other please specify:				

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6. Have the databases listed 1, 3 & 4 above been used for decision making in areas of climate change adaptation? If yes, please state situation or scenario.

7. Do you share your climate change adaptation /-related data with other departments, agencies or organizations? If yes please state them and your reasons for sharing. If no, please state the reasons.

8. Are the existing databases - as specified under questions 1, 3 & 4 - sufficiently structured/managed to be powerful and appropriate information and decision tools for climate change adaptation? Please state reason for your reply.

9. Are existing applications for data entry, transmission, and analysis user friendly and appropriate? If not, how can they be improved?

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10. Please state any problems encountered during maintenance of the data or the databases.

Accessibility

11. Does your department have the following:

		Who manages this?
1.	<input type="checkbox"/> a local area network (LAN) or Ethernet	
2.	<input type="checkbox"/> EDF 9 Map server	
3.	<input type="checkbox"/> Web Server	
4.	Internet connectivity <input type="checkbox"/> LAN <input type="checkbox"/> Broadband <input type="checkbox"/> Dial up	

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User Needs

12. The ultimate aim of this exercise is to develop national and regional climate change databases for land-based resources which are fulfilling your user needs.

PLEASE NOTE THE FOLLOWING: Climate change information often bears uncertainties. Climate scenarios - which are the basis for most climate change information - are hypothetical and depend on decisions and assumptions how humankind will develop in the next 100yrs. The climate change databases will build on this information and will create links between climate information but cannot generate more certainty about upcoming events.

a) Bearing this in mind, which sectors you are working in are particularly risk-prone to climate change (also in correspondence with the findings of workshops held within Service Package 1 in Tonga and Vanuatu)?

b) which impacts in the above mentioned sectors can be expected due to climate change according to your opinion? (also in correspondence with the findings of workshops held within Service Package 1 in Tonga and Vanuatu)?

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c) how do you perceive the climate change database being utilized to assist in the above mentioned sectors especially your area of work or in the decision making processes in your department? Please state as many as you like.

Other comments

Any other comments:

Please return filled out questionnaire to Makelesi Kora-Gonelevu on email makelesik@gmail.com. Thank you for taking the time to fill out this questionnaire.

-----THE END-----