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Report of Outcomes from the Expert Workshop on Climate Change Held in Brisbane (Australia) on July 5-7 2011

Sub-groups:
Climate Variability & Climate change and their impacts
Water
Energy

Work Package 4: Deliverable Report 4.1.4

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Report on the experts workshop on Climate Change (Environment) held in Brisbane, Australia, on July 5-7 2011

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1.

General context

Background of the workshop

PACE-Net aims to establish a Europe-Pacific science and technology (S&T) cooperation platform in order to promote the participation of the Pacific region in international cooperation activities and programmes of the European Union's Framework Programme 7 (FP7). PACE-Net sets up dialogue *fora*, bringing together relevant S&T experts and stakeholders to establish the priority areas for FP7 including Specific International Cooperation Actions (SICAs). As reported in the Document of Works (DoW) of the project, the Pacific region is an appropriate place to lead greater partnerships in research dedicated to global challenges such as the observation of climate change and related sustainable development of remote communities, which was the focus of this workshop. Indeed, the Pacific Ocean is a key area for the study of climatic change effects and adaptation to them; it is at the interface between oceanic and atmospheric streams, communities are highly vulnerable to climate-related extreme events and long term changes such as sea-level rise, and scientific domains such as coral research allows the study of past and recent climatic evolution.

Specifically, the environmental wealth of the Pacific region is regularly threatened by natural hazards and processes (*e.g.* erosion, tropical cyclones, storm surges, earthquakes, volcanoes, tsunamis, floods and droughts) and unsustainable demands on ecosystems (excessive logging, mining activities, impoverished soils, ineffective water management, urban expansion, waste disposal etc.). Moreover, the region and its communities' water and food supplies are very vulnerable to extreme climate events and potential climate change impacts. Because of the altitudinal position of many islands, the high sensitivity of soils and ecosystems, the consequences of natural hazards and of climatic changes and human activities along coastal areas can be dramatic if insufficiently managed. Greater partnerships in climate change research could help Pacific Island Countries and Territories (PICTs) to understand and adapt to its effects, and also reinforce the significant role they play on the global scene in negotiating international agreements for the mitigation of climate change. As highlighted by the European Union (EU) communication *EU relations with the Pacific*, a strengthened partnership and an enhanced political dialogue between Pacific region and EU could better support joint actions in multilateral *fora* where the two regions often share interests in improving global governance of climate change. The isolation of the Pacific *African Caribbean Pacific* (ACP) countries and *Overseas Countries and Territories* (OCTs) also means that adaptation of technologies to their remote and tropical environment, including capacity to better cope with extreme events such as cyclones, is a key research challenge and opportunity for EU-Pacific cooperation.

While identifying some agreed science focal areas that support regional development goals for ongoing collaboration between the EU and the Pacific, the network partners identified "climate change" as a priority theme for present and future research in the region, which can be well supported by Pacific research teams. It is a field in which Pacific expertise can be developed at an international level.

This report was prepared based on the deliberations of a group of experts in climate change in the Pacific[1]; it formulates a number of key research issues and suggested research themes. These priority areas for future research in the Pacific region emerged through a structured and participatory process (see methodology section hereafter).

EU priorities in the "Climate Change" field

As stated by the European Commission (EC, 2011), climate change is one of the greatest environmental, social and economic threats our planet is facing. It is a key international scientific and management challenge for the 21st century. There is no scientific doubt that man plays a significant role in global warming and that society is facing enormous challenges associated with mitigating climate change effects and adapting to its impacts (Intergovernmental Panel on Climate Change, 2007). The global dimension of climate change and the need to improve our understanding of the processes, impacts and the mitigation and adaptation strategies linked to it has led to many international collaborative research efforts, in which Europe has played – and continues to play – a leading role (EC, 2011).

Past scientific findings in climate change research and assessments by the Intergovernmental Panel on Climate Change (IPCC) have provided the basis for global policy actions. These have included the UN Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the international post-2012 process launched at the Bali UNFCCC conference in December 2007. The EU – together with its international partners – is now aiming to create a new comprehensive global agreement tackling climate change which will set priorities, commitments and goals for the near to long term future (EC, 2011).

Climate change in FP7 – key research themes

"In FP7 (2007–13), climate relevant research is dealt with across various themes such as 'Environment (including Climate Change)', 'Energy' and 'Food, Agriculture, Fisheries and Biotechnology'. Targeted climate change research falls under the theme 'Environment (including climate change)', 'Activity 6.1 Climate Change, Pollution and Risks', focusing in particular on the following issues:

1- the earth system and climate, and related abrupt changes
2- natural and anthropogenic emissions
3- the global carbon cycle
4- greenhouse gases
5- future climate
6- the natural, social and economic impacts of climate change
7- mitigation and adaptation strategies, including novel responses to climate change
8- natural climate-related hazards such as floods, droughts, storms or forest fires
9- climate change impacts on health." *(EC, 2011)*

[1] Experts list appended to this document.

Equally, the European Commission has proposed that "*one central 'blue-green' theme should be the sustainable management of natural resources (including water) and the support of Pacific ACP countries in their actions to deal with the* ***consequences of climate change****: rising sea-levels, diminishing fish-stocks, coral bleaching, unsustainable logging, land and soil degradation and increasing pollution and waste*" (EU, 2008). Therefore, S&T in the Pacific could reinforce climate change research capacities in areas essential for the development of the region, such as water management, fisheries management, biodiversity and maintenance of ecosystem services, development of appropriate energy technologies, as well as disaster preparedness. In addition, there is a strong geostrategic coherence in the S&T fields to be addressed by EU-Pacific cooperation, on both specific local topics which are of interest in both regions (e.g. water and fisheries management approaches), as well as for global themes such as climate change impacts, ecosystem vulnerabilities, use of non-sustainable resources, preservation of quality of life and environment, and global governance systems.

2. Workshop methodology

Objectives

The Climate Change thematic workshop, like others of the PACE-Net project, has been set up to maximize the potential to achieve a number of substantive (content-based) and procedural (process-based) objectives.

The substantive objectives of these first workshops were to capitalize on the invited experts' knowledge and experience to:

- Identify key issues and specific priorities for future S&T work in the Pacific related to the relevant thematic area; and
- Develop potential project proposals (including SICAs) to drive Pacific S&T for the highest specific priority areas, that could be funded through FP7 or other mechanisms.

The procedural objectives of the workshops were to:

- Encourage all experts to actively participate in the thematic area analyses and project development activities (facilitation methods have been chosen to help each participant to have their views noted and heard by others);
- Encourage participants to learn more about each others' interests in the Pacific and to determine if they have sufficient mutual interest to jointly develop future projects; and
- Use facilitation methods that enhance the efficiency and effectiveness of the workshop interactions and discussions.

Process

To meet the objectives set out above for the workshop, a structure for facilitated group activities and discussions was proposed as outlined in the PACE-Net "Thematic Workshop Process and Evaluation Summary Report". After participant introductions, the first phase of the process in the Climate Change Thematic workshop followed the "issue and priority mapping" process presented graphically in Figure 1 as detailed in the report to identify key issues and priority areas for future S&T activity in the Pacific.

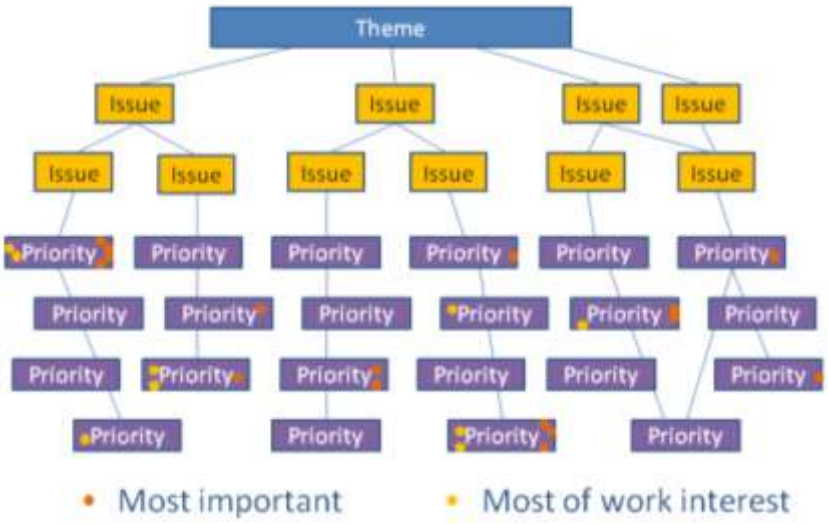

Figure 1: Issue and priority mapping process outline

From the group's map and voting on priorities (see Figure 2), three key areas—water and health; sustainable energy; and climate change—emerged as being of key importance to the Pacific and of work interest to the expert group members, as will be detailed in the next section on Workshop outcomes.

Figure 2: Finalised Climate Change group issue and priority map

The group was then split into three subgroups around these areas, based on the individual experts' preferences, and were provided with the points to discuss and record to support SICA or other types of project development. These points for SICA/project development included:

- Justification for research in the priority area
- Previous project/research insights
- Research questions
- Proposed methodology
- Project partners
- Required funding and timeframe
- Key expected outcomes
- Other opportunities for collaboration in interest area (networks, conferences, exchange programs)

3. Workshop outcomes

Phase 1: Issues and Priorities

Following introductions, the group brainstormed issues they were aware of in the Pacific. After a brief group discussion of these issues, participants each had the opportunity to develop specific priorities for work in the Pacific related to these issues. Each participant spoke to their contributions, providing more detail and making the case for the importance of the issues and priorities. Key categories of issues and priorities at this stage included:

- **Water quality and quantity,** including: access to clean drinking water; understanding impacts of human activities and S&T on water quality and ecology; improving understanding and management of fresh water groundwater lenses; managing competing needs of fresh water resources; understanding the impacts of nutrient export into lagoons and coastal ecosystems; investigating emerging pollutants; and finding and using affordable and acceptable water quality indicators to monitor water systems.
- **Water and health**, including: too many people – mostly children – dying of gastro-enteritis each year; identifying acceptable levels of risk to health; improving health and access to sanitation; buiding acknowledgement and understanding of the links between water and health; developing practical use of understanding of what works for communities and adopting appropriate technologies, practices and indicators to measure progress.
- **Marine environments and monitoring**, including: evaluating and preventing the effects of salt water intrusion; understanding marine resources and use in the pacific; improving understanding of oceans including biodiversity, coastal regions, ocean circulation, atmosphere interactions and impacts on climate, sea-levels and projections at regional and local scales; understanding and managing invasive species and their impacts; and developing open-access ocean monitoring systems.
- **Climate systems and climate change**, including: developing a systems approach for understanding the ocean and its climate links; furthering IPCC analysis for the Pacific region; understanding natural climate variability as well as change; developing understanding and projections of pelagic (deep ocean) ecosystems; understanding current monitoring in the Pacific and developing effective programs to fill identified knowledge gaps or to adjust programs to ensure greater beneficial use of resources in the future; and improving forecasts of climate effects and building capacity and strategies to cope with impacts.

- **Land and disaster risk management,** improving urban planning and managing risks of urban drift and sprawl; developing coast line monitoring and mapping at the local scale; understanding erosion processes, such as distinguishing human made erosion from natural erosion processes; improving disaster preparedness, risk response and reconstruction by gathering local knowledge and working with communities to learn about management strategies, issues of relocation and potential conflicts; understanding, preparing for and managing reponses to natural hazards including tsunamis, earthquakes, cyclones and volcanos.
- **Energy,** collating data in the Pacific region to identify gaps and to develop sustainable, efficient, non-polluting integrated systems, including managing connection to current systems and indigenous sources, working with SMEs tourism operators to integrated renewable energy systems, capacity building and knowledge management in government departments, and researching energy and gender, as energy effects woman and children disproportionally
- **Capacity building, engagement and governance**, including the need for Pacific researchers to be involved in research projects and development initiatives to increase their appropriateness and sustainability, engaging the private sector and linking them to the research community– e.g. in tourism and agriculture ; building preparedness and response capacity for disaster risk and considering options for the future like relocations and conflict management ; and developing social understanding and planning capacity on key well-being issues like groundwater and health links.

These issues naturally fell into three areas with some overlap – water and health, climate change and sustainable energy. The group voted on the issues for importance and for their interest in developing a potential project.

At this stage, the workshop broke into three groups, one for each of the priority issues, and was tasked with developing an outline of a potential project.

Phase 2 Sub-group: Climate Variability and Climate Change, and their impacts

This section summarises issues linked to climate, physical oceanography and basic biogeochemistry of the ocean. While identified as important research areas in the workshop, Volcanoes and Telluric risks have not been discussed, mostly due to the lack of expertise present in these areas available during the meeting.

The group of experts present in one of the three sub-groups (*see appendix 1*) chose to identify research priorities grouped under the theme area: “Climate Variability and Climate change, and their impacts”

Regional background on the theme area

In the South Pacific, Pacific Island countries and territories (PICTs) are highly vulnerable to extreme events but also to a number of large-scale climate drivers that create variabilities. PICTs lie in a region of oligotrophic, warm oceanic waters, where atmospheric conditions are intimately related to the South Pacific Convergence Zone (SPCZ) (*e.g.* Vincent et al., 2010,

Brown et *al.*, 2011). The SPCZ is the largest and most poorly understood world climate engine: it is a region of high convection, which drives the main water resources dynamics of a number of PICTs. Major atmospheric phenomena are related to the SPCZ presence and position: Cyclones (~15% of the annual world count), Madden Jullian Oscillations (MJOs), seasonal variability, interannual variability driven by El Niño/Southern Oscillation (ENSO), and decadal variability. Impacts of these phenomena include extreme precipitation and destructive wind events (e.g. cyclones), long term droughts (e.g. under the influence of ENSO), and sea-level variations and therefore on-flow effects (e.g. erosion, fire, flood) to urban infrastructure, populations, food security, economies and trade. The winds, whose orientation is influenced by the SCPZ, also transport dust and volcanic ash from source regions to the open ocean where they may contribute to fertilizing the planktonic activity.

The oceanic ecosystems, including fish and corals, are influenced not only by surface climate; they also depend intimately on the oceanic environment. Large- and small-scale circulation patterns influence larval dispersal and the migration of species; water temperature, salinity, nutrient availability, dissolved oxygen concentration and pH affect biological activity; and oceanic currents, waves and sea level shape coastal habitats. Together, these properties of the tropical Pacific Ocean have a profound effect on the ecosystem productivity (fisheries; aquaculture…). Understanding these complex and interacting systems is a major challenge, however, because the tropical Pacific Ocean varies across an enormous range of spatial and temporal scales. For example, within just a few days, cloud cover, local upwelling, surface mixing due to storms or oceanic eddies can substantially modify sea surface temperature, salinity, currents and nutrient supply at the scale of reefs and islands. On larger spatial scales, seasonal changes in nutrient upwelling have a significant effect on primary productivity. Key properties of the Pacific Ocean are dominated by the interannual variations of the El Niño-Southern Oscillation (ENSO). On longer time scales climate 'regime shifts', like those recorded in 1925 and 1943, and in 1972-1976 occur and can be viewed in a number of oceanic and atmospheric variables (*e.g.* variations in the strength of the mid-latitude westerly winds, or variations in trade winds, variations in surface salinity). They are characterised by "abrupt" ENSO-like changes that can last for several decades, commonly associated with the Interdecadal Pacific Oscillation (IPO) or the closely related Pacific Decadal Oscillation (PDO). These changes are also thought to affect the entire ecosystem functioning. Profound changes over and above natural climate variability are also occurring, due to the build-up of anthropogenic greenhouse gas emissions in the atmosphere. The South Pacific is therefore a region of active oceanic and atmospheric circulation where both components are strongly coupled. The ocean structure and these interactions determine the structure of the ocean biogeochemistry, including carbon dioxide (CO_2), as well as the pelagic and coastal ecosystems. The South Pacific region is among the least understood and observed region. It remains poorly documented.

State of the art

Some recent projects/research investigations that have taken place in this priority area include:

- **Southwest PacIfic ocean circulation and Climate Experiment (*SPICE*)**: A scientific framework to study the Southwest Pacific ocean physics and climate, endorsed by CLIVAR (World Climate Research Programme Climate variability and Predictability). 2

reports (Ganachaud *et al.,* 2007; 2008).
(http://www.clivar.org/organization/pacific/pacific_SPICE.php)
The goal of SPICE is to observe, model and understand the role of the Southwest Pacific ocean circulation in:
(a) the large-scale, low- frequency modulation of climate from the Tasman Sea to the equator; and
(b) the generation of local climate signatures whose diagnosis will aid regional sustainable development.
Main outcomes so far for this project:

- Coordinated operations (France/USA/Australia) to observe, monitor and model the Southwest Pacific Ocean since 2008
- Assessment of the ocean models of IPCC class to properly represent the ocean circulation, the SPCZ and the associated climate signals

- **PCCSP** funded by the Australian government (Powers et al., 2011)
(http://www.cawcr.gov.au/projects/PCCSP/about.html)
  - The objectives of the PCCSP are to:
    - *undertake research into climate change and variability*
    - *build research capacity in partner countries*
    - *disseminate research findings*

  Main outcomes so far for this project:
  - A 600 page, two volume scientific report called "Climate Change in the Pacific: Scientific Assessment and New Research" was recently released as part of the Pacific Climate Change Science Program (PCCSP). This report draws on research conducted around the world, including PCCSP research. The PCCSP was a major research program aimed at helping 14 developing island countries in the Pacific (Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu) and East Timor to gain a better understanding of how climate has changed in the past and how it may change in the future. The PCCSP ran to the end of December 2011 and has now been superseded by the Pacific Australia Climate Change Science and Adaptation Program (PACCSAP). Volume One describes the climate and oceanography in and around the Pacific Ocean (25°S-20°N and 120°E-150°W), the main factors influencing climate and oceanography in the region, observed trends, our ability to simulate Pacific climate and projections of future Pacific climate based on new analyses of WCRP/CMIP3 models and dynamical downscaling. Projections are provided for temperature, rainfall, extreme events, (including tropical cyclones, extreme hot days and heavy rainfall days), sea-surface temperature, ocean acidification, and sea-level rise for three future 20-year periods centred on 2030, 2055 and 2090, and for three different scenarios of future greenhouse gas and aerosol emissions: B1 (low), A1B (medium) and A2 (high). The report also describes uncertainties associated with the projections – including those on regional scales – and concludes with recommendations to further improve understanding of the climate system in the region. Individual climate change reports for each of the 15 participating countries are presented in the second volume. Each of the country reports in

Volume 2 has four main sections: (1) seasonal cycles, (2) climate variability, (3) observed annual trends, and (4) projections for atmospheric and oceanic variables.

- The USP-EU **Global Climate Change Alliance (GCCA)** Project (http://www.usp.ac.fj/index.php?id=9702)
  This is a four year project funded by EU. A component of the project includes Applied Research and also research carried out by students. The goal of this component is to provide data and ways to help with a better understanding of the impacts of climate change in the region and with the determination of adaptation strategies best adapted to these impacts of climate change. This component will involve the statistical analysis of model generated databases and the determination of the reliability of the model outputs at high geographical resolution, the development of plausible projections of national/local climate variability and extremes for two different timeframes (model projections at 20-50 years), the analysis of the likely impacts of climate change, the review and formulation of adaptation strategies and practices for specific sectors and regions of the Pacific Islands. This could include vulnerable communities in regions such as low0lying atolls, deltas, or coastal communities.

- **SPC PROGRAMS ON LIVING RESOURCES. Some EU funding schemes**:
  - Scicofish and Devfish projects
    http://www.spc.int/fame/en/projects/devfish2
    http://www.spc.int/fame/en/projects/scicofish/about-scicofish
    SPC-book: Bell, J *et al*.: Preliminary assessment of the effects of climate change on fisheries and aquaculture in the Pacific. In: The Contribution of Fisheries to the Economies of Pacific Island Countries and Territories. R. Gillett (Ed), Pacific Studies Series, Asian Development Bank (in press).

- **Integrated Marine Observing System (IMOS) funded by Australian Government**
  - IMOS was established under the National Collaborative Research Infrastructure Strategy (NCRIS), with initial funding of $50M in 2007. It has successfully deployed a range of observing equipment in the *oceans around Australia*, and is making all of the data freely and openly available through the IMOS Ocean Portal imos.aodn.org.au/webportal/. IMOS aims to meet the needs of the research community, address issues of national importance and contribute to international ocean observing programs. Observations being undertaken are guided by science plans developed within the marine and climate science community. These plans address five major research themes: multi-decadal ocean change, climate variability, major boundary currents, continental shelf processes and biological responses. IMOS is designed to be a fully-integrated, national system, observing at ocean-basin and regional scales, and covering physical and biological variables.

- **Sea Surface Salinity observation network (French ORE-SSS)**. (http://www.legos.obs-mip.fr/serv.-observations/service-dobservation-de-la-salinite-de-surface-et-des-oceans-sss).
  The present SSS Observation Service aims at collecting, validating, archiving and distributing in situ SSS measurements derived from Voluntary Observing Ship programs. It is based on the IRD historical savoir-faire, and presently federates the efforts of scientists from - and/or benefits from financial supports of - different French institutes (IRD, CNES, CNRS, IFREMER, INSU, IPEV, OMP). This SSS Observation Service has an "Observatoire de Recherche en Environnement" (ORE) label. It also represents the French contribution to the international Global Ocean Surface Underway Data (GOSUD) program.
- **ReefTemp (Australia)** is a mapping product that provides information on coral bleaching risk for the Great Barrier Reef region. It is a collaborative project between CSIRO Marine and Atmospheric Research, the Great Barrier Reef Marine Park Authority and the Bureau of Meteorology.

Remaining gaps/research questions uncovered

A number of issues have been addressed or are addressed separately by national programs. For instance, a number of Australian funded programs have advanced research in the South Pacific (see above) but they do not for instance cover the French territories (i.e. New Caledonia, Wallis and Futuna, French Polynesia). There clearly is a need for enhanced collaboration between Australia and New Zealand, and other countries, including French territories.

- *Long-term observing system of the ocean and the atmosphere in open ocean is required as there is a need for:*
  - *A long-term ocean time series to document the physics, chemistry and biology of the South Pacific open ocean.*
  - *Theoretical, numerical and observational studies to improve the understanding of the ocean-atmosphere climate variability in the South West Pacific, including the thermodynamics and dynamics of the SPCZ and its characteristics in the next AR5 IPCC simulations.*
  - *Long-term observations of the coastal ocean: biogeochemistry and effects of acidification on ecosystems.*
- *Assessment of absolute regional sea level (discriminating land versus ocean height variations) on short time intervals, as well as over longer term intervals (e.g., decadal) to understand natural versus man-induced changes. These assessments need to be specific to islands.*

Potential new project identified during this workshop

From this justification and state of the art, the **key research questions for new projects identified during this workshop** would be the following ones:

1. Sea level: what are the regional evolutions and predictions of absolute sea variations on short and long term?
2. What are the climate/meteorological/oceanographic systems specific to the area and their interactions during the past, present –day and future climate?
   i. Enhancing understanding of SPCZ
   ii. Enhancing understanding of Cyclones
   iii. Enhancing understanding of MJO
   iv. Enhancing understanding of ocean circulation
   v. Enhancing understanding of interactions between these systems and with the land (e.g., mass effects for ocean, vegetation-atmosphere).
3. How do the large scale climate systems downscale to island scales from present-day situation to future climate as projected by IPCC, and especially for the updated CMIP5 climate simulations?
4. What are the responses of the ocean, biogeochemistry, including acidification to these climate/meteorological/oceanographic systems (and why do they occur)? This includes the open ocean and the coastal and lagoon systems.
5. What are the ecosystem responses up to top predators, on land, atmosphere and coastal/open ocean (and why do they occur)?
6. How does this impact human behaviour (migration, economy, security)?

Proposed methodology

The experts propose the following **methodology** for the project (preliminary investigations, selection of study cases/fieldwork locations, stakeholder involvement, disciplinary knowledge and skills required, proposed analysis techniques and interpretation frameworks).

The labels correspond to the previous section's labels.

7. Sea level:
   i. **Data analyses**: Tide gauges, altimetry including tectonic effects at coasts.
   ii. Modelling large scales and downscaling at island scales
8. Specific climate/meteorological/oceanographic systems:
   i. **Data analyses**: in situ ocean (temperature, salinity currents, proxies from shells, corals…) /atmosphere (met stations, Met radars…) and land (met stations, land use, hydrology…proxies from trees, pollen…). Satellite measurements and analyses for ocean/atmosphere, land (vegetation, land use…)
      - **Ocean**: Necessity to set up a multidisciplinary and long-term ocean time series in the SPCZ. Such a station is under assessment (SPOT, the South Pacific Time series at 168°E/21°S)
      - **Past climate**: geological records from proxies from corals, trees, pollen which involve drilling, microchemistry, dating.
   ii. **Modelling**. Improving climate models and regional models: atmospheric model, ocean models, coupled ocean/atmosphere/land models
9. Statistical and dynamical downscaling models
10. Ecosystem response to climate change

i. Coupled ocean/biogeochemical models for open and coastal ocean.
ii. Long term time series of ocean parameters nutrient, optics, carbon system sensors, phytoplankton speciation. This includes open and coastal ocean
iii. High resolution Satellite data and new algorithms from satellite colour, including dedicated algorithms for shallow water and coastal ocean colour

11. Top predators and fisheries
    i. Coupled ecosystem models, stock assessment models, population dynamics models - for open ocean and coastal seas
    ii. Assessment of zooplankton, micronecton and top predators from observations and fisheries data.
12. Impact on societies: comprehensive studies associating human and climate sciences

Partners who could carry out this project

Potential known and not yet identified **key research leaders** (local operational and research organisations among others) from the:

- Scientific community
- Environmental/security/development agencies
- Local met services and universities.

The proposed **research programs** should be in the framework of the existing international programs:

- CLIVAR (http://www.clivar.org/) PACIFIC PANEL for climate variability
- IMBER (http://www.imber.info/) for marine ecosystem
- LOICZ (http://www.loicz.org/) for sustainability of coastal zones

National organisations:

- AIMS (Australia)
- CSIRO (Australia)
- GEOMAR/AWI (Germany)
- IRD, CNRS, IFREMER, University of New Caledonia, University of French Polynesia, Meteo-France, via GOPS (France)…
- JCU (Australia)
- Max Planck Institute (Germany)
- NIWA, New Zealand universities (NZ)
- PCCSP (Australia)
- SOEST/ IPRC (USA)
- University of Melbourne, University of New South Wales (Australia)
- USP (Fiji)

The level of **funding** and **project timeframe** remains to be defined according to the extent of the project.

The proposed time frame is > 5 years and 10 years preferably **because of the necessity to monitor the impact of climate over the long term.**
Alternative project designs could suit different funding instruments. Which funding sources are possible and preferable, remains to explore.

Key outcomes

Key outcomes sought from the project (research and development related):

- Increased scientific knowledge
- Tools to help managers
- Assist policy and development decisions et local and regional scales
- Possibilities for mitigation of climate change effects

Other **opportunities** for international collaboration related to this interest area (existing networks, conferences, exchange opportunities) will be explored (and disseminated among the PACE-Net community).

Phase 2 Sub-group: Valuing differences in water management

The subgroup for the water and health priority area (see attached list of experts), developed a project concept from a few key issues brainstormed in the collective session, including the multiple uses and values of water, understanding water resource quality and quantity issues, community engagement in water management, and policy and practice.

Project proposal justification

The project concept or potential SICA of "Valuing differences in water management" was primarily driven by the issue that too many people in the Pacific die from, or are impacted by, preventable gastrointestinal disease, for which access to safe drinking-water and sanitation make key contributions. Improving access to clean drinking-water is one response to this issue. The project concept: recognised that effective water management is a shared responsibility and needs to be integrated from community to Ministerial cabinet—across the multiple users of water; and seeks to better understand approaches to effective integrated water management.

Numerous studies, including those from Australia and Europe, in natural resource management have shown that "one size does not fit all" (e.g. Bache and Flinders, 2005; Daniell, 2010; Crean, 2011) – in other words that one form of management system or policy instrument is not likely to be easily or usefully applicable to every situation, due to a range of diversities of culture, geography, infrastructure, socio-economic development etc.

In working up the final project concept, a review of recent research and experiences around the world, and specifically linked to water management experiences of the Pacific needs to be expanded.

Key research question

The key research question for this SICA/project would be:

Recognising differences between Pacific Island countries and between urban, rural and outer islands, what flexible approaches of effective water management can be adopted, adapted or developed?

The sub-questions related to this key question would be:

1. What water management approaches are used now? For example, integrated water resources management (IWRM), community-based, formal institutions. Understanding the roles and responsibilities of different actors in these approaches needs to be explored.
2. How effective are these approaches? Who determines what is effective? What does effective look like? How do you measure effectiveness?
3. To what extent can these approaches accommodate future pressures (climate change, demographic change, cultural change)?
4. To what extent are communities engaged in water management? How does this engagement influence respect for water management and change practice? The starting point is to understand how community interacts with water.

Proposed approach

The proposed approach for treating these questions is "Participatory action research", involving multi-disciplinary and agency science (researchers and applied *e.g*. CROP agencies), policy makers and practitioners (range of users including community, NGOs). Coverage of a diversity of locations throughout the Pacific would also be required.

Anticipated outcomes

The anticipated outcomes of a SICA or projects developed using this approach, would be improved livelihood outcomes through culturally and locally appropriate engagement in water management solutions, e.g. fewer deaths, fewer cases of illness, transferable knowledge and skills, improved physical assets of the community.

Upcoming opportunities to network in the area of water and health

- Asia Pacific Water Forum, February 2012
- World Water Forum, March 2012
- Practical Responses to Climate Change Conference, May 2012
- Global Water Systems Project
- Pacific Forum Leaders meetings
- Rio +20, 2012
- Pacific WASH Coalition

Phase 2 Sub-group: Sustainable Energy

The energy sub-group members were a part of the Climate Change thematic workshop for initial deliberations and later worked independently on a possible project proposal.

Justification: Energy as part of the sustainable development agenda

The sub-group discussion started with looking at the energy situation in the Pacific Island Countries. It was clear that there are a number of issues that require research investigation and investment, and that country specific solutions to the energy problem, including issues of access and sustainability, have to be developed. In particular, it was established that there is a need to explore the linkages between the lack of access to energy and other development indicators, including those of the Millennium Development Goals. Energy and gender, energy and health were some such issues where research exploration is required. Energy access should also not be looked at as a stand-alone solution to the energy problem, but it must be developed in such a way that supports the overall sustainable development of the Pacific communities.

SICA/project proposal: South-Pacific renewable energy data centre

In order to develop locally appropriate solutions for energy access, knowledge of available resources was imperative. Like in many other sectors, the data on availability and quality of renewable energy resources is not available for most of the countries. This makes development of renewable energy projects well neigh impossible.

The group recommended that regional renewable energy data centre be set up as a priority project/SICA. Some work in this area is already happening at the University of South Pacific but a more expansive programme is needed. Collecting and making data available from a central location will help project developers (e.g. Independent Power Producers) and development partners to more efficiently look at the feasibility of setting up renewable energy based electricity generation or establishing biofuel production.

Another example where such data collected and stored at such a centre could be useful is in the carbon trading projects (e.g. CDM) where definite numbers are required by the investors/buyers.

In our discussions we established there was clear evidence and pressing need for a central institution existing in the Pacific region to be assigned the responsibility of data collection, collation and retrieval, in light of several research activities the platform was advised had been done in the region in the past, but data are unavailable or not easily identifiable and accessible.

Potential partners who could carry out this project

USP, a teaching and learning centre of excellence and also an existing regional organization, was recommended by the sub-group to be appointed as the central contact point for PACE-NET funding in the region and be given the responsibility to coordinate and monitor energy-related research activities and programmes in the Pacific region and most importantly as a centre for data collection, collation and retrieval for all research activities in the region. Also they could identify gaps in collected data and organize with potential research workers in addressing these issues. USP would endeavour to invite other regional institutes like the Fiji National University and the National University of Samoa to be part of this initiative.

The proposed project would also involve development of appropriate pilot renewable energy systems in the Pacific region. USP has 14 campuses/centres spread all over the Pacific and this project could be used to convert all these centres into model sustainable energy practitioners and the systems would also be used for capacity building/ renewable energy awareness within the local community.

4. Provisional calendar

Experts consultation and validation of the report draft version

This draft report will be circulated among all experts of the workshop panel (until September 30th 2011 - October 15th at the latest). The final report will be then submitted to Mr Armand Beuf (PACE-Net project officer at EC).

EC contacts

Lead by Mr Beuf (Project officer) a PACE-Net delegation will meet the concerned EC Directorates in order to introduce the SICA proposals and the topics that should be prioritized for the Pacific region. This initiative should be developed in March 2012, during the project second bi-regional platform, in Brussels.

5. References (selection)

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Appendix 1: List of participants to the PACE-Net workshop "Climate change"- 1) Variability and Climate change and their impacts; 2) Energy and 3) Water - in Brisbane, 5-7 July 2011

First name	Last-name	Organisation & Contact	Keywords	Short bio
Stefano	ALMALFITANO	Ital Water Research Institute amalfitano@irsa.cnr.it	- Ecology of the aquatic systems; - Biology of temporary waters; - Effects of climate change on aquatic communities; - Role of aquatic microbes in biogeochemical cycles; - Microbial population dynamics in sediments and waters.	Researcher in Aquatic Ecology at Water Research Institute, CNR (Italy). Studies on aquatic ecosystems under different natural and anthropogenic pressures. Specifically, researches on microbial communities in marine and freshwater systems, in both benthic and water column compartments. Climate change was the main common background of my studies (as regards the crucial role of microbes in the mineralization processes of the organic matter and, thus, in the global carbon cycle).
Gillian	CAMBERS	Pacific Climate Change Science Project (PCCSP) CSIRO gillian.cambers@csiro.au	- Climate change science and adaptation - Coastal zone management - Education for sustainable development	As part of Australia's International Climate Change Adaptation Initiative, the Pacific Climate Change Science Program has been working since 2009 to conduct a comprehensive climate change science research program aimed at providing in-depth information about past, current and future climates in Partner Countries. The PCCSP is a collaborative research partnership between Australian Government agencies (principally the Bureau of Meteorology and the Commonwealth Scientific and Industrial Research Organisation [CSIRO]), East Timor and 14 Pacific Island countries (Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu), carried out in collaboration with regional and international organisations.
Katherine	DANIELL	Australian National University (Australia) katherine.daniell@anu.edu.au	- Global sustainable development - Water and environmental policy, engineering and management - Sustainability: multi-level governance, strategic planning, risk assessment, evaluation programs - Design and coordination of participatory processes for decision-	Dr Katherine Daniell, *BEng(Civil)(Hons)/BA Adel., PhD (ANU/AgroParisTech, France), MIEAust*, is a Research Fellow in the Australian National University's Centre for Policy Innovation and coordinates Australia's involvement in the PACE-Net EU Project. Katherine has recently worked in Europe and Australia on projects related to water governance, risk management and climate change adaptation. Katherine is a guest editor for a special feature in the journal *Ecology and Society* on "Implementing participatory water management: recent advances in theory, practice and evaluation", a

			aiding and conflict management - Leadership, capacity building, education, innovation processes and knowledge management	compilation of papers that brings together policy, management and research lessons from the European Union's AquaStress and NeWater FP6 Integrated Projects. She also teaches executive development courses for the Australian National Institute for Public Policy (ANIPP) on multi-level governance.
Jan	GREGOR	Institute of Environmental Science and Research jan.gregor@esr.cri.nz	- Drinking-water quality management science and regulatory processes - Public health risk assessment and management for drinking-water supplies, particularly for small, resource-limited communities - Working at the interfaces of science, policy and practice, bridging policy formulation and implementation - Improving stakeholder and community participation in addressing issues related to water management - Contributing consultation and planning expertise to the development and review of Pacific regional water-related frameworks and action plans on wastewater management, sustainable water management, and drinking-water quality and health.	Scientific advice for developing and implementing New Zealand's national drinking-water quality management strategy, contributing to drinking-water standards development, estimating burden of waterborne disease, public health risk management practice for drinking-water supplies and other water quality management tools, and supports the local implementation of the tools. Management of the national drinking-water dataset and associated national reporting. Research on impacts of the environment on human health, particularly in groundwater, fresh and drinking water quality, wastewater and safe bio waste, and the use of integrated social and biophysical research to support decision making in the environmental and public health sector.
Karen	McNAMARA	PAC Centre for Environment & Sustainable Development USP Fiji Pacific Centre for Environment & Sustainable Development mcnamara_k@usp.ac.fj	- Community-based climate change adaptation (including traditional knowledge) - Population displacement due to environmental change - Disaster risk reduction and	PACE-SD (Pacific Centre for Environment and Sustainable Development) endeavours to promote integrated research of regional relevance and international standard in the area of environment and sustainable development. The major goal of its research is to promote targeted and integrated work on environment and natural resource issues with a view to promoting sustainable development. Staff at PACE-SD has expertise in

			management (including traditional knowledge) - Development, gender and sustainable livelihood studies - Participatory action research methodologies	community-based work, agro-forestry, oceanography, food security, environmental education and ESD, sustainable livelihoods, fisheries and climate modelling. Moreover, PACE-SD provides teaching and training initiatives. In terms of formal training, PACE-SD staff teach subjects including: 'climate change impacts, vulnerability and adaptation', 'climate science' and 'disasters risk assessment and management'.
Alexandre	GANACHAUD	IRD (LEGOS/CLIVAR) Noumea alexandre.ganachaud@ird.fr	- Ocean role in the climate system - Impact of climate variability and climate change on the Ocean - Large and regional scale oceanic circulation of the Southwest Pacific - Ocean transports of heat, salt, oxygen and nutrients - Island effects and jets	Physical oceanography in Noumea started in 1956, with a peak of activity in 90's with the establishment of the network that monitors ocean conditions in the tropical Pacific (TOGA network for understanding and predicting El Nino). The team reinforced its activities in 2005 with the creation of an international experiment on the ocean and its influence on the climate of the Pacific Southwest, SPICE (http://www.clivar.org/organization/pacific/pacific_SPICE.php). Activities include intensive measurements and modelling the Coral Sea and Solomon Sea, as well as specific studies of the South Pacific Convergence Zone and cyclone activity in the context of climate change.
Christophe	MENKES	IRD Oceanography and climatology christophe.menkes@ird.fr	- Ocean dynamics and atmosphere - Top predators and environment - Climate Impacts on vector borne diseases - Cyclones	Studies of climate variability and climate change impacts onto cyclones in the South west Pacific mostly using ocean/atmosphere modelling. Modelling of climate impact onto vector borne diseases such as Dengue fever. Modelling the interaction between the ocean dynamics, its biochemistry and top predators such as Tuna in the south west Pacific.
Bernard	PELLETIER	South Pacific integrated observatory for environment and terrestrial and marine biodiversity (GOPS) bernard.pelletier@ird.fr	- Geology - Natural hazards - Vertical motion of lands - Sea level variation - Tsunami	Structure and evolution of active margins, island arcs and back-a basins, tectonics, active faulting, swath mapping, seismic and tsunan hazards, sea level variation. Numerous campaigns at sea aboard national and internation research vessels. Multi-beam bathymetry, seismic, magnetics, gravit dredging, submersible dive and deep sea drilling. Southwest Pacific (Tonga-Kermadec and Vanuatu margins, North Fiji and Lau-Havre basins, Wallis and Futuna and New Caledonia EEZs)
Lionel	LOUBERSAC	IFREMER (Research institute for the exploitation of the sea) lionel.loubersac@ifremer.fr	- Coastal Environment - Tools and Information Systems for coastal zone management	Present expertise of Ifremer research unit in New-Caledonia: develops and supports the shrimp industry; research works in animal husbandry, eco-physiology, pathology, nutrition &

			- Marine aquaculture - Marine Biodiversity - Marine protected Areas	understanding of farm and ponds ecosystems functioning. New themes: valorisation of marine micro-organisms, inventory of marine halophytes, management of coastal ecosystems and marine protected areas, setting up of new technologies for marine observation, development of methods and tools to support coastal zone management Own expertise: Remote sensing, Coastal management and development of information and communication systems on environment and water quality at national level.
Gerd	RUECKER	International Bureau of the Federal Ministry of Education and Research at the Project Management Agency c/o German Aerospace Centre (DLR) gerd.ruecker@dlr.de	- Identification of key science focal areas for supporting coordinated collaboration between researchers from the EU and the Pacific. - Identification of qualified high-level officials from the public, private and political sector for participation in the second bi-regional Platform in Brussels in 2012. - Identification and discussion of the strength of research in the Pacific region. - Information about the priorities of the EC in the Pacific. - Information about Pacific and European networks and potential funding instruments	Dr. Gerd Rücker joined the International Bureau of BMBF as Senior Scientific Officer in 2011. In this position he was responsible for stimulating bilateral co-operation with India and other countries in South-Asia. He also has experience with EU projects and has been involved in INCO-Nets and ACCESS projects and coordinates collaboration projects of German universities with universities in the Asia-Pacific Research Area on establishment of research structures. From 2002 until 2011 he worked as a Post-doc, senior researcher and project coordinator in the field of remote sensing, GIS and spatial analysis of environmental issues at DLR´s Research Centre in Oberpfaffenhofen, Germany. He holds a PhD in Geography from the University of Bonn and studied also meteorology and soil science.
Emma	McDonald	Ministry of Research, Science and Technology Emma.MacDonald@msi.govt.nz		
Kalara	McGREGOR	Earth Systems kalara.mcgregor@earthsystems.	- Land use planning and design - Agro forestry/food systems - Entrepreneurship and development	Earth Systems is a multi disciplinary environmental consultancy firm that provides specialist environmental services to the environmental and energy sectors in the Asia Pacific region. Earth

		com.au		Systems specific areas of expertise are environmental /social impact assessment, climate risk assessment and management, water quality monitoring, assessment and treatment, and specialist advice and hands-on capabilities in energy efficiency initiatives, energy generation, waste-to-energy technologies and energy auditing.
Atul	RATURI	School of Engineering & Physics, USP raturi_a@usp.ac.fj	- Renewable energy ACP - Renewable Energy systems development (solar, hybrid) - Solar cells fabrication and performance - Carbon trading - Efficient lighting for rural folks	Ph.D. in materials science and have worked at universities in India, Kenya, PNG and Fiji. My current research is on dye-sensitised solar cells, techno-economic analysis of PV/hybrid systems. We use locally available plant dyes as the sensitising material to fabricate PV devices. We are also interested in studying the behaviour of standalone solar PV and hybrid systems under local conditions and help develop guidelines for remote area applications.
Eddie Taitosaua	WINTERSTEIN	SROS (Scientific research organisation of Samoa) eddie.winterstein@sros.org.ws	- Renewable Energy - Environment - Hydrology - Meteorology - Seismology/Geophysics (to a lesser extent)	In charge of the Environment and Renewable Energy Division of SROS. Our mission statement aims to conduct scientific research and develop technologies which outcomes are of great value in the development and sustainability of value added goods and services for export and to achieve reduction on fuel imports and greenhouse gas emissions. ERE research area - locally available sources of renewable energy which can be exploited for fuel production in the transportation sector and electricity production in the power generation sector. Initial area of research work is bio-fuel but will be extended to other identified alternative sources like geothermal, ocean thermal, tidal movement/wave action and wind in the future.