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A Pilot Information Management Training Workshop – Phase II

for

PICCAP
National Coordinators

Port Vila, Vanuatu
3 – 4 December 1998

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PICCAP National Coordinators

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3 – 4 December 1998

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1. Summary

The workshop began with a review by Mr James Aston, the Coastal Management Officer at the South Pacific Regional Environment Programme (SPREP), of the Pilot Information Management Training Workshop–Phase I which was held in Apia, Samoa, 29–30 January 1998 (referred to here as the First Information Management Workshop). Dr Edmund Green, from the World Conservation Monitoring Centre (WCMC), had presented a framework for information management at this workshop. Participants were introduced to a step by step cyclical process, termed the Information Management Cycle, that involves prioritising information needs, analysing information needs, designing information products and services, agreeing on roles and responsibilities within networks and building capacity in information management generally. The participants used the tools and methods in the Information Management Cycle to prioritise climate change issues relating to Objective 3: Mitigation, and Objective 4: Vulnerability and Adaptation, of the Pacific Islands Climate Change Assistance Programme (PICCAP) Work Programme.

Pilot Information Management Training Workshop–Phase II was held in Port Vila, Vanuatu, from 3–4 December 1998 (and is referred to here as the Second Information Management Workshop). Dr Green followed the review by Mr Aston with a more detailed introduction to the principles of information management in PICCAP for the benefit of those PICCAP national coordinators who were not present at the First Information Management Workshop in Apia.

After the presentation PICCAP national coordinators conducted a group review of the information needs for vulnerability and adaptation assessment in Pacific island nations. They discussed problems arising from the vague definitions of the Intergovernmental Panel on Climate Change (IPCC) sector definitions for vulnerability and adaptation assessment, and the inappropriate nature of some of these sectors to Pacific island nations. The PICCAP national coordinators suggested alternative working definitions, and used these to identify, then prioritise, information needs in each PICCAP nation for vulnerability and adaptation assessment.

Dr Green then used the PICCAP context to illustrate a presentation on the design of information-sharing networks and the benefits that all participants can accrue in such networks. The workshop then discussed the role of information networks in PICCAP, identifying present constraints to information sharing which could be avoided by an efficient PICCAP information network (for example, regional level problems with other institutions; difficulties of communication between PICCAP national coordinators; the irregular use of electronic communication by PICCAP national coordinators; the fact that PICCAP is still in its early stages; and the poor coordination which exists between PICCAP national coordinators). An unstructured and informal network and good personal relationships have developed among PICCAP national coordinators largely as a result of attending PICCAP meetings over the course of the past year. However, the group acknowledged that this network was inefficient in the context of sharing information.

The meeting concluded that the Internet was probably the cheapest, fastest and most efficient means of establishing an information-sharing network between PICCAP national coordinators. The benefits and potential problems of a PICCAP website for this purpose were identified. The workshop concluded with a presentation by Dr Green on building institutional capacity for information management.

2.0 Review of the First PICCAP Information Management Workshop, Apia, Samoa, 29–30 January 1998

Thursday, 3 December 1998 (1300–1400): Presentation by Mr J. Aston

This presentation reviewed the topics which had been covered in the First Information Management Workshop. Readers requiring further details should refer to the report of that workshop which is available from SPREP.

2.1 Why is information management important?

- Information is a resource of the same relative importance to good management as other resources such as people, money and facilities.
- Having the right information, in the right form, at the right time, can take the guesswork out of policy advising and decision making.
- Information can generate important economic returns to society.
- Much information held within countries and the PICCAP region is irreplaceable and a part of the retrievable history.

A framework for information management (the Information Management Cycle) was presented and discussed at the First PICCAP Information Management Workshop held in Apia.

This framework is a mirror image of the steps needed to develop strategies for sustainable development and management plans for coastal areas.

2.2 The Information Management Cycle

There are five steps:

1. To prioritise the issues;
2. To analyse the information needs;
3. To design information products and services;
4. To agree on roles and responsibilities; and
5. To build capacity in information.

2.3 Modules covered by the First Information Management Workshop

- Information and policy making (Step 1 in the Information Management Cycle);
- Information needs analysis (Step 2 in the Information Management Cycle); and
- Information product design (Step 3 in the Information Management Cycle).

2.4 Modules not covered by the First Information Management Workshop

- Information networks (Step 4 in the Information Management Cycle);
- Data custodianship and access; and
- Building information management capacity (Step 5 in the Information Management Cycle).

2.5 Outputs of the First Information Management Workshop

- A range of options and relevant issues for mitigation of greenhouse gases identified at a very broad level and categorised into six IPCC recognised sectors;
- Identification of priority information needs for each mitigation sector on a country by country basis and regionwide basis;
- Identification of priority information needs for sectors of the economy, geographical areas and key ecosystem components at risk to climate change on a national and regional level;

- Identification of existing information and information gaps that could be used for the Vulnerability and Adaptation assessment on a national and regional level; and

- Case studies and recommendations that can be incorporated into the World Conservation Monitoring Centre Information Management Training Handbook Series.

2.6 Recommendations of the First Information Management Workshop

- Need to establish a resource base and identify institutions and expertise in the countries and at the regional level for implementing PICCAP;

- Need to have the skills to extract and receive information from a range of individuals and committees;

- Need to develop links with other programmes such as the National Environmental Management Strategies; and

- Need for future training on:
  - methods for managing traditional knowledge as a distinctly different type of information to data derived from modern scientific investigation;
  - the roles of end users in information management; and
  - the practicalities of managing information in the Pacific region over the Internet.

2.7 Purpose of the Second Information Management Workshop

- To review the utility of the Information Management Cycle for implementing PICCAP;

- To revisit and follow up the recommendations of Phase I: Pilot Information Management Cycle;

- To complete the modules on 'Information Networks' and 'Building Capacity in Information Management'; and

- To provide the background and discussion points for the development of a PICCAP Phase II project on adaptation.

2.8 Anticipated outputs of the Second Information Management Workshop

- New ways of thinking about managing information of relevance to PICCAP;

- A more complete understanding of the resource bases available in the region (community, country, regional and international level) for implementing PICCAP especially the implementation of adaptation and mitigation options;

- Coordination issues, mechanisms, pathways and networks defined; and

- A set of training modules on information management framework that is relevant to the work of the countries.

2.9 Introduction to the principles of information management in PICCAP

Thursday 3 January 1998 (1400–1500) Presentation by Dr E. Green

Dr Green began the workshop with a presentation which revised the general aspects of information management and its importance in supporting sound decision-making practices. This hour set the context for future detailed presentations and discussions by placing special emphasis upon:

- the timely, comprehensive and accurate information which is needed to solve environmental problems;

- the frequently overlooked fact that this information must be presented in a form which is easily understood by decision-makers;

- the complexity of environmental problems is such that multiple organisations and disciplines are always involved; and

- the difference between project-based and decision support systems.

With this in mind, Dr Green then described different information management contexts (local, national and international) and the differences between them, and introduced the need for information management contexts within the Climate Change Convention. Participants discussed the two Articles of the Convention which highlight

the need for information management (Articles 4 and 5, see Figure 1) by obliging parties:

- to develop and exchange data on climate change through networks of national governments, non-government organisations and intergovernmental organisations; and

- to raise public awareness of climate change through education and training.

PICCAP places a central focus on the role of information management techniques by stating that at the end of the project, the country teams, with associated experts, will link science, policy and planning in the climate change field and will have gained the following knowledge, skills and tools:

- The expertise necessary to prepare national implementation plans and National Communications;

- Expanded and systematised environmental and socio-economic data bases required for assessing vulnerability to climate change and sea-level rise and for evaluating adaptation options;

- Well-developed national and regional networks upon which Pacific island countries can rely for cooperation in matters relating to the assessment, planning and implementation of measures for dealing with issues of climate change; and

- Heightened awareness and appreciation of climate change and sea-level rise issues among governmental organisations, NGOs, local community groups and private sector stakeholders as required through national consultation processes and workshops.

Dr Green illustrated ways of achieving this with reference to the Information Management Cycle, a flexible, process-oriented approach (Figure 2). He showed how the process breaks down the production of information into a series of steps which progressively empowers managers to achieve common objectives. He presented the five steps of the Information Management Cycle as a framework for the rest of the information management workshop:

1. Prioritisation of needs ~~-b~~balancing economic, environmental and social needs towards sustainable development;

2. Information needs analysis ~~-a~~analysis of the information needs for nations working to meet their obligations under the Climate Change Convention;

The need for information management in the Climate Change Convention

Article 4, Section g–i

(g) Promote and cooperate, in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies.

(h) Promote and cooperate in the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies.

(i) Promote and cooperate in education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non-governmental organisations.

Article 5, Section a

(a) Support and further develop, as appropriate, international and intergovernmental programmes and networks or organisations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimise duplication of effort.

Figure 1: The need for information management in the Climate Change Convention

3. Design of information products ~~the~~ the optimal method for disseminating climate change information, facilitating its uptake and insuring effective implementation;

4. Network architecture ~~the~~ the organisation of regional networks for the sharing of climate change data and the different roles of partners in such networks; and

5. Capacity building ~~id~~entifying the strengths and weaknesses of networks and enabling partners to meet their obligations under the Climate Change Convention.

The Information Management Cycle was used to introduce the PICCAP national coordinators to a process which could be used to address climate change policy issues in a planned, yet responsive manner.

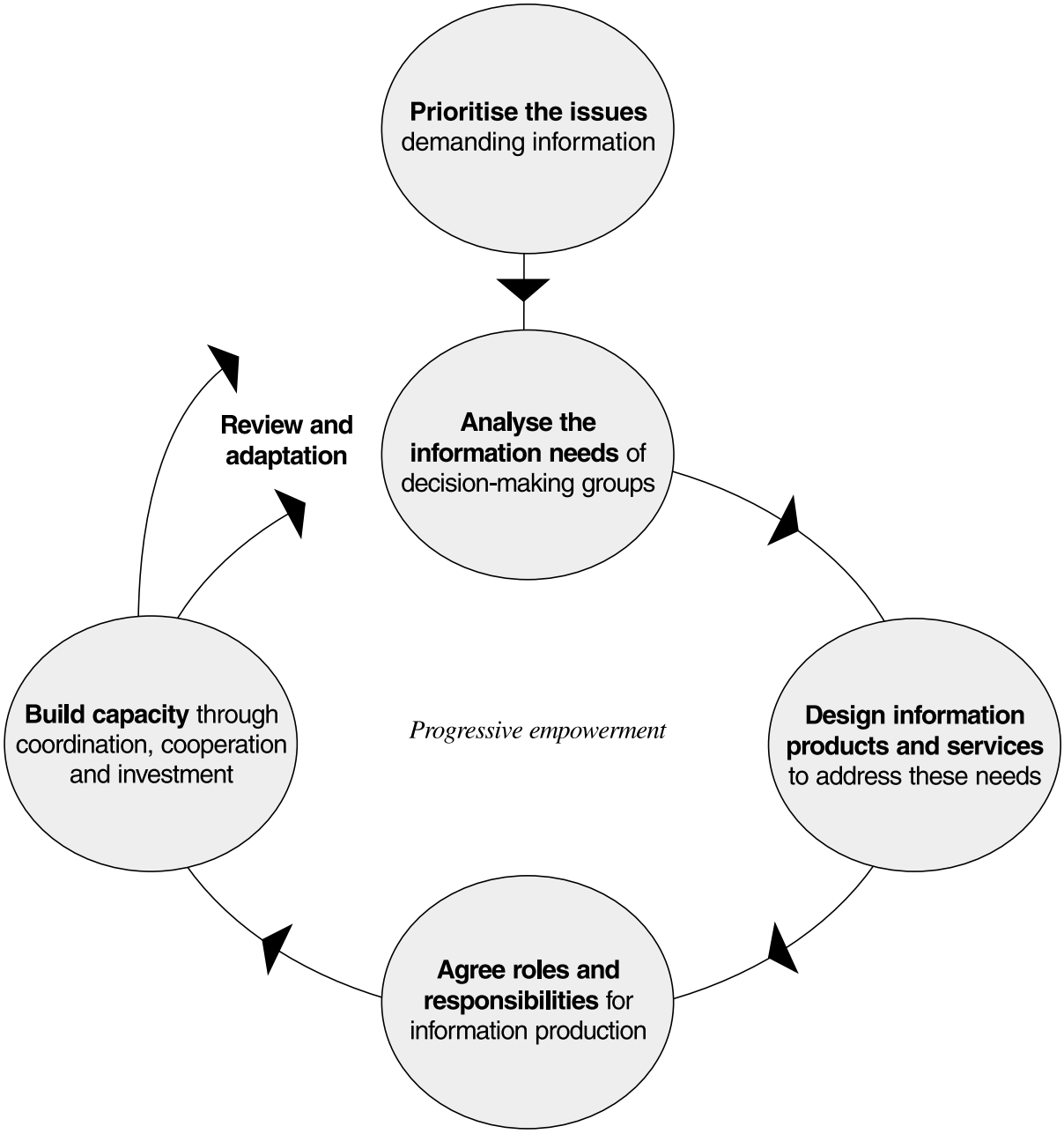

Figure 2: The Information Management Cycle

3.0 Review of information needs for vulnerability and adaptation (V&A) assessment in Pacific island nations

Thursday 3 December 1998 (1500–1700): Group discussion facilitated by Dr E. Green

This session was devoted to a group discussion on the relative importance of information in sectors of the economy, significant geographical areas and key ecosystem components that may be at risk from climate change. These were divided into the five categories commonly accepted by the IPCC for Adaptation and Impact Analysis (coastal zone, human health, water supply, food security and urban areas). These are the same categories which had been used during the Certificate Training Programme on Climate Change Vulnerability and Adaptation (V&A) Assessment. PICCAP national coordinators identified the information needs in each sector and ranked them in order of importance (1 = highest priority, 5 = lowest priority information needs). This session was therefore a more detailed revision of the theoretical assessment of the Information Needs Analysis for PICCAP national coordinators carried out in the First Information Management Workshop.

3.1 Problems with definition

It was clear from the PICCAP national coordinators' comments that the lack of clear definitions for the five IPCC sectors mentioned above creates difficulties in applying them to the situation of Pacific island nations. The best definitions available were drawn up at the UNFCCC Expert Meeting on Adaptation Technologies held in Amsterdam, 20–22 March 1997. For example, urban areas are defined as having between one and 10 million inhabitants, a definition which is clearly unsuitable in the context of PICCAP, where Suva is the largest city (720 000 inhabitants) and Alofi is the smallest (1000 inhabitants). This problem could be dealt with by using a more meaningful definition of urban areas which incorporated centres and relative concentration/development of civil infrastructure, economy and population. However, difficulties would still arise, for example in the Solomon Islands where 80% of the economy and population is rural. PICCAP national coordinators suggested a simpler definition of urban areas as the location of the largest concentration of human settlement, and this definition has been adopted here. This would still present difficulties in countries where the population is quite evenly distributed, such as the Cook Islands, but would be meaningful to most PICCAP nations.

The lack of clear and meaningful definitions in the PICCAP context also causes problems of overlap between sectors. Many of the PICCAP nations are so small that the entire land surface can correctly be considered coastal zone. This means that some information needs are not easily assigned to a sector. For example, reforestation of the uplands of Nauru has been digitally mapped and is stored in a Geographical Information System (GIS), but little other necessary land use data is available. However, this information could justifiably be categorised under coastal zone or food security. Therefore, in the opinion of many PICCAP national coordinators, it is not productive to differentiate between the five sectors.

3.2 Prioritised information needs for V&A assessment in the Cook Islands

		Information needs for vulnerability and adaptation assessment
Coastal zone	1	• 50% of the country consists of low atolls. • Information is needed about the effectiveness of different types of sea wall and the effects of pollution on coral. • The effects of sewage on coral reefs at specific locations.
Water supply	2	• No information exists on appropriate water supplies (e.g. ground water, desalination, rainwater) in a disaster situation. • No information exists on present rates of consumption of fresh water.
Food security	3	• Alternative food sources to the major food crops, especially taro and breadfruit, in the event of drought, cyclones and sea water inundation—the recovery rates of these crops are known but the food supply in the interim is insecure. • General need for information on methods (e.g. seeds, cuttings) to propagate food species in replanting schemes, and the time needed under these different methods for the plants to bear fruit.
Human health	4	• Dengue is present but not malaria, but there is less need for information in this sector than others.
Urban areas	—	• Not applicable. • Rarotonga has a population of 9000, 50% of the national total, but these people are evenly distributed across the island. • A population increase of approximately 5% p.a. is balanced by an equal emigration rate.

3.3 Prioritised information needs for V&A assessment in the Federated States of Micronesia

		Information needs for vulnerability and adaptation assessment
Food security	1	• 80% of population rely on subsistence food, but there is no information on rates of production or area under cultivation. • Good information on the amount of imported food. • Recent ENSO impacted on breadfruit but it's not known how severely. • Appropriate food preservation techniques in the face of natural disturbances such as cyclones, especially in rural areas.
Water supply	2	• No data on water supply in rural areas.
Coastal zone	3	• No specific information needs were identified.
Human health	4	• Need information on climate-related diseases, presently have dengue but not malaria, need to know if this will change.
Urban areas	5	• Data is available on urban areas (population 10 000, increasing by 3% p.a.) but is scattered and not easily accessible.

3.4 Prioritised information needs for V&A assessment in Fiji

		Information needs for vulnerability and adaptation assessment
Coastal zone	1	• The information which exists is scattered, invalidated and there are problems with the scale at which the data supporting the information was collected. • Impact of mining and cyclones on coral reefs.
Food security	2	• Production rates under different climatic conditions.
Human health	3	• There is a lot of information available in this sector, but none of it related to climate change. • Department of Health is fully committed and cannot adjust to the extra workload that planning for climate-related changes in human health conditions necessitates.
Water supply	4	• The Department of Public Works maintains a database on water supplies for the main islands but information on water supply in the outer islands is needed.
Urban areas	5	• Information exists, for example the town boundaries have been defined, and the population of Suva is known (720 000 increasing by 30–40% p.a.).

3.5 Prioritised information needs for V&A assessment in the Marshall Islands

		Information needs for vulnerability and adaptation assessment
Coastal zone	1	• Coral reef profiles. • Beach erosion. • Current patterns. • General information, especially around the capital city area.
Water supply	2	• Optimal location for water wells.
Food security	3	• Data exists on imported food but not the amount produced by subsistence farming.
Human health	4	• Dengue appeared in 1998 ~~it~~ is unknown if this was related to climate change. • Will malaria follow?
Urban areas	5	• How large is internal migration to built-up areas? • What are the infrastructure/construction implications of internal migration to built-up areas? • Capital (Majuro) has a population of 10 000.

3.6 Prioritised information needs for V&A assessment in Nauru

		Information needs for vulnerability and adaptation assessment
Coastal zone	1	• No information on the coastal zone at all. • Impact of shoreline developments such as the new wharf. • General coral reef studies ~~-~~very little data on Nauru reefs is held within the country. • Ocean currents ~~-~~how might they be affected under changing climate conditions and what will be the effects on Nauru?
Water supply	2	• Data needed on rainfall, practicality of desalination, present and future water consumption.
Human health	3	• No specific needs were identified.
Food security	4	• Well understood ~~-~~92% of food is imported.
Urban areas	5	• No specific needs were identified.

3.7 Prioritised information needs for V&A assessment in Niue

		Information needs for vulnerability and adaptation assessment
Coastal zone	1	• Very limited information on all aspects of coastal zone management. • Short staffed, e.g. total of two people in the Department of Fisheries, with one of these on permanent secondment to the Fisheries Forum Agency in the Solomon Islands. • The effect of effluents on coral reefs.
Food security	2	• Plant genetic resources. • Land use. • Agricultural production, especially of taro which is the major export crop.
Water supply	3	• Some monitoring studies on the depth of freshwater lenses and quality of the water have been carried out, but there is not enough information available to plan for the effects of a prolonged drought. • Most water is collected from artesian drinking wells ~~-~~what alternative sources could be used?
Human health	4	• Dengue is present but is only a problem after cyclones ~~-~~will this become more common? • Malaria is not yet present, but will this change with climate change?
Urban areas	5	• Household surveys already completed. • Population of the capital (Alofi) is 1000, constituting 50% of the population.

3.8 Prioritised information needs for V&A assessment in Papua New Guinea

		Information needs for vulnerability and adaptation assessment
Human health	1	• Climate related disease, migration of disease-bearing organisms to higher ground as a result of sea level rise, frequency of occurrence.
Food security	2	• Food species ~~s~~species, quantity, quality. • Relative importance of subsistence food versus imported food is unknown. • Appropriate food preservation techniques in the face of natural disturbances such as cyclones, especially in rural areas.
Coastal zone	3	• Understanding of the coral reefs around the mainland is good, but there is nothing for the outer islands.
Water supply	4	• Water quality, continuity of supply. • Atoll islands especially ~~t~~there is recent evidence of increasing salinisation to water supplies on these islands.
Urban areas	5	• Scattered but accessible information exists. • 500 000 – 600 000 people live in urban areas and urban populations are increasing at 2–3% p.a.

3.9 Prioritised information needs for V&A assessment in Samoa

		Information needs for vulnerability and adaptation assessment
Food security	1	• The capability of the land to produce food. • Availability of new land as sea level rises. • How much low-lying agricultural plains have been eroded and the salinity of their soils affected. • Digital mapping of coral reefs.
Human health	2	• Demography of human and agricultural pests. • Dengue recently arrived in Samoa, will malaria follow?
Coastal zone	3	• Construction of seawalls. • Building of houses and civil infrastructure within the coastal zone. • Land reclamation. • Removal of mangroves. • Composting toilets.
Urban areas	4	• Apia's population is 45 000 and represents 20–30% of the total population. • A household survey has been conducted by the Department of Statistics, data on: – the number of people resident in each house – the number of houses with water and electricity. • The World Bank and Asian Development Bank are currently studying urban planning in Apia.
Water supply	5	• A water authority was established in 1994, and water supplies and quality are well understood.

3.10 Prioritised information needs for V&A assessment in the Solomon Islands

		Information needs for vulnerability and adaptation assessment
Coastal zone	1	• No institution or government department with defined responsibility for coastal zones: as a result data is almost totally lacking. • Identification of those coral reef areas which are at risk from sea-level rise.
Food security	2	• Which crops are grown in the coastal zone? • Suitability of different crops to drought and/or increasing concentrations of salt in the soil. • Appropriate food preservation techniques in the face of natural disturbances such as cyclones, especially in rural areas.
Urban areas	3	• No specific information needs were identified. • Capital (Honiara) has a population of 80 000, many provincial centres with populations of approx. 10 000.
Water supply	4	• No specific information needs were identified.
Human health	5	• Malaria and dengue are already present.

The PICCAP national coordinator for the Solomon Islands considered many of the information issues raised by other national coordinators, such as coastal erosion threatening the transport infrastructure, not to be applicable to the larger islands of this nation. The effect of climate change on land use is the major area in which information is needed for Vulnerability and Adaptation Assessment in the Solomon Islands.

3.11 Prioritised information needs for V&A assessment in Tuvalu

		Information needs for vulnerability and adaptation assessment
Coastal zone	1	• Impacts of erosion on infrastructure and therefore economic activity. • Assessment of vulnerability of coastal communities.
Food security	2	• Quantities of imported versus locally produced food. • Preservation techniques.
Water supply	3	• What are the major (present and future) sources? • What would be the effect of drought and storm surge on these sources? • How rapidly is salt water intruding into present freshwater lenses?
Human health	4	• Little information needed in this sector.
Urban areas	5	• The population of the capital (Funafuti) is 4000 and is increasing at 4% p.a.

3.12 Prioritised information needs for V&A assessment in Vanuatu

		Information Needs for Vulnerability and Adaptation Assessment
Coastal zone	1	• The severity of impact of climate change on islands of different geological age ~~-h~~ow will coral reefs (i) be affected themselves, (ii) protect these islands? • The present users of coastal resources such as mangroves ~~-h~~ow much mangrove is there, where is it? • Removal of aggregates for building. • More data is needed on the effects of logging on watersheds and catchment areas. • The importance of coastal fisheries to subsistence diets.
Food security	2	• Appropriate food preservation techniques in the face of natural disturbances such as cyclones, especially in rural areas.
Water supply	3	• Information on water supply in rural areas is needed ~~-r~~ainwater, wells or rivers? How are different supplies likely to be affected by salt water intrusion?
Human health	4	• Data on human health is abundant.
Urban areas	5	• Waste management techniques in relation to population growth. • Port Vila has a population of 20 000.

3.13 A summary of information needs for V&A assessment in PICCAP nations

Although in most cases PICCAP national coordinators were not specific on the type of coastal zone information that was needed for V&A Assessment, there was a clear consensus that this was the most important sector in terms of information needs (Table 1), with food security being the second most important sector. Information on the relative contributions of imported and home-grown to the national food budget is needed across the region. There is also a widespread need for information on how environmental events related to climate change (for example droughts, floods, salt water intrusion) will affect food production. The need for information in the water supply and human health sectors is about equal across the PICCAP nations, and the unsuitability of the urban area sector to Pacific island nations is reflected in its low ranking. The PICCAP national coordinators from the Cook Islands and Nauru did not consider the urban area sector applicable to their national situations.

The 11 PICCAP national coordinators present at the PICCAP Phase II workshop in Port Vila, Vanuatu, December 1998 prioritised information needs in the five IPCC sectors of Vulnerability and Adaptation Assessment. PICCAP national coordinators identified the importance of information in each sector then prioritised these *needs* (not the importance of each sector itself). Sectors ranked first or second have been shaded.

	Coastal Zone	Food Security	Water Supply	Human Health	Urban Areas
Cook Islands	1	3	2	4	N/A
Fiji	1	2	4	3	5
FSM	3	1	2	4	5
Marshall Islands	1	3	2	4	5
Nauru	1	3	5	2	N/A
Niue	1	2	3	4	5
PNG	4	2	3	1	5
Samoa	3	1	5	2	4
Solomon Islands	1	2	4	5	3
Tuvalu	1	2	3	4	5
Vanuatu	1	2	3	4	5
Average rank	1.6	2.1	3.3	3.4	4.7

1 = highest priority

5 = lowest priority information needs

Table 1: Information needs in the five IPCC sectors of vulnerability and adaptation assessment

4.0 Information networks—benefit and design

Friday, 4 December 1998 (0900–1000): Presentation by Dr E. Green

Many different groups possess knowledge of a cultural, economic or scientific nature which could be of great value to the conservation and sustainable use of living resources. This may have been built up over many years or generations and represents a significant investment in terms of time, money and intellectual effort. The intellectual property resulting from this investment is often seen as an important asset, to be guarded from outsiders and made available only in exchange for other assets, for example money. It is not surprising, therefore, that the flow of information between different segments and levels in society is often frustrated by political, organisational or even personal barriers.

4.1 Constraints to information sharing that can be managed using networks

In general, there is a lack of awareness of the benefits of information sharing, allowing the potential disadvantages, including fears about loss of intellectual property, to dominate. This leads to the erection of unnecessary barriers to information sharing based, for example, on the belief that intellectual property, when shared, will be diluted, misrepresented, or otherwise used to the detriment of its owner. Sometimes such beliefs are well founded, for instance in the case of owners of indigenous knowledge who are fearful of exploitation by drug companies; owners of scientific knowledge, particularly those whose careers depend on publication, who fear plagiarism or lack of acknowledgement; and owners of technological knowledge who fear infringement of patents, copyright and other forms of know-how.

Owners of all types of information may feel uncomfortable about sharing their investment until they understand why it is needed and how it will be used. Given that access to information is a vital part of most people's everyday work (whether this is from different parts of the same organisation or from external individuals, organisations or sources), efficient procedures for information sharing are essential to productivity. For example, human population figures generated by a national census agency may be required by planners in the agricultural and health sectors; forestry department maps may be needed by an environmental lawyer assessing a claim on public forest land; and, calling on generations of experience, a village elder may need to advise his community on the best moment to harvest a wild crop. Such work can be delayed, devalued or prevented by lack of information sharing.

A special challenge arises when producing information to address environmental concerns such as climate change. The information needed to support policy and practices in this area is multi-disciplinary in nature, even when confined to a single sector such as forestry or agriculture, and may be required on a diverse and variable set of topics. It is inevitable, therefore, that the underlying datasets will be scattered amongst many organisations and sources, making the task of integration especially time-consuming. Furthermore, if some organisations are unable or unwilling to provide access to their data, there may be no option but to reproduce secondary copies at great expense. Even worse, decisions may be made in the absence of important data because the latter have not been accessible.

Figure 3 presents a variety of constraints which can hinder the unrestricted exchange of data within a network. In many cases, such constraints will be perfectly reasonable. There are powerful techniques based around the principle of custodianship for overcoming unnecessary barriers that have been erected. A simple method for assessing which constraints may be the most plausible in any given situation is to consider what would happen if a request were made for one's own data. This helps to anticipate and appreciate the difficulties encountered by others.

4.2 The principles of information networks

Information networks, which are simply assemblages of individuals, groups and organisations with common information goals, overcome barriers to data access by focusing on the need for cooperation. They range in size from loose

associations of individuals based upon personal contacts and historic ties, to actively managed consortia of government agencies, NGOs, scientists and private organisations, all with shared information goals. The aim is to build trust and confidence between the network's partners, who may include scientists, policy-makers and resource managers, leading to improved uptake of scientific information in policy and planning.

The rewards of information networking can be great. For example, more reliable access to data can enable organisations to fulfil their core responsibilities more effectively and consider new opportunities and roles. Participation in networks enables information products to be developed with wider support and with greater efficiency. It is a classic 'win–win' situation in which organisations, whether they are providing or receiving data, become empowered through cooperation.

However, it would be naive to assume that active and positive cooperation will happen as a matter of course. Each partner (or stakeholder) must be able to see some concrete benefits in joining the network, whether this is the ability to improve the quality of a dataset, acquire access to other datasets, or enter a long-term relationship with another organisation. As the network becomes established and recognised, further potential benefits are economies of scale, minimised duplication of effort and external investment on a scale which individual partners could not attract.

Information networks require substantial effort to establish and maintain. Benefits must be perceived as exceeding the costs of participation, for example in terms of the time and resources spent liaising with other partners (networks are unlikely to succeed unless this fundamental principle is understood). When balancing the costs and benefits of entering an information network a key question is 'What will it cost me to contribute?', as well as 'What can I expect to gain?'.

Information networks tend to establish themselves in similar ways. The initial push is from non-governmental organisations, professional associations and scientists who are often among the first to become aware of impending environmental issues, and wish to share information and experiences in order to support each other's activities. As awareness of the issues rises, and the activities of the individuals concerned are seen by outsiders as a credible source of information, cooperation is consolidated by harmonising approaches to data management and by developing information as a group rather than separately.

Informal networks of this kind can be operated on very low budgets, since they are driven primarily by the personal commitment of individuals. Eventually, however, increased size, prominence and acceptance by greater numbers of users can enable information networks to grow into self-supporting bodies, for instance with secretariats, which are recognised or even adopted by governments. Not all networks develop in this way: some may be initiated directly by governments or industry, or indirectly via externally sponsored projects.

Common constraints on data access

- No established corporate policy or guidelines on data access
- Not willing to release data (e.g. for reasons of copyright, confidentiality, security or institutional/ personal rivalry)
- Physical procedures for retrieving data are too complex (e.g. inefficient means of accessing/ compiling/editing/copying data)
- No funds to process the request (e.g. due to staff costs or costs of media)
- Request for data is not made clearly enough
- Requested data are still under development
- Requested data are not fit for release (e.g. not standardised or quality-assured)

Figure 3: Common constraints on data access

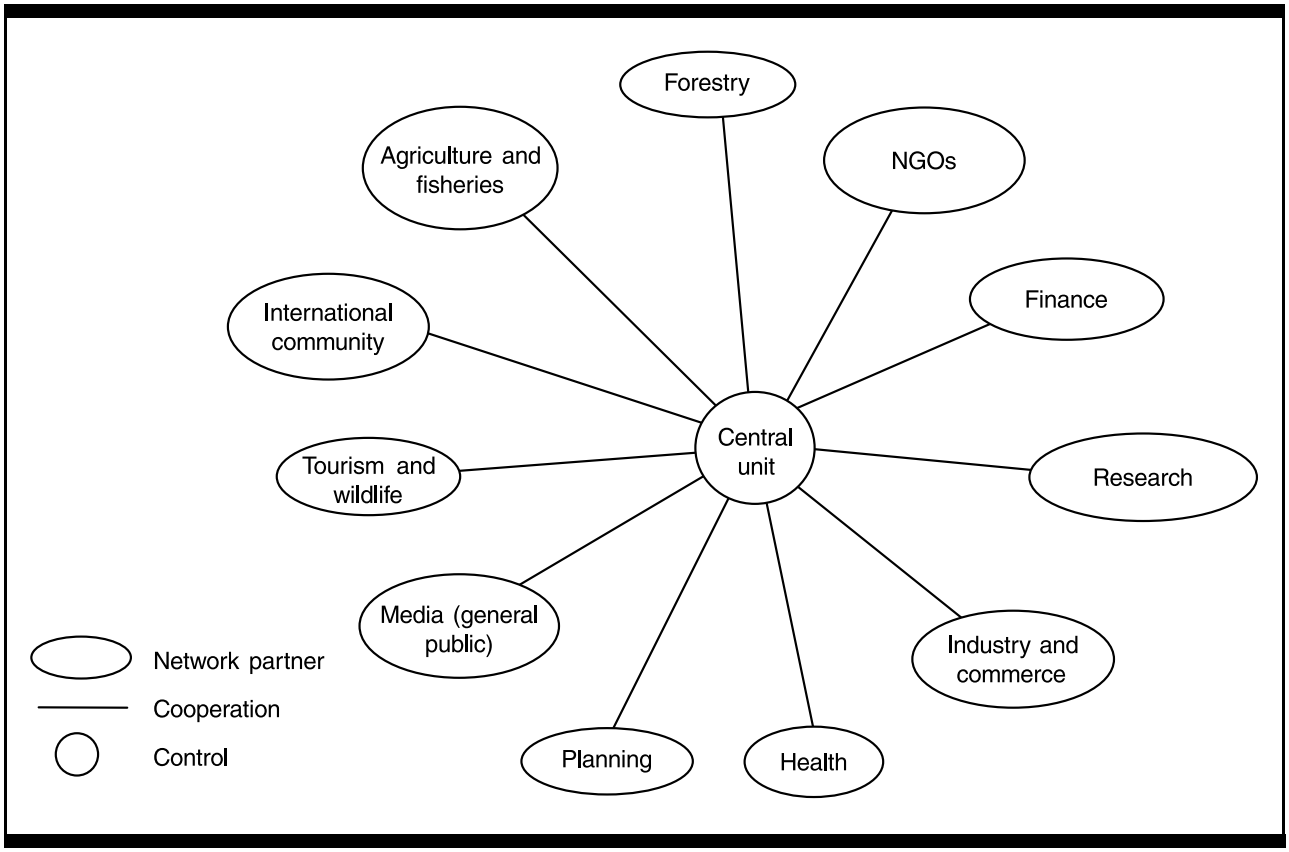

Figure 4: A centralised network

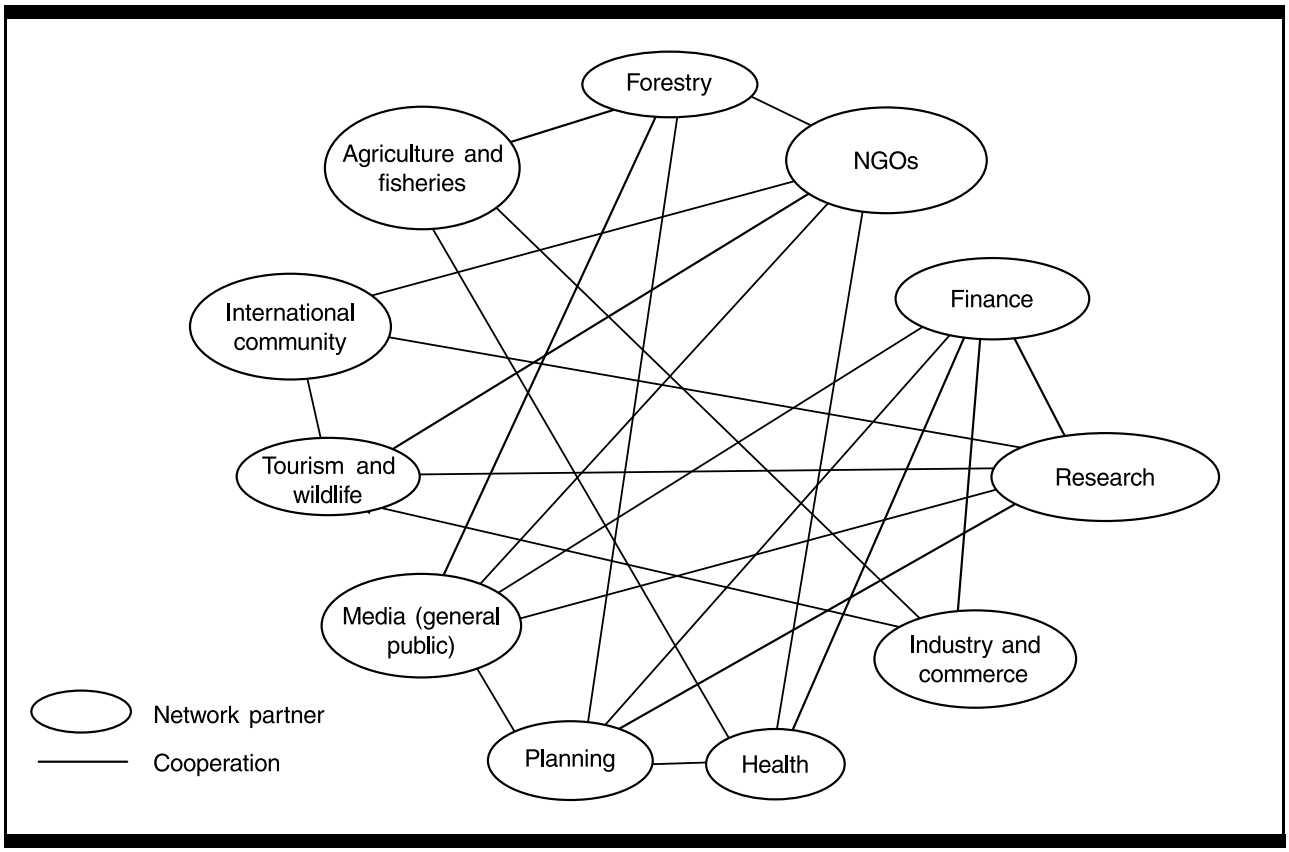

Figure 5: The structure of a distributed network

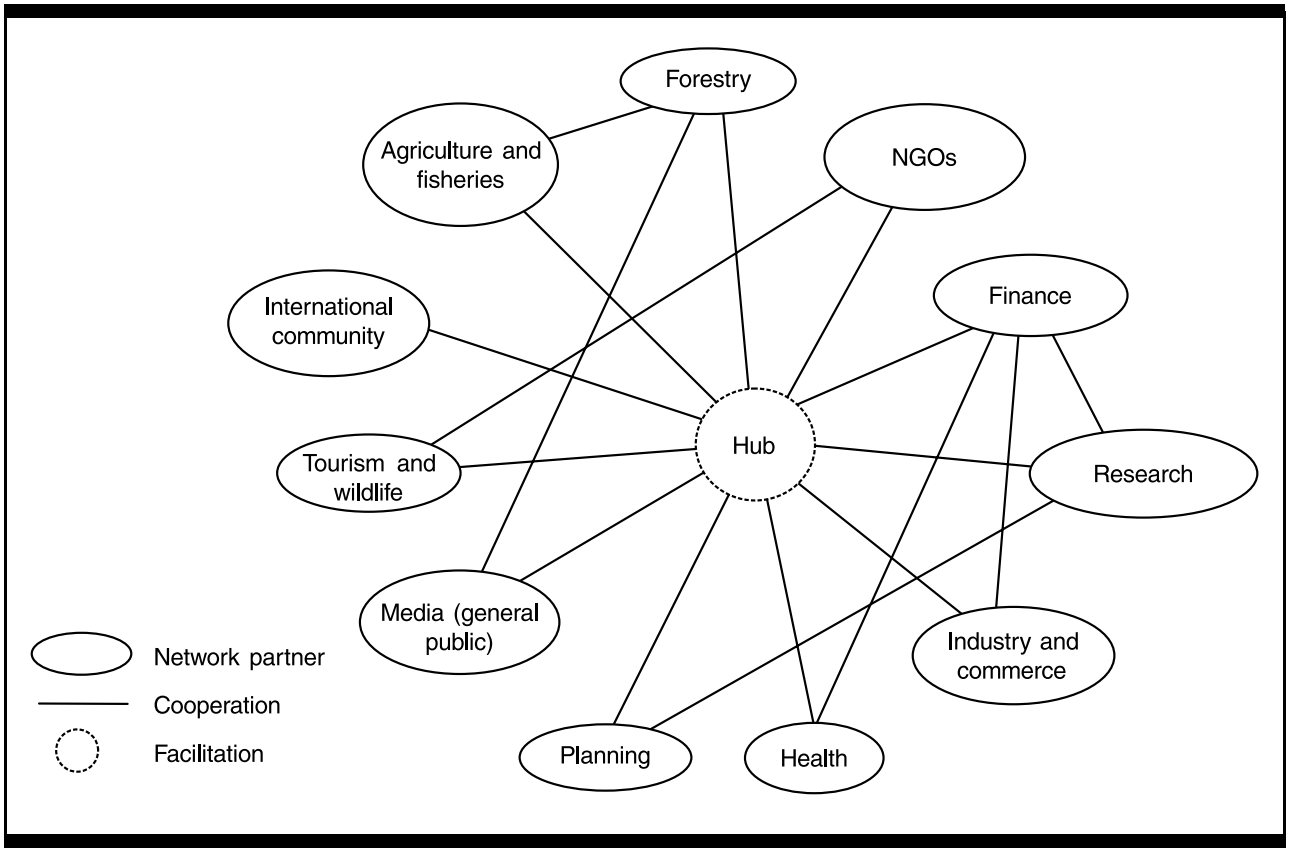

Figure 6: The structure of a managed network

4.3 The design of information networks

There are two basic forms of information network. The first uses a centralised architecture (see Figure 4) where there is a single organisational unit at the centre of the network. Individual partners communicate and cooperate within that unit, for example by providing specific data and advice, but not directly with other partners. The implication is that the central unit provides all the necessary people, facilities and procedures to generate information products. This is equivalent to saying that the information system is located in one central location, with partners supporting this as necessary. Centralised data management is efficient in situations where partners work within a single operation, so that individual feelings of data ownership are subsumed by corporate objectives. It is also useful in situations where, for security reasons, data must be managed under tightly controlled conditions (for example, in a bank). Finally, it is the only practical way forward in cases where individual partners do not have the capacity to manage data themselves.

The second form of network has a distributed architecture (see Figure 5). Partners operate in an unrestricted environment where communication is encouraged between all parties. No attempt is made to coordinate or control the partnerships that may develop; there is total democracy of cooperation. This is equivalent to saying that the information system is spread across all of the network's partners, that is, the network *is* the information system. Interestingly, the two architectures—centralised and distributed—mirror wider changes in information technology strategy over the last decade, from large, centralised computers (mainframes) to small, desktop computers (personal computers) communicating with each other via ever more extensive electronic networks. The Internet is the ultimate example of a distributed network, albeit chaotic and unfocused, although electronic communication is not essential to network functioning in general.

There are drawbacks to both architectures. In the first case, the central unit may be perceived as controlling access to data and information products by custodians. Under such conditions it may be difficult, even impossible, to establish a 'cooperative spirit' since, quite correctly, partners expect to retain full rights and responsibilities over their data. With distributed networks, however, partners are not coordinated or provided with direction, resulting in duplication of effort, lack of agreed standards, and generally impeded progress towards common information objectives.

The weaknesses of both approaches can be rectified through the formation of a hybrid, or managed network, which allows free communication between partners and provides coordination and other networkwide services through a 'hub' (see Figure 6). Unlike a centralised network, the hub of a managed network serves the collective interests of the network's partners, rather than the specific interests of a single organisation or operation. Usually, the hub would be managed by a committee representing the interests of each partner in the network, plus associated administrative support. A dotted line is used to denote the hub in Figure 6 to reinforce its role as facilitator, not controller, of the network. A good measure of the success of the hub in serving collective interests is the number of bilateral partnerships it helps to form. This feature distinguishes the managed network from more centralised approaches. Table 2 summarises the advantages and disadvantages of each type of network.

Type of network	Advantages	Disadvantages
Centralised	• Efficient planning and administration • Useful when capacity of partners is low	•Partners must be prepared to give up/ mandate management of their data to another body
Distributed	• Perceived as very democratic • Cheap to set up	•Difficult to achieve long-term results due to lack of coordination
Managed	• Efficient planning and administration • Good communication and cooperation between partners	•Potentially costly to maintain

Table 2: The advantages and disadvantages of different types of network

5.0 The role of information networks in PICCAP

Friday 4 December 1998 (10:00–12:00): Group discussion facilitated by Dr E. Green

The workshop discussed the role that information-sharing networks could play in PICCAP. The national coordinators began by identifying the constraints to information sharing and drew up the following list:

- Regional level communication with other institutions:
  - Agencies such as the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF) have a well established network in the region. However, there are some gaps in the network that can impede information flow out of the region.

- Communication between PICCAP national coordinators is difficult:
  - email is not regularly answered or commonly used by PICCAP national coordinators;
  - PICCAP is still in its early stages; and
  - many PICCAP national coordinators are overloaded with other projects.

- Very little coordination exists between PICCAP national coordinators.

- There are serious limitations to email in the region:
  - the expense;
  - reliability of access in some cases;
  - the cost and difficulty of transferring files as attachments to email messages; and
  - some PICCAP national coordinators only have access to email through an account shared by many people, or have to rely on a second party to forward their mail.

The representative from the Cook Islands provided an example of the benefits that would be obtained through information sharing within an efficient network of PICCAP national coordinators. He had recently discovered that a team of American scientists had been visiting the Cook Islands every three months for the past 15 years for the purpose of measuring air quality, and that they were also working in five other PICCAP countries. The data are available ~~a~~ PICCAP information network would have been an ideal way of:

- informing all PICCAP national coordinators of the existence of this potentially extremely useful database; and

- distributing the data to those PICCAP national coordinators who were interested in using the data.

At the moment there exists an unstructured and informal network between National PICCAP Coordinators, largely as a result of attending PICCAP meetings over the course of the past year. While good personal relationships between National PICCAP Coordinators have developed as a result of this, it was acknowledged to be inefficient in the context of sharing information.

5.1 The role of a PICCAP website

The potential benefits and problems of a PICCAP website were discussed by the PICCAP national coordinators. The main benefits were perceived as being:

- a website would act as a central resource for all PICCAP national coordinators;

- correspondence, data and news could be posted centrally;

- PICCAP national coordinators could access the PICCAP website at their convenience and thereby avoid many of the problems with email;

- datasets could be stored at the website for use by all PICCAP national coordinators;

- a website would be a cheaper method of communication than email; and

- a website would provide a profile to the activities of the PICCAP national coordinators, both nationally and internationally.

Potential problems were identified as being:

- uncertain reliability of access to the Internet by some PICCAP national coordinators;

- a concern that a website might lead to a reduction in personal contact between PICCAP national coordinators; and

- bureaucratic barriers ~~a~~access would be through national telecommunication companies but payment would be through government.

However, the overall consensus was that a website would offer a valuable resource for information sharing, coordination and communication between PICCAP national coordinators.

6.0 Building the capacity of network members to manage information efficiently

Friday 4 December 1998 (1230–1345): Presentation by Dr E. Green

Member organisations (or individuals) of a network must have the capacity to manage the information that they are committed to sharing with other network members. However, the phrase 'information management capacity' means different things to different people. To some, it applies only to the hardware and software necessary to build databases and information systems. To others, it encompasses the political commitment, constructive policies and public support necessary to apply information to the resolution of environmental concerns. WCMC employs a pragmatic definition of information management capacity, namely the direct assets available to an organisation in terms of its data, expertise and facilities, and indirect assets in the form of management systems and partnerships with other organisations (Figure 7).

6.1 Defining information management capacity

Direct assets are relatively easy to quantify, since they are physical in nature and can be documented. Indirect assets, which serve to consolidate the direct assets, are more subjective in nature. For example, two organisations with roughly similar data, expertise and facilities may perform very differently due to variations in the quality of their management systems, although it may be difficult to quantify exactly why. An organisation's management systems dictate the efficiency of everything from task allocation and scheduling, to project design, strategic planning and cooperation with external partners. If the systems work, then all of these aspects run smoothly; if they don't, then productivity may suffer.

Constraints in information management capacity can seriously impede progress towards organisational goals, limiting the contribution that organisations are able to make to addressing environmental concerns. Considering the magnitude of the challenges affecting most countries in this area, building information management capacity can be seen as an issue of national importance. However, it is almost inevitable that 'needs' for capacity building will outweigh what can be delivered with available resources. This applies to individual organisations and networks alike, and equally to government, non-government and private organisations. Clear priorities for capacity building are needed, and the greatest challenge is deciding how and where to channel investments.

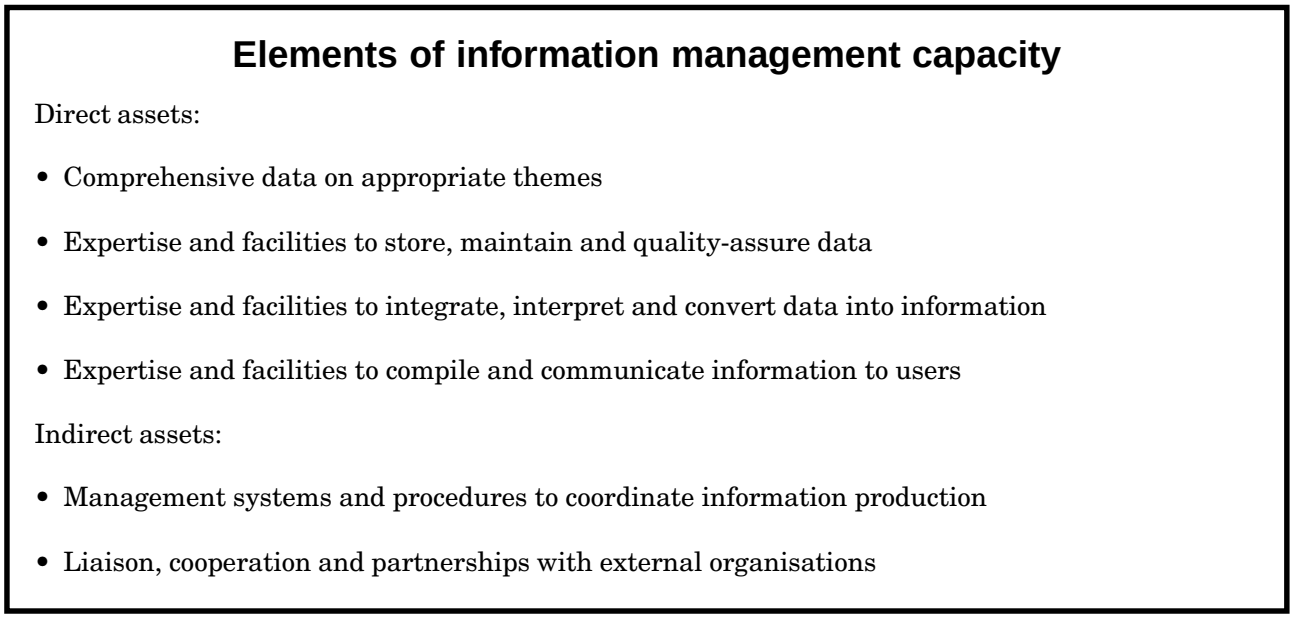

Figure 7: Elements of information management capacity

Taken as a whole, the capacity of a network of organisations depends on the individual capacities of its partner organisations. Thus, when attempting to strengthen the capacity of a network to manage information effectively, typical aims are to address critical gaps in capacity, supplement (not duplicate) existing capacities, and seek efficiencies through closer cooperation between the organisations concerned. These are strategic aims and, consequently, require strategic planning.

Clearly, investments in capacity building should, wherever possible, be based on a survey of where existing capacities are located and how readily these can be mobilised for specific tasks. This can be achieved by assessing the capacity of the network's partner organisations, for instance with respect to the range and quality of the datasets that they manage, the human resources that they possess, and their ability to access technical and physical facilities.

The survey contributes directly to the process of strategic planning, which involves identifying which types of capacity are critically lacking, which are in need of strengthening, and which areas would benefit from closer cooperation. This allows objectives, targets, roles and responsibilities to be assigned to organisations in such a way that they achieve their goals in concert with the needs of the network for information. The main justification for the effort expended on this process is to provide enhanced support to users, such as decision-makers in the public and private sectors.

A diverse range of tasks is encompassed by the phrase 'information management', and most organisations will take considerable time to achieve their maximum level of effectiveness in this area. Ways need to be found to accelerate this process for the benefit of the organisations concerned, and also the networks in which they operate. Efforts to build information management capacity need to be carefully prioritised and well coordinated. Within an organisation this is the responsibility of senior managers; within a network it is normally achieved through a steering committee plus associated administrative support.

Figure 8 presents a three-stage process for building information management capacity within a network. The process assumes that the network's goals have already been defined and that the information needs of its user base have been determined; in short, that the network is being effectively coordinated and managed. The aim is to transform a situation in which environmental information is inconsistently handled, incomplete in coverage and difficult to access, into one in which relevant and timely information products are available to defined sets of users.

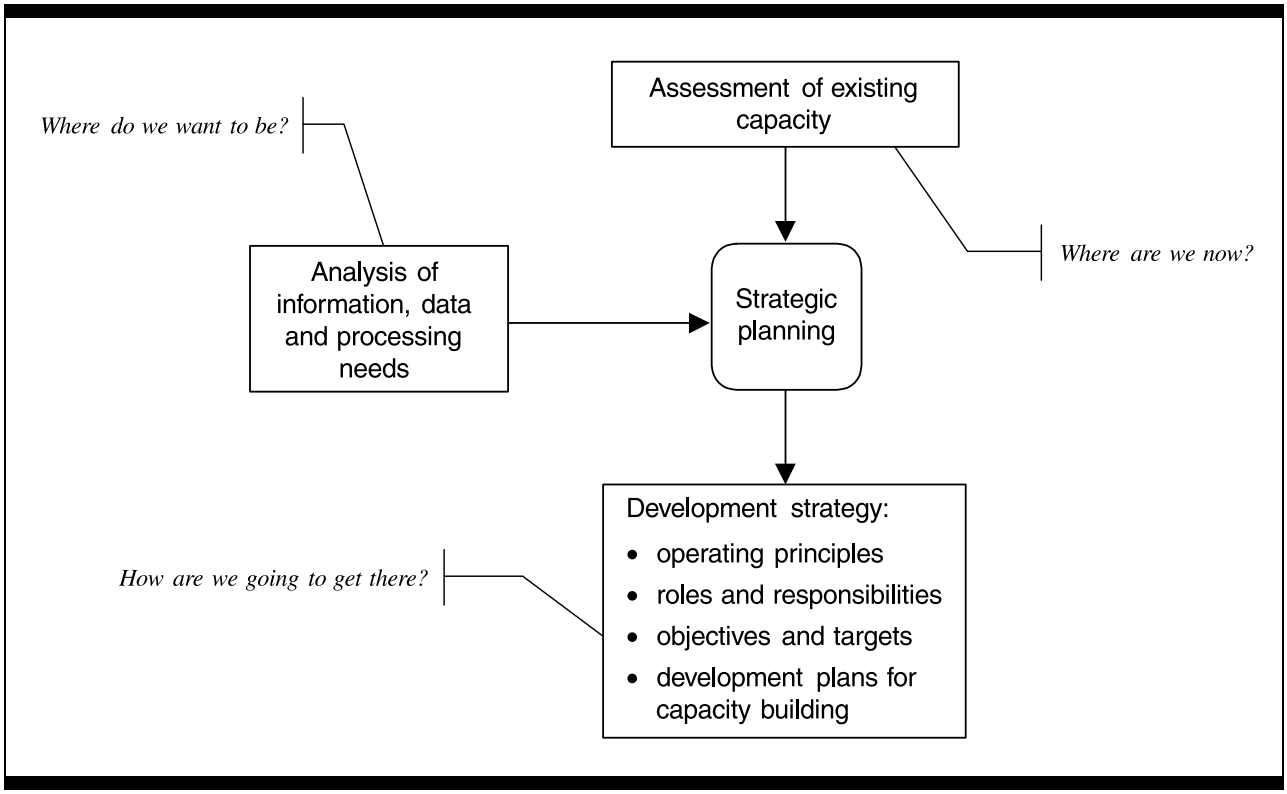

Figure 8: A process for building information management capacity within a network

6.2 Surveying institutional capacity to manage information within a network

When large numbers of organisations or individuals are involved in a survey, it may become very demanding in both cost and time. Taken from the design of the questionnaire to the analysis of the final results, a survey conducted at the national level, for example, covering upwards of 50 organisations, could take up to six months to complete. For this reason, it is essential to engage the full support and resources of the network's partners, by making it clear to them why the survey is being conducted and how it will be used to benefit them. Specifically, participants' organisations can expect to:

- develop ties with other participants;
- help plan the development of the network;
- understand better where to obtain data and information on complex, cross-sectoral issues, such as conservation and sustainable use of living resources; and
- review (and, potentially, address) internal strengths and weaknesses in information management capacity.

To ensure that the survey is taken seriously, it also needs to be recognised as being completely impartial (that is, beneficial to the network as a whole, not specific organisations). Thus, it is desirable for the survey to be overseen, if not actually implemented, by a steering committee, body or other group that represents the interests of the network's partners (for example, a network hub). This group can be charged with the task of initiating the survey, and ensuring that its results are employed to the maximum effect.

In many cases, a comprehensive survey of capacity may be unnecessary. The main requirement is to determine the availability of necessary capacities, rather than all capacities, some of which may not be needed. A key question to bear in mind when conducting the survey is 'What capacities will be needed by the network to deliver its goals?', as well as the more elementary question of 'What capacities currently exist?'.

The survey should empower managers to review and, perhaps, restructure their information management activities in such a way that their corporate goals are consistent with those of the networks in which they operate. It should address all of those capacities outlined in Figure 7, plus additional capacities where these are relevant or specific to local conditions. Aspects of an organisation which might be considered for inclusion in the survey are:

- Institutional details ~~b~~asic institutional details need to be recorded.
- Direct assets:
  - Datasets: summaries of the datasets for which the organisation acts as custodian.
  - Expertise: descriptions of the expertise available to the organisation which is of most relevance to, for example, climate change. Particularly strong or relevant expertise should be highlighted, as should priority needs.
  - Facilities: descriptions of the main facilities the organisation can access to enhance information production, for example, measuring equipment, computer software and hardware, data input and output devices, and physical facilities (such as dedicated premises, transport). Particularly useful or relevant facilities should be highlighted, as should priority needs.
- Indirect assets:
  - Management systems and the organisation's portfolio of projects as they relate to the provision of data and information to users.
  - Partnerships: Memoranda of Understanding (MoUs) provide indirect evidence of external partnerships, although these in themselves do not guarantee cooperation.

6.3 Survey methods

Various options are then available for implementing the survey. The simplest, and possibly only practical option for large geographical regions is to produce a questionnaire and distribute this to focal points in the selected organisations. The main problem with questionnaires is that they have a notoriously poor response rate. Various techniques exist to improve this but, even when these are employed, the response rate still may be too low to be effective. Some form of active engagement of the organisations is usually necessary. Various suggestions are presented below:

- Before distributing the questionnaires, invite participants to a workshop to discuss the purpose, time-scale and method of completion of the questionnaire. This provides an opportunity to engage them in the process and assist by reviewing the questionnaire.

- Telephone or visit each of the selected organisations after the questionnaires have been distributed, or invite them to a 'surgery' where their reservations or difficulties can be addressed.

- After most of the questionnaires have been returned, invite participants to a further workshop to review the survey's findings, and consider how these can be transformed into strategic capacity-building plans.

In complex cases, more intensive site visits may be necessary to assist with the completion of questionnaires. For instance, it may be necessary to conduct individual or group meetings, brainstorming sessions and other fora in order to generate the required level of commitment. Interactive dialogue is especially useful when addressing the more subjective aspects of the survey, such as the requirements the organisation has of the network, or the success of its external partnerships. Ideally, the survey encourages staff to review their personal and corporate strategies with respect to information management and consider how efficiencies can be made.

7.0 Workshop conclusions

The Information Management Cycle has proved to be a useful framework for identifying and prioritising information needs in the PICCAP context. This was confirmed through the debates held over the two information management training workshops. The latter session benefited greatly from the experiences of the PICCAP national coordinators on the Certificate Training Programme on Climate Change Vulnerability and Adaptation Assessment in New Zealand. PICCAP has purchased six sets of WCMC information management training materials for national coordinators to use over the next year. There was a general consensus at the Vanuatu meeting that these materials would be useful in organising the large amounts of complex data and information that would be generated throughout PICCAP, which would be essential in achieving many of the PICCAP objectives.

However, the PICCAP national coordinators recognised that many constraints to efficient information sharing exist within themselves as a group, the PICCAP programme and the wider Pacific region. Many of these constraints could be avoided or reduced with the establishment of a more structured network between the PICCAP national coordinators, a network which would also allow efficient information-sharing links to be established between PICCAP and the wider international community. Although problems with the use of electronic communication methods in this network were identified, it was agreed that the Internet provided the cheapest, most efficient and only practically feasible forum. The PICCAP national coordinators suggested that future PICCAP meetings explore the possibility of establishing a PICCAP website for the purposes of facilitating coordination and information sharing between themselves and other institutions.

8.0 Information about the World Conservation Monitoring Centre (WCMC)

The WCMC is internationally recognised as a centre of excellence in the location and management of information on the conservation and sustainable use of the world's living resources. The Centre was established by three of the key international organisations working in the field of biodiversity conservation: the World Conservation Union (IUCN), the World Wide Fund for Nature (WWF) and United Nations Environment Programme (UNEP). WCMC staff have more than 15 years experience in this field, and provide information services to organisations ranging from UN agencies to multinational corporations.

WCMC is an independent non-profit organisation which provides information services on conservation of biodiversity. Three services are offered by WCMC:

- Information Services that provide and facilitate wide access to information on the status, value and management of biological diversity;
- Capacity Building Services, helping others to gather, manage, interpret and use information on living resources; and
- Data Management Services that include secure storage, sharing and management of data on behalf of other agencies and networks.

WCMC employs over 60 staff, with a broad range of experience in biodiversity information and its management. Key skills include:

- Development and provision of information services and information management on:
  - endangered species
  - habitats of conservation concern (Arctic, Forests, Marine and Coastal, Wetlands)
  - national parks and reserves
  - international agreements and programmes
  - locating information from other sources worldwide
- Design and management of information systems;
- Map-based Geographical Information Systems (GIS);
- Use of electronic communications networks; and
- Advice and training.

WCMC works in close collaboration with a wide range of organisations and individuals to increase access to the information necessary for wise management of the world's living resources and helps others to do the same task in other parts of the world. WCMC is committed to the principle of exchange of data with other centres and non-commercial users, and wherever possible data managed by WCMC is placed in the public domain.