

**PACINET:
A BIOSYSTEMATICS NETWORK
FOR THE PACIFIC**

**Proposed Approach
&
Workplan**

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What is Biosystematics?

Systematics, or Taxonomy, is the study of kinds of organisms of the past and living today, and of the relationships among these organisms.

Systematists – people who study systematics or taxonomy - collect and study the variety of plants and animals and group them according to patterns of variation. Systematists are also vitally interested in determining the evolutionary history of species and the features that result in adaptation to the environment. To understand the pattern of variation and relationships among the organisms, Systematists study plants and animals in nature, in museums, and in laboratories, to develop a classification for the myriad forms of life, a classification based on differences and similarities of features such as form, distribution, chromosome number, behaviour, biochemical pathways, and molecular structure.

Some Systematists analyse the scientific basis of classifications to understand evolution, while others delve into the dynamic aspects of nature, studying such things as the processes that lead to the origin of species, interactions among organisms, and equilibrium states in communities. Other Systematists, concerned over the loss of natural habitats and the degradation of the environment through the expansion of human activities, study the impact of people on the ecosystems of the world and the resultant changes in the biology of the species included. Others again may seek and screen potential new crops or drug plants.

(From: American Society of Plant Taxonomists –
Careers in Biological Systematics, May 2002)

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Abbreviations

ACP	Africa, Caribbean, Pacific
ADAP	Agricultural Development in the American Pacific
ASCC	American Samoa Community College
AusAID	Australian Agency for International Development
BMNH	British Museum of Natural History
CABI	Centre for Agriculture and Bioscience International (United Kingdom)
CBD	Convention on Biological Diversity
CINHP	Cook Islands Natural History Project
CNMI	Commonwealth of Northern Mariana Islands
COM-FSM	College of Micronesia – Federated States of Micronesia
CREES	Cooperative Research, Extension & Education Service
CROP	Council of Regional Organisations in the Pacific
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
DEC	Department of Environment and Conservation (Papua New Guinea)
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FFA	Forum Fisheries Agency
FRI	Forest Research Institute (Papua New Guinea)
GTI	Global Taxonomy Initiative
ICC	Interim Coordinating Committee
IPR	Intellectual Property Rights
IRD	Institut de Recherche pour le Développement
LOOP	Locally Owned and Operated Partnership
MAFFM	Ministry of Agriculture, Forests, Fisheries and Meteorology (Samoa)
MAPI	Ministry of Agriculture and Primary Industries (Solomon Islands)
MASLR	Ministry of Agriculture, Sugar and Land Resettlement (Fiji)
MTAs	Material Transfer Agreements
NACI	National Coordinating Institute
NAQIA	National Agriculture Quarantine and Inspection Authority (PNG)
NARI	National Agriculture Research Institute (PNG)
NECI	Network Coordinating Institute
NEMS	National Environment Management Strategy
NIs	National Institutes
NSW	New South Wales
NZODA	New Zealand Official Development Assistance
OCT	Overseas countries and territories
PACINET	Pacific Identification Network
PAPGREN	Pacific Agricultural Plant Genetic Resources Network
PICs	Pacific Island countries
PNG	Papua New Guinea
PPPIS	Pacific Plant Protection Information System
RTMPP	Regional Technical Meeting on Plant Protection
SPC	Secretariat of the Pacific Community
SPEC	South Pacific Bureau for Economic Cooperation
SPREP	South Pacific Regional Environment Programme
TCN	Technical Cooperation Network
TNC	The Nature Conservancy
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNITECH	University of Technology (Lae, PNG)
USA	United States of America
USDA	United States Department of Agriculture
USP	University of the South Pacific

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Executive Summary

Introduction

PaciNet is the name of the proposed “loop” of BioNET-International for Pacific Island countries. BioNET-International is an organisation established to help developing countries implement various environmental conventions, including the 1992 Convention on Biological Diversity, and its taxonomic capacity building component, the Global Taxonomy Initiative. In keeping with the system adopted in the 13 loops already established, PaciNet will have support from a technical support network – AnzusLOOP, composed of Australia, New Zealand and the USA (Hawaii).

PaciNet was officially established at a meeting of the Secretariat of the Pacific Community in Nadi, Fiji, February 1996. Shortly after, and with funds from BioNET-International, a meeting was organized by SPC to develop a framework to build national taxonomic capabilities. The lack of any progress following the meeting resulted in another in 2000. The combined meeting reports, *Establishment of PaciNet BioNet Programme*, published by SPC, provides a list of perceived needs, with a US\$7.5 million budget. The lack of any priority given to the recommendations, insufficient funds, and continued intellectual property concerns, again stalled the development of PaciNet.

The failure of these meetings to produce tangible outcomes, and with a considerable portion of the budget already spent, meant that a different course of action was required if PaciNet was to become operational. In 2001, SPREP, the South Pacific Regional Environment Programme, was chosen as Secretariat of PaciNet, by the Council of Regional Organisations in the Pacific. SPREP then established the Interim Coordinating Committee of CROP organizations to oversee the execution of a work plan.

This report, commissioned by SPREP, had three aims: first, to review the taxonomic capabilities of CROP organizations and to reaffirm their willingness to collaborate in PaciNet; second, to detail discussions with Pacific Island countries on their taxonomic capabilities, needs and aspirations; and third, provide recommendations on the implementation of PaciNet and a work plan for the first two years. Terms of reference are provided (Appendix 1).

Visits were made to countries hosting CROP organizations (Fiji, Papua New Guinea, Samoa and Solomon Islands), and to Guam and the Federated States of Micronesia, between February and April 2002 (Appendix 5 & 8). For those countries not visited, a questionnaire (Appendix 2) was sent asking for information on biosystematics from persons within government organizations and national and regional universities. Twenty of 150 people sent the questionnaire responded (Appendix 3). For all countries a summary of taxonomic resources and needs is provided (Appendix 4).

CROP organisations

SPREP has a regional mandate for biodiversity and resource conservation and hosts the regional invasive species programme. It does not have any capacity for biosystematics, its interest is more in the management of biodiversity and supporting research studies that will extend understanding within the region. In terms of its role in PaciNet, SPREP will be the focal point, managing the network, coordinating its activities with support from the national institutions, and liaising with international organizations and donors.

SPC has some, albeit, small capability to identify pests, but does have resources under its Pacific Plant Protection Service, and Pest Management in the Pacific project to send samples for expert identification.

Forum Fisheries has no biosystematic capacity, and declined an invitation to participate in PaciNet.

The University of the South Pacific has a good herbarium and marine collections, representative of some countries of the region, and taxonomists capable of identifying vascular plants and many groups of marine organisms. Specimens from Pacific Island countries are identified free of cost. Most are mailed to the institutes, but a small number are received as digital images. USP provides training in the taxonomy of marine species and vascular flora.

The major omission in the region is a capability to identify terrestrial and marine organisms and terrestrial fauna.

A Letter of Collaboration for consideration by the three CROP organizations willing to participate in the Interim Coordination Committee is provided (Appendix 6).

Pacific Island countries

Capacities, needs and initiatives

Several important national collections exist in the region, but there is a lack of funds for their maintenance, and some are in need of urgent attention. A summary is provided, with comments on the overall condition of the collections. There is concern, too, about those collections that have been lost due to a variety of reasons, and there is need for a mechanism to prevent similar misfortunes. The herbarium of Solomon Islands is presented as a case in point.

There are few taxonomists; those that are present are in the larger countries (Fiji, Papua New Guinea, Vanuatu) or non-independent countries or territories (Guam, New Caledonia). The expertise is mainly in botany and vertebrate taxonomy. Overall, skills in non-pest invertebrates and microorganisms are lacking. Discussions in-country, and replies to questionnaires, noted a decline in the number of taxonomists throughout the region, such that in none of the countries was it possible to undertake unassisted pest and disease surveys, for example, let alone make inventories of complex ecosystems.

Taxonomists in the region are constrained by lack of access to a range of tools and services that are taken for granted in more advanced countries. In some cases, there is a lack of training to take advantage of the resources available. Literature is not accessible, communications are costly, slow and unreliable, and computers and software outdated. It was noted, however, that much literature on vertebrates, especially birds, and the insect pests, weeds and pathogens of crops and trees does exist, and that some of this information is in the form of CD-ROMs, some web – supportive. There are also web-based discussion groups, such as *Aliens* and *PestNet* and databases, such as *Ecoport*, that can assist in the identification of a range of taxonomic groups.

There was a consensus that in the short-term, PacifiNet should aim to have one or more persons in all countries trained as parataxonomists or identifiers, who would have some taxonomic skills, but, more importantly, could process specimens, knew where they could be sent for identification, and knew how to record the results.

There have been some attempts to come to terms with the extent and potential of the biodiversity that exists in some countries. SPREP has helped in the preparation of national State of the Environment Reports, and UNDP and UNEP National Biodiversity Strategies and Action Plans. Some have been finalized or endorsed by national governments, many have not. Only a few of these report mention invertebrates or microorganisms. Papua New Guinea alone has recognized the economic potential of the country's biodiversity and has sought to set up a government agency to take advantage of it.

International perspectives: collections and initiatives

Large collections of Pacific Island specimens exist outside the region, in museums and other institutions. In some instances they contain type specimens, which are particularly important. However, there is little information about these collections within the region, and even where there is, access to the material can sometimes be problematical. Important collections of insects and microorganisms are present in New Zealand, Hawaii and the UK, in particular. The collections at the Bishop Museum, Hawaii number some 22 million specimens covering a wide range of taxonomic groups. These and other institutions worldwide continue to maintain expertise in Pacific biodiversity.

There are a number of important initiatives by international organisations and sub-regional agencies established to make inventories of the world's species as well as to provide information, training in taxonomy, classification and research, and the management and conservation of natural resources. Some examples are provided, including recent initiatives under the GTI (CBD), Species 2000 (consortium of databases), the Pacific Biological Survey of the Bishop Museum, the Asia-Pacific Biodiversity Initiative of the Royal Botanic Gardens, New South Wales (details provided in Appendix 7), Tree of Life, Global Biodiversity Information Facility, and DIVESITAS. All these are important developments that Pacific Island countries need to consider to avoid duplication before formulating their own strategies.

Development of PaciNet: areas of greatest impact

There are serious impediments to the development of PaciNet. Pacific Islands countries are not well endowed with the resources required to manage the biodiversity that exists, and the down-turn of many economies does not suggest that the situation will change in the near future. Also, there is little sharing of the scant resources that do exist, even though the problems and needs are similar. There is a realization of this, and in two meetings to establish PaciNet, capacity building through long-term training, the establishment of information systems, rehabilitation of collections, further collecting, the use of modern diagnostic techniques, and other activities, were suggested. Although understandable, it is unfortunate that little attention was paid to the collections held outside the region, or that which is being done or planned by organisations, institutions and the like, to inventory the world's biodiversity, including that of Pacific Island countries. There was also insufficient attention given to the specific needs of Papua New Guinea, an area of unique biodiversity.

Establishment of a PaciNet Secretariat

It is envisaged that SPREP retains its role of overall coordination of PaciNet, delegating responsibilities to a member of staff, who will become a part-time manager. The manager will be assisted by a Task Force of specialists from the region. These may include members of national institutes or those from other organizations (government or private) where appropriate expertise exists. SPREP will be advised by CROP organizations on the composition of the task force. The manager, Task Force, representation from CROP organizations and NACIs (in addition to the Task Force members) will constitute the Board (the NECI), which will invite participation from AnzusLOOP countries to complement the expertise of the task force members. It is suggested that Papua New Guinea has a permanent position on the Board. The Board will meet annually to draft a work plan, which will be distributed to NACIs for comment and agreement. A regional meeting of all countries will take place at the end of the second year to evaluate progress, and draft a work plan for the next biennium.

Work plan for initial 2 years

It is suggested that because of budgetary constraints, PaciNet concentrate on the following activities in the first 2 years. Milestones for key activities should be identified, and a risk management plan developed to guide implementation. This will be the task of the PaciNet manager. Activities will include the following:

- Seek involvement in initiatives to document global biodiversity.
- Give priority attention to the security of existing collections in Papua New Guinea: carry out a detailed national biosystemics resources and needs assessment; hold a national stakeholders' meeting; and make plans and seek donor support for new collection facilities.
- Establish a support network, preferably through a web-based list, so that information and advice can be easily and quickly shared.
- Take stock of the collections (in addition to those of Papua New Guinea) that are in need of urgent attention, and take action to prevent further deterioration.

- Develop a regional biosystematics database for Pacific Island countries, including specialists and institutions.
- Develop information materials to raise public awareness of the importance of biodiversity.
- Distribute taxonomic ‘tools’ that are presently available.
- Train parataxonomists, or identifiers, in each country to be able to collect, preserve, catalogue and where required, send specimens for identification.
- Start work on a Regional Biodiversity Database, seeking opinion on the format from international organisations establishing databases for other regions.

Outstanding concerns to implementation of the network

PaciNet assumes that member government agencies, institutions and individuals interested in the region’s biodiversity will collaborate and share the results of research and other studies. However, there is concern in the region that there has been exploitation of resources without due regard to benefit-sharing in the past, and because of this there have been delays in obtaining permits to export specimens, plants in particular. In this regard, SPC’s PAPGREN (Pacific Agricultural Plant Genetic Resources Network) has a role to play in discussing options as part of its country dialogues, and in the development of MTAs.

Another concern noted during the course of the survey was that some countries have difficulty in dealing with requests for the importation of dead and preserved plant and animal material. Additional pest risk analysis training is required.

1. Introduction

The accurate identification of living organisms is the cornerstone of their conservation and use. Countries as signatories of the 1992 Convention on Biological Diversity have agreed to “Identify components of biological diversity important for its conservation and sustainable use (Article 7), and taking into account the special needs of developing countries “establish training in measures for the identification, conservation and sustainable use of biological diversity ...” (Article 12). To do this demands considerable resources, often beyond the limitations of individual countries.

In recognition of the lack of taxonomic expertise in many countries throughout the world, BioNET-International was established in 1993. Its objective is to pool, share and develop the existing taxonomic resources in sub-regions of developing countries through Technical Cooperation Networks (Locally Owned and Operated Partnerships – LOOPs) for South-South cooperation. Fourteen LOOPs have been identified which cover most of the developing world’s sub-regions; they are: CARINET (Caribbean), SAFRINET (Southern Africa), ASEANET (Southeast Asia), EAFRINET (Eastern Africa), WAFRINET (Western Africa), EASIANET (Eastern Asia), SACNET (Indian subcontinent), ANDINONET (Andes region), WESTASIANET (Western Asia), NEURASIANET (Northern Asia), NAFRINET (Northern Africa), LATINET (Latin America), MESOAMERINET (Central America), and PACINET (Pacific Islands). The LOOPs are linked through a Technical Secretariat based in UK, and at the local level each LOOP has a Network Coordinating Institute, which works with the National Communicating Institutes. The sub-regional networks of BIONET-International have been identified as appropriate structures through which much of the Global Taxonomy Initiative (of the CBD) can be effectively implemented.

In addition to these LOOPs, a technical support network, known as BIOCON has been formed, which consists of consortia of institutions in regions of developed countries, eg EuroLOOP, consisting of over 100 institutions in 23 countries. The one of relevance to the Pacific Island countries is AnzusLOOP – Australia, New Zealand and the US State of Hawaii. The BIOCON Networks will facilitate the transfer of taxonomic information, skills and expertise and new technologies from advanced centres to relevant institutions in the LOOPs through donor-funded programmes, ie North-South cooperation.

PaciNet is the nominated LOOP for the Pacific, membership of which includes all Pacific Island countries. The establishment of PaciNet as the regional LOOP for the Pacific was approved by government representatives from the Pacific Island countries at a meeting organized by the Secretariat of the Pacific Community in Nadi, Fiji in February 1996. After this, there was little activity, until March 2000, when PaciNet was endorsed at a second SPC meeting in Nadi, Fiji, and a revised list of activities formulated by country representatives from the agriculture and environment sectors.

At the March 2000 meeting, the activities were grouped under five headings:

- ❑ Development/enhancement of information and communications;
- ❑ Training of taxonomists and technicians;
- ❑ Rehabilitation of existing collections and records;

- Development of new technologies;
- Operations of the network and national coordinating institutes.

Both meetings stressed the necessity to carry out a needs assessment to determine the most feasible options for strengthening biosystematic services in the region.

In 2001, the South Pacific Regional Environment Programme was requested to host the PaciNet 'Secretariat' by the Council of Regional Organisations in the Pacific, and encouraged to work in close collaboration with the SPC, Forum Fisheries Agency and The University of the South Pacific as well as national institutions for the implementation of activities. In keeping with its role of Secretariat, SPREP intends to establish an Interim Coordinating Committee, which will include representatives of CROP organizations. The ICC will oversee the implementation of a detailed work plan for PaciNet for the first two years.

SPREP realises that the most appropriate approach for the setting up of PaciNet would be to build it from the national level up. This was also the intention of the first two regional workshops in 1996 and 2000, that were funded by BioNET-International and coordinated by SPC. However, because of the uncertainty and concern among Pacific Island countries in respect to ownership of information and intellectual property, neither workshop produced an agreement on a framework for national and regional representation in PaciNet. Thus, the opportunity to get the network built from the national level up was missed and, unfortunately, that approach is now no longer an option in the immediate future as funds are insufficient.

The organisation of the two workshops used some US\$200,000 provided by BioNET-International. There is a balance of approximately US\$112,000, of which some US\$40,000-50,000 has been suggested for capacity building (fellowships, etc.). The remainder will be used by SPREP to start the network.

The balance of funds leaves no other option for SPREP but to pursue the establishment of PaciNet from the regional level down. As a first step this would include bringing the key regional agencies together in an Interim Coordinating Committee, with representation from institutions in Hawaii, Australia and New Zealand.

In order to identify areas where each of the four key regional organizations could provide support to PaciNet, and to initiate the development of a collaborative agreement with the PaciNet Secretariat, SPREP sought the services of a consultant to assist with the following:

- Formalise the Technical Cooperation Network between the relevant CROP organisations;
- Implement a resources and needs assessment to determine how PaciNet can help countries overcome their taxonomic constraints; and
- Prepare a work plan for the first 2 years of PaciNet for presentation to relevant CROP organisations and national coordinating institutions.

Full Terms of Reference are provided in Appendix 1.

This report provides the outcomes of the review, which was carried out between March and May 2002 (Appendix 8).

2. Methodology

Information on the taxonomic resources available in the region, as well as needs, was obtained via questionnaire and country visits. The questionnaire (Appendix 2) was sent by email to *c.* 150 individuals in Pacific Island countries who were involved in biosystematics. The recipients were selected from the subscription list of *PestNet*, a regional pest identification and question and answer service for plant protection and quarantine. Twenty people from 12 countries (American Samoa, Australia, Commonwealth of the Northern Mariana Islands, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Kiribati, Nauru, Palau, Papua New Guinea, Solomon Islands) returned completed questionnaires (Appendix 3). Their views and comments are reflected in this report, and in the overview of needs and resources (Appendix 4).

Visits were made to CROP members: SPC (Fiji), SPREP (Samoa), FFA (Solomon Islands) and USP (Fiji), to educational institutions in Papua New Guinea (University of Technology, University of Papua New Guinea), and Micronesia (University of Guam, College of Micronesia, Federated States of Micronesia), and government departments in Fiji, Papua New Guinea and Solomon Islands (Appendix 5). As time for the review was limited, preference was given to those countries where collections and/or regional organizations were present. The discussions within the countries visited focused on the national biosystematics resources and capacity, needs and the willingness of institutions to participate in PaciNet.

The first part of this report describes the regional organisations, their technical capacity to provide assistance to the development and implementation of PaciNet as well as suggestions how they might interact to deliver the taxonomic services required. The second part provides an overview of resources in the region obtained from the country visits and the information presented in returned questionnaires. Where information could not be obtained in time, the consultant used his knowledge, and that of colleagues, gathered from visits throughout the region in recent years. While every effort was made to verify these observations, it is realized that they may not reflect current situations, especially in regard to the state of national collections.

3. Formalising a Technical Cooperation Network among CROP organisations

This section provides a brief overview of the biosystematic capabilities of the four regional organisation of relevance to the development of PaciNet. It concludes with a draft *Letter of Collaboration* for consideration by CROP organisations to become parties to the ICC.

3.1 South Pacific Regional Environment Programme

Biodiversity and natural resource conservation falls within the mandate of SPREP, with specific areas – mainly economic species – covered by SPC, FFA and USP. SPREP hosts the regional invasive species programme, which is a focal area of BioNET-International, and one that is becoming increasingly important worldwide. SPREP does not have a capacity in biosystematics, nor does it intend to develop one. Its interest is in the management of biodiversity, public awareness, education, and the support of research studies and projects that will further the current limited knowledge of diversity within Pacific Island countries.

SPREP views its role in the establishment and development of PaciNet as a coordinating institution and the main focal point for biosystematics in the Pacific region. As Secretariat to PaciNet, SPREP will oversee and manage the initiative, provide support to NECIs and NIs in the Pacific member countries, and liaise with BioNET-International, as well as institutions in the AnzusLOOP and elsewhere. SPREP will oversee the development of a regional database and host it. The organisation will assist with capacity-building, especially in the fields of education and information dissemination, and also with the development and implementation of specific projects concerned with the region's biodiversity and its conservation.

Contact person and nominated SPREP Chairperson for the Interim Coordination Committee is Mr. Sam Sesega, Biodiversity Programme Officer, South Pacific Regional Environment Programme, PO Box 240, Apia, Samoa. Email: sams@sprep.org.ws.

3.2 Secretariat of the Pacific Community

SPC's mandate relevant to biodiversity is largely with species of economic importance in the forestry, agriculture, livestock and fisheries sectors. There is also an interest in those species that impact on human health, such as mosquitoes and vector-borne organisms.

3.2.1 Agriculture and livestock

Pest and disease management of agriculture and livestock is the responsibility of two advisers. The Animal Health Adviser considers that there are relatively few pests and diseases of livestock in the region and that they are adequately determined. The Adviser has played a key role in the development of *Paravet*, an Internet-based training and education programme that is also supported by the Agricultural Development in the American Pacific Programme. The design of *Paravet* may be of future interest to PaciNet for the distribution of distance education and training programmes in taxonomy.

The Plant Protection Adviser heads a large, well resourced division, drawing support from the European Union, Australian Agency for International Development and New Zealand Agency for International Development. Projects that are relevant to PaciNet are:

- *Pacific Plant Protection Service*, which provides plant protection and quarantine advisory support to the region's 11 ACP/OCT countries: Fiji, French Polynesia,

Kiribati, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna. Other countries, ie those traditionally affiliated to New Zealand and USA, are excluded from this assistance. The project is funded for 4 years (2002 – 2006) with a grant of €4.4 million from the European Union, and provides staff with expertise in quarantine, plant virology, general plant pathology, entomology, weed management, extension, and plant protection information and library services.

- *Pest Management in the Pacific* funded by AusAID and NZODA, includes: (1) a project to strengthen plant protection capacity in the Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Marshall Islands, Nauru, and Palau; (2) a *Fruit Fly Management* project, which provides advisory and surveillance support to all Pacific Island member countries; (3) a project aimed at developing, testing and promoting sustainable management methods for the taro beetle; (4) plant protection support and advice to Cook Islands, Niue and Tokelau; and (5) information and library support services.

There are now staff in most countries skilled in the identification of fruit fly species of economic importance, those that are indigenous, and those that might be introduced. Most countries now have quarantine surveillance schemes and emergency response programmes for fruit flies. SPC has a collection of 129 species from Pacific Island countries and some from Southeast Asia and Australia. Reference materials have been provided, including displays of 32 fruit fly species of economic importance (whether present or not) and printed information, which in many cases has been translated into local languages. Much of the information is on the *Pacifly* website, hosted by SPC. Taxonomic support is available from the Fruit Fly project entomologist in Suva, Fiji, and expertise in fruit flies is available in Australia.

As part of its project activities, SPC has rehabilitated the Pacific Plant Protection Information System, a database on pests and diseases of economic importance in Pacific Island countries. It is in the process of updating the information on several Pacific countries: French Polynesia and Niue have been completed, and several other countries are near completion. The database allows each national plant protection authorities to record pest occurrences, and allows for the inclusion of information on quarantine interceptions. In the near future, these national databases will be linked to assist with pest risk assessments. However, the databases are not fully compatible with EcoPort, which is the one favoured by BioNET-International, although data transfers between them may be possible.

SPC has funds for the identification of pest specimens under both the EU and AusAID/NZODA programmes, as well as the , training of plant protection staff in the identification of pests and diseases and the collection, preservation, storage and shipping of specimens. Funds are also available for the development and distribution of plant protection information, including CD-ROMs and literature.

SPC has limited in-house capacity to identify pests and diseases, and has to arrange for specimens to be sent directly from member countries to overseas institutions where identifications are made. In view of restrictions imposed by the EU on the *Pacific Plant Protection Service*, most pest samples from the 11 ACP/OCT countries are sent to CAB International/British Museum of Natural History in the UK. Samples

from Micronesia and the Cook Islands, Tokelau and Niue are sent to New Zealand (eg Landcare Research), Australia (eg Commonwealth Scientific and Industrial Research Organisation), or to taxonomists in other countries.

The SPC Land Resources Division in Fiji has a well-equipped library that includes information on pests and diseases of agriculture, livestock and humans, which is accessible to students, researchers and the public, for reference purposes.

3.2.2 Marine

The SPC Marine Resources Division is based in Noumea, New Caledonia. It includes coastal fisheries and aquaculture, but also has a significant component focused on pelagic fisheries, which complements FFA programmes.

3.2.3 Health

The Community Health Programme is located in Noumea and Suva, and features the prevention and control of vector-borne diseases, including those transmitted by mosquitoes, malaria, dengue and filariasis.

SPC has confirmed its interest in participating in the PaciNet ICC. The contact person is: Dr. Mick Lloyd, Plant Protection Adviser, Secretariat of the Pacific Community, Private Mail Bag, Suva, Fiji, Email: mickl@spc.int

3.3 Forum Fisheries Agency

FFA has a clear and well-defined mandate to advise Pacific Island member governments on policies, sustainable management and monitoring of stocks of four species of tuna (yellowfin, bluefin, skipjack and bigeye) in the Exclusive Economic Zones of member countries. FFA has no biosystematic resource capacity, and the development of one is not envisaged. Consequently, FFA has declined to participate in the PaciNet ICC.

3.4 The University of the South Pacific

3.4.1 The Pacific Centre for Environment and Sustainable Development

The Centre was established at USP in 2001. This was done in recognition of the need to develop a more focused and collaborative approach to environmental education, research, consultancy and capacity building in the Pacific. The Centre utilises USP resources for its project activities. Biodiversity has been identified as one of its core areas for research and consultancy including taxonomic studies of terrestrial, freshwater and marine organisms, identification of threats to island biodiversity and the development of community-based conservation action plans.

3.4.2 South Pacific herbarium

USP maintains large plant collections from the Cook Island, Fiji, Kiribati, Niue, Tonga, Tuvalu and Samoa, as well as specimens from several other Pacific Island

countries. The Herbarium has a full-time curator and several experienced support staff. The collection, which is in very good condition, is housed in a new, air-conditioned building. Costs for the maintenance of the collection are borne by USP from its core budget.

3.4.3 Marine Studies Programme

This Programme has a few specialists skilled in biosystematics, and in addition has strong links with overseas institutions and specialists. Mr. Johnson Seeto, Lecturer, Marine Science, has expertise in the taxonomy of marine and freshwater fishes, molluscs and echinoderms (sea cucumber and starfish). He has described three fish species new to science. Dr. Cameron Hay, Director of the Institute of Marine Resources is a specialist in algal taxonomy. Honorary research fellows provide additional expertise in the taxonomy of corals (Dr. E. Lovell), crustaceans (Mr. A. Forbes), freshwater and terrestrial molluscs (Dr. A. Haynes), and freshwater fishes (Mr. A. Jenkins). The staff of the Institute maintain links with scientists that are, from time-to-time, called upon to assist with the identification of specimens.

The Marine Collection, housed at the Marine Studies Complex at USP Laucala Campus is maintained by Mr. J. Seeto, who has assumed the role of curator. It is likely that this position will be formalised in the near future, and supported by USP core funds.

Specimens are usually identified without cost from Pacific islands as a service to the countries. The number of specimens received each year is small, although last year Vanuatu sent 300 shells for identification. In addition, some 20-50 identifications are done from digital photographs each year. When queries are sent this way, identifications are made immediately by the institute staff; one specimen which was thought to be a new species was posted on the Internet to seek assistance from other specialists.

The Institute provides training in taxonomy of marine species.

USP has indicated that it wishes to strengthen its biosystematic capacity in terrestrial fauna. However, a high rate of staff turnover may impede the development of a sustainable taxonomic capability. The University library is well equipped to support the taxonomy of vascular plants and most marine organisms.

USP has confirmed its interest in participating in the PaciNet ICC. The nominated contact person is: Mr. Johnson Seeto, Lecturer – Marine Science, Marine Studies Programme, The University of the South Pacific, Suva, Fiji. Email: seeto_j@usp.ac.fj.

3.5 Conclusions: CROP organisations and PaciNet

In summary, SPREP's mandate and management capacity provides it with a sound basis to become the Network Coordinating Institute for PaciNet, even though the organisation lacks taxonomic expertise.

SPC has only minor in-house taxonomic capability, but it can arrange and pay for identifications of agricultural, livestock and forestry pests. It also offers training in the identification of pests and diseases of economically important crops and trees.

USP has a good herbarium and marine collection, representative of some countries in the region, and staff that can identify vascular plants and many groups of marine organisms. It lacks capability in the identification of terrestrial and marine microorganisms and terrestrial fauna.

FFA has no biosystematics capacity, and has no intention of developing one. The organisation has declined to participate in the PaciNet ICC, but has offered to provide logistical support (office space, transport, training facilities) for the implementation of any projects, research or other studies by PaciNet.

3.6 Draft letter of collaboration between CROP organisations

A draft *Letter of Collaboration* for consideration by CROP organisations to become parties of the ICC is provided in Appendix 6.

4. Biosystematics in Pacific Island countries: resources and initiatives

4.1 National collections

National collections of significance are present in several island countries. These include the herbaria of Fiji, Papua New Guinea and Vanuatu, and the arthropod collections of the Commonwealth of Northern Mariana Islands, Cook Islands, Fiji, Guam, Palau, Papua New Guinea, Tonga and Vanuatu. However, all these collections appear to be constrained by limited funding and expert curators; most are in urgent need of attention. This applies to the specimens, the equipment used to curate them, and the buildings in which they are housed.

Based on the information from returned questionnaires, correspondence with specialists, country visits as well as the observations of the consultant over the last 4-5 years, a summary has been prepared, which describes condition of the collections and their requirements (Table 1). The table also includes collections maintained by regional organisations.

Of great concern, are the collections that have been lost in previous years due to civil strife (eg the important insect collection of Solomon Islands) and natural disasters (eg the arthropod collection of the Ministry of Agriculture, Forests, Fisheries and Meteorology, Samoa, which was severely damaged by Cyclone 'Ofa in 1989). A system is needed for the (temporary) care of collections when threatened by these misfortunes. A case in point, is the herbarium of Solomon Islands, which should be transferred to USP for safe keeping until the Government can find the funds to maintain this valuable asset.

Table 1. Summary of known collections in Pacific Island countries, their condition and needs

Country	Collection	Condition	Comments	Reference
American Samoa	ASCC arthropods	Good		M. Schmaedick, 2002
	ASCC Herbarium	Good		M. Schmaedick, 2002
CNMI	CNMI arthropods	Good	Curator leaves end 2002, successor uncertain	O. Bourquin, 2002
Cook Islands	CINHP biodiversity database	Digital	Some 3,000 species, catalogued, many with photographs	G. McCormack, 2002
	Ministry of Agriculture arthropods	Good	Agricultural pests	W. Liebrechts, 2001
FSM	COM-FSM arthropods	Very poor	Urgently requires rehabilitation	W. Liebrechts, 2002
	COM-FSM Herbarium	Good	Recently established, in need of support	B. Raynor, 2002
Fiji	Forestry Department arthropods	Good	Curator left in 2000; no successor	W. Liebrechts, 2002
	Research Division MASLR arthropods	Reasonable	Requires maintenance and cataloguing	W. Liebrechts, 2002
	Fiji Museum vertebrates	Poor	Requires urgent maintenance	D. Watling, 2002
	SPC arthropod collection	Reasonable	In need of maintenance	W. Liebrechts, 2002
	SPC Fruit fly collection	Excellent		L. Leblanc, 2002
	USP Herbarium	Excellent	Maintained from USP core funds	M. Tuiwawa, 2002
	USP Marine collection	Excellent	Proposal submitted for USP core funding	J. Seeto, 2002, E. Lovell, 2002
French Polynesia	Herbarium	Poor	Requires maintenance	L. Mu, 2002
	IRD collection of arthropod, marine and terrestrial fauna	Unknown		
Guam	University of Guam arthropods	Good	Well maintained	J. McConnell, 2002
	University of Guam Herbarium	Good	Well maintained	J. McConnell, 2002
Kiribati	Insignificant			W. Liebrechts, 1997
Marshall Islands	Insignificant			W. Liebrechts, 2001
Nauru	Insignificant			W. Liebrechts, 2001
New Caledonia	National herbarium	Good	Well maintained	V. Lebot, 2002
Niue	Insignificant			W. Liebrechts, 2001
Papua New Guinea	NARI (Port Moresby) national agricultural insect collection	Good	Insufficient funds for maintenance	S. Krull, 2002; W. Liebrechts, 2002
	NARI (Port Moresby)	Unknown		T. Price, 2002

	Herbarium of fungi & plant diseases (the 'DS Shaw' collection.)			
	FRI (Lae) National Herbarium	Good	Urgent lack of space	J. Dobunaba, 2002, W. Liebregts, 2002
	UPNG collections: Fisheries, vertebrates, reptiles, amphibians, mosquitoes; Herbarium	Unknown	Very likely in need of (urgent) maintenance	L. Hill, 2002
Palau	National insect collection	Poor	In need of urgent maintenance	C. Emaurois, 2002
Samoa	MAFFM arthropods	Very poor		W. Liebregts, 2000
	USP (Alafua Campus) arthropods	Reasonable	About 100 species	A. Palupe, 2002
Solomon Islands	Arthropods		Destroyed in 2000 ethnic tension	J. Saelea, 2002
	Herbarium	Poor	Possible transfer to Fiji or PNG	J. Pita, 2002
SPC, Fiji	Pacific fruit fly collection	Good		L. Leblanc, 2002
	Pacific arthropod (pest) collection	Reasonable	Requires sorting and maintenance	J. Wright, 2002
Tokelau	Insignificant			
Tonga	Arthropods	Unknown	In need of maintenance	W. Liebregts, 2001
Tuvalu	Insignificant			
Vanuatu	Herbarium	Good		G. Jackson, 2002
	Arthropods	Unknown	Needed maintenance in 1996	W. Liebregts

4.2 Biosystematic specialists/taxonomists

It is to be expected in a region of 22 Pacific island states and territories of vastly different size and economic resources, that national taxonomic skills would differ greatly. This is certainly the case, but overall the situation is not good. Where biosystematic expertise exists, it is mostly in botany and vertebrate taxonomy, limited to the larger countries in the region (Fiji, Papua New Guinea and Vanuatu) or to the non-independent territories (Guam and New Caledonia). Skills in the identification of other major taxonomic groups, especially non-pest invertebrates and microorganisms that constitute the bulk of biodiversity, are lacking. Expertise in the remaining countries is very limited. There is, however, a vast pool of traditional knowledge and an ability to provide local language names to many of the herbaceous plants, trees, terrestrial and marine vertebrates and, in some cases, pests and pathogens of economic importance.

The lack of taxonomic specialists is having serious repercussions. At the time of the mission, crop pest surveys in several countries (Cook Islands, Fiji, FSM, Samoa and Tokelau) were taking place or being planned. All involve external institutions or regional organisations at considerable cost, in some instances, to national

governments. Invariably, the specimens collected are sent overseas for identification, with the result that there is little development of local taxonomic capacity.

These events are not altogether surprising. The last decade has seen a reduction in the size of civil services in all countries in the region, and as taxonomists have retired, positions have fallen vacant, or been eliminated from the establishment. Now few countries are equipped to identify even the most common pests and diseases, let alone develop inventories of complex ecosystems. And the situation is hardly likely to improve with downward economic trends across the region.

Respondents to the questionnaire (Appendix 4), and comments made arose during discussions throughout the region, highlighted a need for the development of national skills and expertise that will allow the identification of specimens to the level of family and genus. The aim would be to form a group of parataxonomists or *identifiers* in each country, trained for the job, skilled in the use of equipment, literature, databases, Internet-based facilities, etc who can process specimens for identification overseas.

4.3 Biosystematic tools and information

A range of applications and services have been developed and are available to Pacific Island country specialists. These include handbooks, CD-ROM identification keys, listservers and websites. More often than not, however, there are constraints on the use of these resources due to limited funding, inadequate facilities and, in some cases, inadequate training to utilise what is available. Literature is often not accessible to those working outside capital cities or major research stations. Telephone, fax and Internet connections are costly and often unreliable. Specialists are further hampered by the use of outdated computers and programmes.

During the mission, it became apparent that there are some useful libraries in the region, and some countries are making use of online taxonomic services. These are briefly mentioned.

4.3.1 Literature

The vascular plants of most countries in the region have been well documented and allow identifications to be made with relative ease. However, most of the texts need updating. There is also an extensive literature on vertebrates, especially on birds of the region. In addition, there has been extensive research covering many taxonomic groups that has been reported in scientific journals and reports.

A wide range of documents have been published for plant protection and quarantine specialists; these include pest survey reports, handbooks, pest alerts and leaflets that include descriptions and photographs to assist field officers and researchers with the identification of agricultural pests and diseases.

Overall, most countries have very good records of insects pests, weeds and pathogens of their agricultural crops and plantation trees. Many of the records and associated literature have been put into databases.

4.3.2 Digitised reference material

A number of organisations have developed CD-ROMs, some of which are web supported. For example, Pacific Island Ecosystems at Risk in Hawaii, USA, with assistance from the US Forest Service and the Institute of Pacific Islands Forestry, has developed a CD-ROM which provides photographs and detailed description of invasive weeds, and this is available without cost. CAB International has developed a Crop Protection Compendium, a digital taxonomic identification programme. SPC has provided each of its member countries with a copy of the Compendium, which otherwise they would have to buy.

With assistance from the Bishop Museum in Hawaii, a checklist of Micronesian pests has been compiled; it is on-line at: www.crees.org/plantprotection/aubweb.

4.3.3 Web-based services

Aliens is the listserver of the Invasive Species Specialist Group, Species Survival Commission of the International Union for the Conservation of Nature in Geneva, Switzerland. It provides a discussion forum for practitioners and academics on topics relating to invasive species. Participation by Pacific Island countries has been limited, perhaps because topics only occasionally involve species of concern to the region. The Group also hosts the Global Invasive Species Database (www.issg.org/database), which provides information on invasive species that threaten biodiversity. It covers all taxonomic groups from microorganisms to animals and plants.

PestNet is a non-government organisation offering a free question and answer e-mail service (pestnet-subscribe@yahoogroups.com) for Pacific Island countries to access and share information on plant protection and quarantine issues. It also allows the rapid identification of pests, diseases and weeds from attached digital photographs. There are 350 members worldwide. PestNet does not provide an authoritative determination of species; however, identifications given on-line have invariably proven correct when specimens were later submitted for critical examination. PestNet messages are filed on a website for retrieval by subscribers.

EcoPort was developed by FAO as a worldwide biodiversity database, and has been endorsed by BioNET-International as the primary database for the capture, management and dissemination of taxonomic and associated ecological information and knowledge. It is freely accessible on the web (<http://www.ecoport.org/>), but is difficult to navigate and needs to be made more user-friendly.

The Pacifly website (www.spc.int/pacifly/) is managed by SPC and provides detailed information on the occurrence of fruit fly species in Pacific Island countries, their identification and management.

4.4 National biodiversity initiatives

In the early to mid-1990s, SPREP sponsored the preparation of national State of the Environment Reports, and later the National Environment Strategies for most of the Pacific Island countries. More recently, UNDP and UNEP funded the development of National Biodiversity Strategies and Action Plans. Some of these have been finalised

and endorsed by national governments, but many are yet to be completed. These reports generally provide a brief overview of the national biodiversity with a focus on the more obvious terrestrial and marine life, and point out where species are at risk. However, they lack details on invertebrates and microorganisms.

The Papua New Guinea Government, in recognition of the economic potential of the country's biodiversity, initiated *PNGBioNet*, to oversee the development of a conservation-based industry. *PinBio*, as it is more commonly known, became operational in 2000, and has assumed responsibility for the development, regulation and coordination of conservation-based developments in the country. The initiative seeks to involve all institutions and organisations that are involved in biodiversity and its management. The Secretariat is the Department of Environment and Conservation, Port Moresby, and is headed by the Secretary DEC. PinBio is mandated to coordinate and regulate biodiversity research and development, and has the following programmes:

- National Biodiversity Inventory – Led by the Forest Research Institute, Lae;
- Herbal Medicine and Drug Development/Bioprospecting – Led by the University of Papua New Guinea and the National Department of Health;
- Agrobiodiversity and Agrochemicals – Led by the National Agriculture Research Institute;
- Biodiversity Conservation, including carbon sinks – led by DEC;
- Database and Information – Led by DEC;
- Policies, Legislation, Regulation, including Intellectual Property Rights – Led by the Department of the Attorney General;
- Education and Training: Infrastructure Development – Led by the University of Papua New Guinea and the Papua New Guinea University of Technology. This is intended to lead to the establishment of a School of Biodiversity Excellence;
- Awareness – Led by the NGO, Conservation Melanesia.

While all these programmes have relevance to PaciNet, those of greatest, immediate, interest are the National Biodiversity Inventory, and the Database and Information programme. They are in their initial stages of development and are likely to need considerable external support.

4.5 International biodiversity initiatives affecting the region

4.5.1 International collections

A considerable number of specimens have been collected by individuals and expeditions from around the world during the last two centuries. Most, if not all of these specimens, are lodged in collections in museums or institutions outside the region. In many cases, they contain the first specimens from which a new species was described. However, they are sometimes rather inaccessible to Pacific Island countries, although their preservation is assured. Today, the situation is somewhat different: type specimens continue to be lodged with internationally recognised institutions and museums, but reference material is commonly kept or returned to national collections. It remains a fact, however, that for many collections made over the years, some of which are extremely valuable, there is little knowledge about them

within the region, and access to documentation on the collections is not straightforward.

Perhaps one of the best examples of the collecting that has been done, and one that illustrates the wealth of material held outside the region, is of the UNDP/FAO-SPEC Survey of Agricultural Pests and Diseases in the South Pacific between 1974 and 1978. The collection forms the single largest arthropod and microorganism collection of the South Pacific, and is maintained and kept in trust by Landcare Research, New Zealand. Many insects collected during this survey were not considered economically important and remain to be identified. In addition to material from the countries in the survey (Cook Islands, Fiji, Kiribati, Niue, Samoa, Tonga and Tuvalu), the collection now contains arthropod and plant disease specimens from several other Pacific Island countries, including American Samoa, Federated States of Micronesia, Marshall Islands and Palau. There are an estimated 1,000 different species of fungi from 15 Pacific Island countries in the collection (Eric McKenzie, personal communication). The collection is in excellent condition, and is available for reference.

The Bishop Museum, Hawaii, USA, has the largest collection of species from the Pacific region, with some 22 million specimens. The collection includes mammals, birds, reptiles, amphibians, terrestrial and marine invertebrates, vascular plants and cryptogams.

The BMNH has developed a considerable collection of Pacific invertebrates and microorganisms, many of which are of economic importance. Mostly, they have been sent to the Museum's taxonomists for identification, and later returned to the countries.

4.5.2 Taxonomists and biosystematic expertise

Much taxonomic expertise on Pacific biodiversity is available in Pacific-rim countries, notably in Hawaii (Bishop Museum), New Zealand (Landcare Research, New Zealand, Museum of New Zealand) and Australia (eg CSIRO, Queensland Museum) – countries that form the AnzusLOOP that supports PaciNet. The BMNH also provides excellent taxonomic support. The complexity of marine and terrestrial invertebrates and microorganisms, however, requires highly specialised taxonomists, who are few in number and located in different institutes worldwide.

4.5.3 Literature and databases

The collections at Landcare Research, New Zealand are well known to the Pacific Island countries, and for the microorganisms at least, there are publications covering the content. Information on the specimens in the Plant Disease Division Herbarium, is available at (www.nzfungi.landcareresearch.co.nz/). This is not so for the arthropods: the findings of the UNDP/FAO-SPEC survey were originally provided in a text file and made available on microfiche, but they have not been comprehensively published. OO Stout (1982), in his reference book *Plant Quarantine Guidelines for Movement of Selected Commodities in the Pacific* provides details on pest occurrences of economic importance extracted from manuscripts published by the survey.

All collections of birds and mammals of the Bishop Museum have been databased, and those of amphibians, reptiles, terrestrial and marine invertebrates and vascular plants and cryptogams are underway. Much of these are available under *Hawaii Biological Survey* and *Pacific Biological Survey* on the Museum's website www.bishopmuseum.org.

4.5.4 Other international initiatives

The GTI under the Conference of the Parties to the CBD is addressing the lack of taxonomic information and expertise to improve decision-making in conservation, sustainable use and equitable sharing of benefits derived from genetic resources. It is convening a *Global Taxonomy Initiative Regional Workshop in Asia*, 10-17 September 2002, Kuala Lumpur, Malaysia. The Workshop will develop a work plan and pilot projects in the region, which may include compilation of reference materials, and the development of databases and taxonomic expertise. GTI obtains funding from the Global Environment Facility. SPREP needs to be informed of the Workshop outcomes.

Species 2000 intends to catalogue all known species of plants, animals, fungi and microbes on Earth as the baseline dataset for studies of global biodiversity. It will also provide an access point to other data systems for all groups of organisms so that users can locate a species across an array of on-line taxonomic database. The organisation, which is funded from private sources, intends to have on-line access to 50 per cent of the type specimens within 5 years.

A recent (April 2002) meeting in Hawaii convened delegates of institutions in the Pacific and Pacific rim to discuss the establishment of a *Pacific Biodiversity Information Forum*. Spearheaded by the Bishop Museum, Hawaii, this will see the organisation of a Pacific Biological Survey that will produce comprehensive literature databases and species checklists for the entire Pacific region, and eventually incorporate specimen databases. The initiative will become integrated in the development of a *Pacific Basin Information Node*, as part of an overall effort by the Biological Resources Division of the US Geological Survey to make useful biological data more widely available. A major thrust of this effort in the Pacific is to repatriate all data to island nations for use by local decision makers and natural resource managers (Allen Allison, personal communication).

The Royal Botanic Gardens, New South Wales, Australia is implementing an *Asia-Pacific Biodiversity Initiative* under its Plant Diversity Research Programme (Appendix 7). The Initiative fits with the responsibility of the Gardens to improve plant classification of Australian native plants, which requires a knowledge of their origin and evolution. The Initiative also acknowledges the Gardens' responsibilities under the CBD, and in response to the lack of knowledge on biodiversity in parts of the Asia-Pacific region, the Initiative will help countries discover, document and classify plants and to better manage and conserve natural resources. This will be achieved by knowledge transfer and capacity-building with other botanists, active collaboration on plant systematics, historical biogeography, plant identification tools, botanical databases, plant conservation, ecology, and research on plant diseases. The results of the Initiative will be published in printed and electronic form. Current projects and future directions of the Gardens can be seen in Appendix 7.

There are other initiatives underway that Pacific Island countries should know about and contribute to. These include, the *Tree of Life*: a collaborative web project, produced by biologists from around the world, providing information about the diversity of organisms on Earth, their history and characteristics; *Global Biodiversity Information Facility*, with links to the Organization of Economic Cooperation and Development, and the European Commission, which intends to produce homepages for all species of organisms, derived from online databases; and *DIVERSITAS*, which under its focus on assessing current diversity, will foster research on phylogenetic groups, habitats that have been insufficiently studied (such as micro-organisms in soils and sediments), and new methods to study and link the phylogeny/ ecology of these organisms.

5. Development of PaciNet: areas of greatest impact

5.1 General considerations

Pacific Island countries are not well placed to meet the challenges of the conservation and sustainable use of their biodiversity. Their ability to manage biodiversity is particularly handicapped by a lack of taxonomic expertise, information and resources. This might be expected: a similar situation exists in other parts of the developing world, and, in the Pacific, governments are operating under severe financial constraints. Where taxonomic capability is present, it relates mostly to vascular plants, vertebrates, and organisms of economic importance to crops (plants and trees) or those affecting human or animal health: in particular, there is a serious gap in knowledge of invertebrates and microorganisms.

Further, there appears to be little sharing of the scant resources that exist, even though there is considerable overlap of taxa between countries of the region. Sharing of taxonomists and collections does occur, but it is rare. Needs are mostly met through regional organisations, and expertise is brought in. The collections that do exist are, in many cases, in need of urgent attention and maintenance. Buildings are woefully inadequate to secure the precious collections that have been made. If the region is to document, use and share the diversity that is present it will require considerable resources to change the present situation.

The needs of the region have been articulated at two meetings, one in 1996 and the other in 2000. These have been summarized in the Meeting Report: *Establishment of PaciNet BioNet Programme*, published by SPC, 2000. They concern the establishment of information systems in the region, capacity building through fellowships and workshops in biosystematics, the rehabilitation and further development of collections and facilities to house them, the application of modern technologies, including molecular diagnostics, and the establishment and operation of NECI, the network coordinating institute. A budget of *c.* US\$7.5 million for an undisclosed period was suggested; and this did not include the establishment of a legal framework on biosystematics, which was also recommended by the meetings.

It is understandable that the meetings would wish to list all the activities required to set up taxonomic services in the region, irrespective of their cost. However, it is unfortunate that there was no attempt to set priorities. It is evident from the report, that there was insufficient thought given to the collections that have already been made in Pacific Island countries, which are stored at institutions outside the region. Until this is known, it is difficult to assess needs properly and develop a relevant work plan for PaciNet. If, for example, the Bishop Museum holds some 22 million items of Pacific origin, it would be difficult to suggest what surveys, collections, taxonomic training, etc would be needed until the items already collected were known and gaps identified.

Capacity building in Pacific Island countries was given great emphasis in the PaciNet planning meetings, and received the largest share of the recommended budget. However, the development of skills for the identification of any species requires long-term training. Usually, expertise is limited to a narrow range of taxa, and to cover adequately the biodiversity that exists in the region, numerous taxonomists would be required. This would take time to achieve and it would be expensive, with training necessary at specialised institutions in developed countries. These issues will require due consideration when contemplating if funds should be provided for training of specialist taxonomists in Pacific Island countries, in particular in the early stages of developing PaciNet. There are other issues that might be considered more important for the initial years of the programme. One important need is to come to terms with the situation in Papua New Guinea, one of the world's 'hot spots' of biodiversity.

Papua New Guinea has the greatest biodiversity of all Pacific Island countries. It also has vast collections and a number of specialists that are capable of identifying a wide range of taxa. The work done in Papua New Guinea needs to be recognised and supported, in the hope that the expertise that exists can be extended to other countries under the auspices of PaciNet.

5.2 Proposed work plan for PaciNet

The following sections discuss the proposed work plan for PaciNet in its first years of operation, attempting to relate to the priority areas indicated by countries during this study. It is based on the balance of funds provided by BioNET-International for the start up of PaciNet, which is estimated to be US\$112,000.

5.2.1 Composition of the PaciNet Secretariat

There is need to decide how PaciNet will be implemented: the composition of the ICC (regional committee), and its relationship to the NACIs (national committees), and the NIs (national institutes). There is then the need to consider the membership of the board of PaciNet – the ICC, in the first instance, later, the NECI. In addition to CROP organisations and representatives from NACIs, it is suggested that Papua New Guinea should be a permanent member from the outset because of its wealth of biodiversity, and the country's potential to assist other Pacific Island countries less endowed with resources (see 5.2.2). There is also a need to request representation from the AnzusLOOP, from an institution (or institutions) knowledgeable of the region's diversity and international attempts to document it, eg the Bishop Museum, Hawaii; Landcare Research, New Zealand; the Royal Botanic Gardens, NSW, Australia. Day-

to-day coordination of the loop will be the responsibility of SPREP, with advice provided by the Technical Secretariat of BioNET-International.

The usual situation is for loops to be coordinated by staff nominated from national institutes: a proportion of the staff members' time being dedicated to loop activities on the understanding that these activities directly support the institute's mission. However, this might not be possible in the Pacific, where there are 22 island countries and territories, most operating under severe financial constraint and without institutes involved in taxonomic enterprises, such as those found elsewhere.

A solution to this problem, might be to recruit a full-time PaciNet programme manager. However, the current balance of funds is insufficient to fund such a position for 2 years, and it is unlikely that additional funds will be obtained in the immediate future, not until the Secretariat is in operation.

An alternative solution, and one that is favoured by this report, relies only on the funds that are presently available, that SPREP (advised by the ICC/NECI) will maintain overall responsibility for the execution of the programme, but allows for the coordinating tasks to be decentralised, by involving other regional agencies, national institutions or individual specialists.

This option provides for the appointment of a part-time Manager by SPREP to oversee the development of the PaciNet Secretariat, preferably delegating a member of staff to take on the responsibility. The Manager will work with a PaciNet task force of four to six specialists (covering terrestrial and marine vertebrates, plants, invertebrates – possibly micro-organisms). The specialists will coordinate activities in his/her own area of taxonomic expertise in the region; tasks would include the development and management of sector specific networks and databases, and the identification and initialisation of project opportunities. Members of the task force would participate in their individual capacity or on behalf of their institutions. Where there are gaps in important areas, specialists or institutions from the AnzusLOOP would be invited to become members of the task force. An honorarium would be paid to the task force and expenditure of members reimbursed.

Estimated budget requirement: US\$40,000¹.

Recommendation 1:

Establish a PaciNet Secretariat with a part-time project manager, supported by a Task Force of regional specialists covering broad taxonomic groupings.

5.2.2 Papua New Guinea membership of the ICC

Papua New Guinea is a special case among Pacific Island countries because of its unique biodiversity, the presence of taxonomists and those that might be termed 'field experts'. It is also a focus of many institutions around the world interested in biosystematics. There is, however, a paucity of expertise in arthropods and terrestrial microorganisms. The situation of Papua New Guinea can be summarised thus:

¹ The amounts suggested are in all cases for 2 years.

- ❑ The biodiversity of Papua New Guinea is by far the richest of the Pacific Island countries and, importantly, includes much of that in other countries of the region;
- ❑ A large component of the biodiversity, in particular that of arthropods and microorganisms, remains to be identified; a majority of the arthropods have not been collected; and the same applies to the microorganisms;
- ❑ The country has a considerable number of biosystematic specialists covering a wide range of taxa, although many might not be termed ‘taxonomist’;
- ❑ Papua New Guinea has a considerable number of institutions and organisations that are directly or indirectly involved in biodiversity research and conservation;
- ❑ The country has several very large and unique collections that are maintained in good condition supported by national funds. This is not a situation found in most other countries;
- ❑ There is considerable international interest in the biodiversity that exists.

In recognition of the importance of Papua New Guinea to regional biodiversity, in terms of its biological, human and institutional resources, and the support that it can provide to PaciNet, the country should be offered membership of the ICC.

Estimated budget requirement: *Costs of PNG’s participation in the ICC may be covered by the budget for the development of the PaciNet Secretariat*

Recommendation 2:

In view of its status as the region’s largest, most species- rich country, Papua New Guinea should be invited to become a full member of the ICC.

5.2.3 Identification of NACIs

Once established, the Secretariat will request countries to nominate NACIs. The NACIs would be expected to suggest, comment on and endorse the PaciNet work plan for the first two years, as well as give guidance for future years for which donor support would be sought.

Recommendation 3:

Identify and confirm NACIs, and obtain support for the PaciNet work plan for the first 2 years.

Estimated budget requirement: nil (this activity could be completed by email/fax/mail correspondence).

5.2.4 Seek involvement in global initiatives to document Pacific biodiversity

There is need for a proper inventory of the collections that exist outside the Pacific. Catalogues or databases of these collections are needed to determine what is present and to enable them to be interrogated to determine areas where there is need for further activity. As indicated in this report, there are many initiatives worldwide that seek to develop databases of the world’s biodiversity. Funds for these endeavours will be sought from international development assistance agencies as well as the private

sector. There appears to be some overlap, different approaches and a lack of coordination between organisations. At present, many of these efforts are going ahead without the involvement of Pacific Island countries, and this needs to change. It will be an important task of the PaciNet Programme Manager to become involved in the process of documenting the Pacific collections, and to work with NACIs in making use of the information generated. It is important that the information obtained is added to EcoPort, a database endorsed by BioNET-International.

This activity has the highest priority in view of the threat to forest ecosystems due to logging practices in Pacific Island countries, those of Melanesia in particular, where endemic timber species continue to be exploited unsustainably. The species have co-evolved with invertebrates and microorganisms that are similarly threatened. Much of this biodiversity has yet to be determined and catalogued.

Whether or not the Pacific Island countries will request a return of the collections, or parts of them, will need to be considered later. It may be sufficient to support attempts to provide digitised images of the collections.

The proposed budget will allow the Manager and/or Task Force members to participate in relevant workshops, meetings and conferences.

Recommendation 4:

In recognition of the vast collections of Pacific Islands species maintained in institutions outside the region, and present attempts to document and catalogue the world's biodiversity, a high priority of PaciNet must be to determine precisely what has been collected, where it is stored, and become part of present initiatives to catalogue that which has not been determined.

Estimated budget requirement: US\$10,000.-

5.2.5 Papua New Guinea: A case for special consideration

Some of the collections are immensely valuable and any needs assessment by PaciNet has to assess what can be done to support them. The value of the Forest Research Institute Herbarium, Lae, for instance, with its large number of unique specimens, cannot be accurately estimated, but to replace it would be extremely expensive. Very likely, some specimens would be difficult, or even be impossible, to replace as they are rare or are from habitats that no longer exist. The FRI Herbarium should be considered the responsibility of the international community, with support from organisations with mandates for environment and diversity (UNEP and UNESCO).

Funds are needed for the design and construction of a new building, with up-to-date security and fire management systems, and with study facilities to attract national and international scholars and other potential users. A board of management should be established, which might include representation from prestigious institutions concerned with the Pacific's biodiversity, in order to maximise the chances of sustained funding. In addition, Government authorities in Papua New Guinea might consider the transfer of other collections to the new institute, to reduce costs of maintenance and safety concerns, and to facilitate opportunities for research and other types of study.

There are also immensely valuable arthropod collections at Kila Kila (under the auspices of the National Agriculture Research Institute) and at the Forest Research Institute, which are well preserved and maintained. Although the collections are very well known internationally, their significance appears less known to the general public in Papua New Guinea. A national awareness programme is needed, which would, in the first instance, focus on schools, universities, teachers, the government bureaucracy and the private sector.

In addition to the general recommendations listed above, Papua New Guinea has some other concerns that relate to its position as custodian of a vast range of biodiversity. PaciNet might be expected to help with the following:

A detailed national biosystematics resources and needs assessment

In view of the large number of biologists and institutions involved in biodiversity in the country, a detailed assessment is required that will identify relevant specialists and institutions. There is adequate national capacity to implement such a study, which is estimated to take 10 days. Some internal travel is envisaged.

A national stakeholders' meeting

The meeting will discuss the national resources and needs assessment (above) and develop recommendations for assistance under PaciNet. It will also determine the NACI for Papua New Guinea.

Plans for a new herbarium/biodiversity collection facility

If the need for a new facility is agreed, to replace the present one at the FRI, which is too small and lacks acceptable safety features, PaciNet would be expected to assist with the preparation of a proposal for submission to donors. The national stakeholders should consider amalgamating important collections in one facility. There would be advantages in this: it would lead to a centre of excellence – a Papua New Guinea Biodiversity Centre – with reduced costs of maintenance and increased security for all collections; and it would facilitate interactions between taxonomists in different disciplines and lead to beneficial collaboration.

The proposed budget will allow the implementation of a detailed national Biodiversity Resources and Needs assessment for PNG as well as contribute to a national stakeholders meeting, as an initiation of the above programme for PNG.

Estimated budget requirement: US\$5,000.

Recommendation 5:

In recognition of the extent of the biodiversity in Papua New Guinea, its institutions and staff, and its potential to assist the region, PaciNet should assist with a needs assessment, a national stakeholders meeting, and plans for a new facility in which to house the present collections (and assist in attracting donor support).

5.2.6 Establish and support regional networks

It will be important for the Secretariat to consider how it will keep in contact with NACIs and how these and NIs will share information and advice. It might conveniently be done by establishing a web-based list with communications between members of PaciNet by e-mail. A national (intranet) system would be required in Papua New Guinea and, perhaps, Fiji to link specialists within the numerous institutions of these countries.

The members of the Task Force should be involved in the establishment, management and coordination of these networks, in particular those that are sector-specific.

The proposed budget will allow the establishment and operation of general and sector-specific networks.

Estimated budget requirement: US\$5,000

Recommendation 6:

Establish and support regional networks, preferably by using internet/email facilities, which are operated and managed by Task Force members, under supervision of the PaciNet Secretariat.

5.2.7 Identify regional resources and needs, and assist with the development of project proposals to address them

In addition to the resources and needs identified during this study, there are several other areas that need to be addressed in more detail under this activity. One such issue is the many collections of the region that are not adequately preserved, and are in need of urgent maintenance (Table 1). It will be the task of the PaciNet Programme Manager and the Task Force to take stock of these and to assess what can be done to safeguard them from further loss or deterioration. In some cases, eg the herbarium of Solomon Islands, it may be necessary to send the collections overseas for temporary safekeeping. Special attention should be devoted to the collections of Papua New Guinea, as discussed earlier (5.2.5).

Estimated budget requirement: US\$25,000.

Recommendation 7:

(a) Determine in more detail the resources and needs of the Pacific region, take stock of the situation and take remedial action as a matter of priority.

(b) Assist with the development of proposals to secure funding for most needed areas for development of PaciNet.

5.2.8 Develop a regional biosystematics database: a register of taxonomists and their institutions in the region

The development of a detailed database that lists the biosystematic resources within the PaciNet LOOP is needed to enable the identification of specialists who could be called upon to help regionally. Ideally, this should be part of a worldwide project, whereby BioNET-International coordinates similar activities in each of the LOOPS. The project would include the identification of all the world's biosystematics specialists, museums and collections, as well as major literature sources and libraries. It should identify ongoing and forthcoming projects that involve collaborative attempts to strengthen biosystematic capacity between LOOPS.

Estimated budget requirement: US\$5,000.

Recommendation 8:

Establish a database of specialists and institutions of the region willing to provide services to PaciNet (if practical, include those of other LOOPS as well as collaborative work between them).

5.2.9 Development of public information materials

The success of PaciNet will largely depend on the participation of taxonomists in the region, their institutions and the public. PaciNet should assume a major role in increasing the public's awareness of the importance of each nation's biodiversity as well as that of the region as a whole. The development of posters, leaflets/brochures, radio and television programmes, etc as well as materials for schools, should be considered of utmost importance.

The need for a biodiversity awareness programme is particularly urgent in Papua New Guinea. In general, people are not aware of the extent of the nation's biodiversity, and its importance. The development of brochures, videos, posters, etc would improve this understanding, and develop national pride leading to increased support to biodiversity conservation efforts. The programme should target members of the government as well the general public.

Estimated budget requirement: US\$2,000.

Recommendation 9:

Increasing the public's awareness of the extent and value of national biodiversity as well as that in the region as a whole, is important and PaciNet should assume this responsibility; the need is especially urgent in Papua New Guinea.

5.2.10 Acquisition of taxonomic 'tools'

There is a need for the acquisition and where appropriate the development of a range taxonomic accessories to assist plant protection practitioners, students, researchers and natural resource managers with the identification of species. A start might be made with the purchase and distribution of existing tools, and, where necessary, the

reprinting of literature where it is no longer available. In the longer term, countries should have keys to their vascular plants, and booklets for the identification of pest species of major crops, including weeds. Where possible, these publications should also be made available on CD-ROM and the Internet.

Estimated budget requirement: US\$2,000.

Recommendation 10:

Countries have identified a number of taxonomic guides that would be helpful for the scientific community as well as the general public to help in the identification of pests of economic importance, and PaciNet together with SPC should consider making these available as booklets, as well as in a form accessible by computer.

5.2.11 Human resources development: Basic taxonomic skills

Although there are considerable skills in the region, and access to taxonomic assistance for the identification of vascular plants, vertebrates (fishes, mammals, birds, reptiles), and marine species, the identification of microorganisms and arthropods presents considerable difficulties. In view of the extensive training needed to make definitive identifications in these groups – and the costs associated with such training – it is not an appropriate use of limited PaciNet resources to provide this expertise.. This is not to deny the need for trained taxonomists to upgrade their skills or, on occasions, to travel within the region or outside to consult with colleagues.

There is a need, however, to develop basic skills that will eventually lead to the identification of arthropod and microorganisms, perhaps to family or genus. Such training should also include the collection, preservation, storage and shipping of specimens. The result would be to produce *parataxonomists* or *identifiers*, with skills in both economic and non-economic species. (The training of such persons will, in addition to assisting with PaciNet activities, also be of immense use to departments of quarantine; and give them the confidence that comes of being able to accurately and rapidly identify interceptions). PaciNet should support this training, which could be implemented by SPC under its current programmes.

Estimated budget requirement: US\$15,000.

Recommendation 11:

As time and the costs involved in training expert taxonomists will be lengthy and expensive (and positions in government establishments unsustainable), parataxonomists (or identifiers) should be trained in each country to assist PaciNet activities.. Such persons would be able to make preliminary identifications (of arthropods and microorganisms), and to know how to process specimens for definitive identification.

5.2.12 Develop a Regional Biodiversity Database

A Pacific Islands Biodiversity Database that includes all relevant biodiversity information from Pacific island countries is one of the ultimate goals of PaciNet.

Based on the progress in identifying and assessing global initiatives documenting Pacific biodiversity (ref. 5.2.4, Recommendation 4), a start should be made to assist with the compilation of this information, and the design of a suitably structured, comprehensive database for storage and referencing.

Estimated budget requirement: US\$3,000.

Recommendation 12:

Following the identification and assessment of global initiatives to document Pacific biodiversity, a structure for a database should be developed to store this information in an easily managed and accessible format. This would require extensive consultations with all institutions and programmes that are involved in documenting and researching Pacific islands biodiversity.

5.2.13 PaciNet regional meeting

The establishment phase of PaciNet will be completed once the countries have accepted and taken ownership of the initiative. This will require a regional meeting to be held towards the end of two years. The meeting would allow the evaluation of PaciNet and develop recommendations for improving its scope, performance and efficiency, and provide directions for the development of future work programmes. Considering the costs for such a meeting, no funds have been allocated, and support will need to be sought from donors.

Estimated budget requirement: To be sought.

Recommendation 13:

Secure funding to convene a meeting of NACIs, regional stakeholders and relevant international research institutions and organisations to evaluate PaciNet's establishment, and develop recommendations for its development.

5.3 Intellectual property concerns and quarantine issues

A potential constraint that arose during the 2000 PaciNet meeting, and subsequently in discussions during the mission, was the issue of intellectual property rights. This was based on concerns arising from the exploitation of fauna and flora in developing countries without due consideration to benefit-sharing. In Pacific Island countries, this has led to considerable delays in the issue of permits for the export of plant material, in particular. Although MTAs have been agreed by members of PHALPS, their use for the equitable sharing of profits arising from the commercialisation of plant genetic resources, still seems to be controversial. While this should not affect the export of dead, preserved specimens, there are often lengthy delays, sometimes prohibitions, for specimens destined for identification overseas.

This feeling among countries could impact negatively on the development and work of PaciNet. SPREP should, therefore, consider opening a dialogue with countries on the issue of IPR. It might consider bringing it to the attention of SPC for inclusion in national workshops about to begin under PAPGREN (Pacific Agricultural Plant

Genetic Resources Network) to discuss conservation and use activities in each country, to set priorities for future plant genetic resource activities, to link national activities with those of the regional network, and to establish national committees.

Recommendation 14:

SPREP establish a dialogue with member countries to provide assistance to the development of protocols (MTAs) that allow specimens to be exported for identification and storage under the PaciNet initiative.

Whilst the last decade has seen a number of training initiatives in the region to strengthen quarantine services, there is still uncertainty in some countries how to deal with requests for the importation of dead and preserved plant or animal material. It would appear that the training already given to countries in import risk analysis is not sufficient, and more is required. Such training is within the mandate of SPC, and SPREP should encourage SPC to do more, so that transfers of specimens between members of PaciNet are not unduly delayed or prohibited.

Recommendation 15:

SPREP encourages SPC to provide further training to national quarantine services, in the importation of dead and preserved plant and animal materials, to facilitate their movement for identification and storage purposes under PaciNet.

6. Proposed PaciNet work plan for 2002–2004

Based on the above recommendations for activities under the PaciNet initiative, and taking into account the remaining funds provided by BioNet International, the following implementation time frame for the work plan is proposed.

Rec.	Activity	Year 1				Year 2				Est. Costs (US\$)
		1	2	3	4	1	2	3	4	
1	Develop PaciNet Secretariat (Task Force approach)									40,000
2	Invite Papua New Guinea to become member of ICC									nil
3	Identify and establish NACIs									nil
4	Determine ongoing and planned activities/collections outside region									10,000
5	Asses PNG resources and needs									5,000
6	Establish and support national/regional networks									5,000
7(a)	Identify regional biodiversity resources/ needs; stocktake; take remedial action where needed									10,000
7(b)	Develop (sub)regional/national proposals									15,000
8	Develop and maintain regional biosystematics database									5,000
9	Develop public awareness/education materials									2,000
10	Acquire identification tools									2,000
11	Support/develop/conduct training courses									15,000
12	Develop regional biodiversity database									3,000
13	PaciNet regional meeting									n/a
	TOTAL									112,000

Terms of reference

Specific Tasks

1. Assist, in consultation with the TCN Secretariat, relevant CROP institutions and BIONET-International, with the development of a formal cooperation agreement between these institutions and the TCN Secretariat for the implementation of projects within PACINET;
2. Determine and assess the existing biosystematic resources (human, material and infrastructural) available to or in PICs;
3. Identify any constraints that may affect the implementation and success of PACINET;
4. Identify and justify an appropriate National Coordinating Institute (NACIs) for each of the countries visited during this assignment, and for each of these countries, a preliminary listing of all potential PACINET National Institutes (NIs).
5. Identify the needs to improve biosystematic resources, or access thereto, for PICs, and rank these in their importance;
6. Design an appropriate work plan that addresses the needs for biosystematic resources in the Pacific, for presentation to relevant CROP members and national coordinating institutions.

6.1.1 Work plan

The consultant's Terms of Reference will comprise of three distinct activities:

Activity 1:

In coordination with the TCN Secretariat and BIONET-International, assist with formalising the TCN between the relevant CROP members;

Tasks:

Consult with, and where appropriate visit, relevant CROP Institutions (SPC, FFA, USP), on the development of a formal cooperation agreement with the TCN Secretariat for the implementation of projects within PACINET;

6.2 Expected outputs:

1. A clear understanding by each of the CROP agencies targeted of PACINET, its rationale, objectives, modus operandi and the roles envisaged for each of them as part of the PACINET LOOP;
2. An understanding of the role of the interim Steering Committee, and some indication of interest to serve on the interim Steering Committee to oversee the formulation of the LOOP;
3. An understanding to collaborate and contribute taxonomic resources at their disposal for the objectives of PACINET; with conditionalities, if any, clarified.
4. A draft mechanism for formalizing the above understanding.
5. A designated PACINET Focal Point within each of the CROP agencies.

Activity 2:

Conduct a resource and needs assessment to determine the existing biosystematic resources and technologies for resource, training and information sharing available within the Pacific and identify areas where assistance from PACINET would have the greatest impact;

Tasks:

1. Conduct an assessment of existing biosystematic resources (both human and material) in Pacific Island countries, by consulting authorities and individual specialists within PICs, attendance to meetings (eg. RTMPP in Nadi), and/or by means of telecommunication (telephone, fax and email)
2. Determine the needs to improve biosystematic resources, or access thereto, for PICs, and provide a ranking of their priority.
3. For each of the countries visited, identify and justify an appropriate National Coordinating Institute (NACIs) and list all potential PACINET National Institutes (NIs).
4. Identify any constraints that may affect the implementation of PaciNet.
5. Identify areas where PaciNet assistance would have the most significant and effective impact

6.2.1 Expected outputs:

A comprehensive and separate report detailing:

1. Existing biosystematic resources (both human and material);
2. Identified needs, prioritised, for improving biosystematic resources;
3. Potential opportunities within the areas of work FFA, SPC and USP, for addressing these needs.
4. A list of potential National Institutes for PACINET and a recommended National Coordinating Institute amongst them.
5. Potential constraints to the effective implementation of PACINET and clear recommendations of appropriate actions for effectively addressing them.
6. Areas where PACINET assistance would have the most significant and effective impact.

Activity 3:

Prepare a work plan for PACINET for presentation and discussion among CROP members and national coordinating institutions.

Tasks:

1. In consideration of the outcomes of (1) and (2), design an appropriate work plan that addresses the needs for biosystematic resources in the Pacific, for presentation to relevant CROP members and national coordinating institutions. This activity will be conducted 'at home' in the consultant's country, but will involve 6 days of consultation and report preparation at TCN Coordinating Committee at SPREP, Samoa.

6.3 Expected Outputs :

1. Detailed work plan of activities, timelines for implementation, outputs, and an indicative budget for Year 1. (April 2002 – Mar 2003).
2. Indicative work plan of activities, timelines and outputs for the Year 2 (April 2003 – Mar 2004).

19	Are there any training courses/workshops or attachments that would help with your taxonomic work?
20	<p>Under the PACINET Initiative, relevant government, non-government and private institutions and individuals will be invited to participate in a national network of biosystematic resources for each country. The coordination of the national network will be through a National Coordinating Institute (referred to as NACI), which will be the national focal point for communication with SPREP as the Network Coordinating Institute (NECI).</p> <p>Would your organisation be prepared to take up the responsibility of the NACI?</p> <p>If so, what do you view as the a) advantages (ie. strengths) and b) disadvantages (ie. weaknesses) of your institution in this role?</p> <p>a) Advantages:</p> <p>b) Disadvantages:</p>
21	Are there any other institutions that you could recommend to take up the role of NACI in your country?
22	<p>COMMENTS:</p> <p>If you have any other information to add please provide it here.</p>

People who returned completed questionnaires

American Samoa:

Schmaedick, M. Entomologist, American Samoa Community College, Pago Pago.

Australia:

Brown, E. Royal Botanic Gardens, Sydney, Australia

Commonwealth of the Northern Mariana Islands:

Bourquin, O. Manager, CNMI Invertebrate Collection, CREES, Northern Mariana College, Saipan.

Cook Islands:

McCormack, G. Director, Cook Islands Natural Heritage Project, Rarotonga.

Federated States of Micronesia:

Raynor, B. Director, The Nature Conservancy, Kolonia, Pohnpei

Fiji:

Watling, D. Principal, Environment Consultants Fiji Ltd. Suva.

Seeto, J. Lecturer, Marine Studies Programme, USP, Suva.

French Polynesia:

Mu, L. Plant Pathologist, Departement de la protection des vegetaux – Service du developpement rural, Papeete, Tahiti.

Kiribati

Jenkins, S. Director, Foundation for the People of the South Pacific, Bairiki, Tarawa.

Nauru

Cain, J. Secretary for Economic Development, Department of Economic Development, Yaren.

Palau

Emaurois, C. Node Coordinator for the Global Coral Reef Monitoring Network for Micronesia/American Samoa Region, Palau International Coral Reef Center, Koror.

Papua New Guinea:

Ero, M. Assistant Curator, National Agricultural Insect Collection, NARI, Boroko.

Orapa, W. Senior Weeds Scientist, NARI, Lae.

Philemon, E.C. General Manager, Technical and Advisory, NAQIA, Port Moresby
Price, T.V., Professor and Head, Department of Agriculture, The University of Vudal, Rabaul.

Suma, S. Acting Chief Quarantine Officer (Plants), NAQIA, Port Moresby.

Thomson, D. Regional Veterinary Officer, Momase and Islands Regions, NAQIA, Lae

Solomon Islands

Pita, J. Assistant Wildlife Officer, Ministry of Forests, Environment and Conservation, Honiara.

Saelea, J. Acting Director of Research, Research Division, Ministry of Agriculture and Livestock, Honiara.

SPC

Rapp, G. Entomologist, Suva

Overview of resources and needs of Pacific Island countries

The following overview provides a summary based on interviews during country visits, information extracted from questionnaires (see Appendix 2) that have been returned by individual specialists in Pacific Island countries, and personal observations by the consultant and colleagues.

American Samoa

The American Samoa Community College has a specialist entomologist and plant pathologist. It has a well maintained herbarium and arthropod collection, which are helpful for the identification of local specimens. Literature and digital identification tools (USDA Fruit Fly Key; CABI Keys) are available, and the Internet (PestNet, relevant websites) are used to obtain information. Some 25 specimens were sent for identification last year, taking different times and at variable costs: The BMNH is very efficient, but charges £58 per identification, while specimens sent to Landcare Research, New Zealand (which charges NZ\$120 per identification) took longer: results had not been received after 5 months. USDA provides an identification service at no cost, but the efficiency varies. There appears to be no need for training in taxonomy (M. Schmaedick, personal communication, 2002).

The ASCC may be the NACI in American Samoa.

Commonwealth of Northern Mariana Islands

The College of the Northern Mariana Islands in Saipan houses the CNMI Invertebrate Collection, which was recently restored and catalogued in: *Invertebrate Collection – Northern Mariana Islands Status 2001*. O. Bourquin, Consultant Collections Manager, CNMI Invertebrate Collection, Northern Mariana College, Cooperative Research, Extension and Education Service (CREES), Saipan, MP 96950. December 2001 (Draft) 370 pp.). CREES, Saipan, MP 96950. December 2001 (Draft) 370 pp.). Although the collection was not viewed by the author during a visit in March 2002, it is reportedly in good condition (O. Bourquin, personal communication, 2002). Specimens that cannot be identified locally are sent for identification to the Bishop Museum, Hawaii, or to various specialists all over the world, at no cost except postage. Some 1550 specimens were sent for identification to the Bishop Museum last year. The current curator is leaving at the end of 2002, and the continued maintenance of the collection is uncertain.

The College of the Northern Mariana Islands may become the NACI for the territory.

Cook Islands

The Cook Islands Natural Heritage Project has developed the Natural Heritage Biodiversity database in which information on local species is stored. Where possible it is supported by photographs that facilitate identification. The Project does not have a locally-maintained collection, but prefers that specimens are kept overseas. It has a good collection of literature for the identification of some taxonomic group; it also

utilises PestNet and other web-based facilities. Where necessary, specimens are sent for identification overseas with excellent results, and at no costs. Some 20 specimens were sent last year. The Project sees a greater need for visiting scientists to assist with the collection and identification of specimens, and who can provide hands-on training to local staff, rather than training in taxonomy. The Project is interested in taking up the role of NACI for the Cook Islands (G. McCormack, personal communication, 2002).

The arthropod collection at the Ministry of Agriculture's Totokoitu Research Station, Rarotonga is in reasonable condition, and is regularly maintained by local plant protection staff (observations by the writer, 2001).

Federated States of Micronesia

A list of Micronesian arthropods is available on the website www.crees.org/plantprotection/aubweb, and covers most of the Micronesia region (R. Miller, personal communication, 2002).

The Nature Conservancy has a project office in Pohnpei, which implements several biodiversity-related projects. Some 300 plant specimens were sent for identification last year mostly to specialists in Guam, Hawaii or the US mainland who are involved in joint projects. Reference specimens are stored in the developing College of Micronesia -FSM herbarium, which requires further support. There are no adequate identification keys for local flora. Although a book on the flora of Pohnpei is useful, it is now out-of-print. PestNet is considered a useful service, although the TNC has not posted messages. Currently, TNC does not have any taxonomic training needs. COM-FSM may be the NACI for the country (B. Raynor, personal communication, 2002).

COM-FSM has a small agricultural arthropod collection in its office in Pohnpei. Several inspections by the consultant since 1996 have shown that it lacks maintenance, and as a result has significantly deteriorated, requiring major work if restoration is desired.

Fiji

USP

The South Pacific Herbarium has taxonomic skills for vascular plants of Cook Islands, Fiji, Kiribati, Niue, Samoa, Tonga, Tuvalu, Vanuatu, as well as specimens from several other Pacific Island countries (page 6). The collection is in excellent condition and is well maintained, and there is currently no need for any financial assistance through PaciNet. It is likely that the marine collection is also well maintained and does not need any support at this stage. The University has a well equipped library that has excellent links with overseas libraries from where additional information can be sourced.

The Marine Studies Programme and Institute of Marine Studies have a few specialists skilled in biosystematics: Mr. Johnson Seeto, Lecturer, Marine Science, has expertise in the taxonomy of marine and freshwater fishes, molluscs and echinoderms (sea cucumber and starfish). He has described three fish species new to science. Dr. Cameron Hay, Director of the Institute of Marine Resources is a specialist in algal

taxonomy. Honorary research fellows provide additional expertise in the taxonomy of corals (Dr. E. Lovell), crustaceans (Mr. A. Forbes), freshwater and terrestrial molluscs (Dr. A. Haynes), and freshwater fishes (Mr. A. Jenkins). The Institute maintains strong links with overseas scientists and institutions that are, from time-to-time, called upon to assist with the identification of specimens.

The Marine Collection, housed at the Marine Studies Complex at USP Laucala Campus is maintained by Mr. J. Seeto, who has assumed the role of curator. It is likely that this position will be formalised in the near future, and supported by USP core funds.

Specimens are usually identified without cost from Pacific islands as a service to the countries. The number of specimens received each year is small, although last year Vanuatu sent 300 shells for identification. In addition, some 20-50 identifications are done from digital photographs each year. When queries are sent this way, identifications are made immediately by the institute staff; one specimen which was thought to be a new species was posted on the internet to seek assistance from other specialists.

The Institute provides training in taxonomy of marine species.

Ministry of Fisheries and Forestry - Forestry Department

The Forestry Department at Colo-i-Suva, Suva, has a representative collection of forest insects that remains in good condition. The collection was established over the last decade. However, there is now no qualified entomologist in charge, although staff in the Forestry Department are keen to maintain it.

Ministry of Agriculture, Sugar and Land Resettlement

Koronivia Research Station, Nausori has a representative collection of agricultural pests. The collection, which includes specimens collected in the early 1900s is in reasonable condition, but requires cataloguing and maintenance.

Fiji Museum

The vertebrate collection at the Museum is in poor condition and urgently requires maintenance (D. Watling, personal communication, 2002).

Other biosystematic resources

Dr Dick Watling is a specialist in birds of Fiji and Western Polynesia, as well as terrestrial reptiles of Fiji. He has a well equipped library for the identification of specimens. Last year, he identified three specimens from Fiji at no costs. He is interested to assist with training and workshops in taxonomy (D. Watling, personal communication, 2002).

Dr. Watling is not available to take up the role of NACI.

French Polynesia

French Polynesia has a plant herbarium, but this does not include microorganisms and fungi. The collection requires maintenance. Specialist skills and the availability of literature provide some capacity to identify pests and diseases of economic importance, but there are no digital identification tools available. A crop disease survey by SPC in 2001 collected some 100 specimens, but identifications have yet to be received. An average of seven samples is sent each year for identification to overseas institutions. AgriQuality, New Zealand charges NZ\$150 per sample, and is considered very efficient and reliable, but this service is now hampered due to restrictions imposed by NZ authorities on the importation of plant disease specimens. The current diagnostic service provided by SPC is considered to be laborious and time consuming (L. Mu, personal communication, 2002).

The Departement de la protection des vegetaux – Service du developpement rural is a candidate for hosting the NACI, as are the Delegation a la recherche, or the Universite de Polynesie francaise (L. Mu., personal communication, 2002).

Guam

The insect collection of the University of Guam is focused largely on agricultural pests, but also includes a large number of non-pest species (R. Miller, personal communication, 2002). It requires maintenance (O. Bourquin, personal communication, 2002). The University has taxonomic capacity for most agricultural pests and aphids in the Western Pacific region. A 1948 document: *A Summary of the Insects and Flora of Guam*, by Samuel Beller (US Department of Agriculture, Agriculture Research Administration, Bureau of Entomology and Plant Quarantine, Division of Foreign Plant Quarantines, Honolulu, T.H., 282 pp.) provides a good overview of these groups in Guam, but requires updating.

Kiribati

The Foundation for the Peoples of the South Pacific, an international NGO with an office on Tarawa, is involved in biodiversity-related management projects, but has no detailed need for taxonomic services or training. A small arthropod collection was established in the 1980s under a UNDP/FAO/SPC plant protection project, but its current condition is unknown. The Department of Agriculture or the Department of Natural Resources may be nominated to be the NACI (S. Jenkins, personal communication, 2002).

Marshall Islands

No response was received from the Marshall Islands. However, the consultant could not find any arthropod collection during a visit in 2001. That time, specimens were collected and sent for identification with support from the SPC Plant Protection in Micronesia project.

Nauru

The Department of Economic Development, which is responsible for agriculture, has a fruit fly collection supplied by the SPC Fruit Fly Project, and a collection developed by the Republic of China/Taiwan project. The fruit fly collection was provided only recently and is reportedly in good condition. Identification tools that are available to staff include some literature, CD-ROMs (including CABI keys), and access to PestNet. Last year three specimens (whiteflies and fruit flies) were sent for identification. There is a need for basic training in taxonomy as well as the collection, preservation and storage of specimens. DEC is willing to take on the role of NACI, although the National Environment Association and National Youth Affairs may also be candidates (J. Cain, personal communication, 2002).

Niue

As part of a project to provide support to plant protection services in Cook Islands, Niue and Tokelau, SPC implemented a survey on pest and diseases of agricultural crops in October 2000 to update the national pest list. The survey dispatched some 40 arthropod samples to specialists in New Zealand, which resulted in six new records for the country. The survey also newly recorded 27 plant pathogens (E. McKenzie, W. Liebregts and B. Tairea. *Niue Pest Survey – Short Term Consultancy*. Final Report. SPC, 2001). There is no significant collection in the country; specimens are stored at Landcare Research, New Zealand.

Palau

The Palau Conservation and Entomology Department has a herbarium and arthropod collection, but an inspection by the consultant in 2000 indicated an urgent need for maintenance and rehabilitation. There is some capacity to identify vascular plants in the five ecosystems of Palau (C. Emaurois, personal communication, 2002).

The Palau Community College has been recommended as the NACI for the country (C. Emaurois, personal communication, 2002).

Papua New Guinea

Forest Research Institute

The Forest Research Institute, Lae has the largest herbarium in Papua New Guinea, with some 320,000 plant specimens representing some 15,000 species. The collection is housed on two floors in a building whose safety measures, for fire, earthquake and other disasters, do not appear to conform to international standards. The collection is in good condition, but the increasing number of specimens has resulted in a serious shortage of space. Expansion is not possible, and so study areas have been sacrificed to make room for storage cabinets. There are currently some 5,000 specimens awaiting processing, storage and filing (R. Kiapranis and J. Dobunaba, personal communication, 2002).

The collection is likely to be very relevant to adjacent Solomon Islands as well as other countries in the region.

National Agricultural Research Institute (NARI)

The Papua New Guinea national agricultural insect collection is under the care of NARI at Kila Kila, Port Moresby. The collection contains representatives of many of the arthropod groups besides insects. It is housed in a 5-year-old air-conditioned, iron-clad, building. The collection is in good condition, and there are storage cabinets available for expansion, but there is a lack of study facilities.

The Curator, Mr. Stefan Krull, is a German volunteer under a development assistance programme (another 12 months of his contract remains), and he is assisted by Mr. Mark Ero. Maintenance costs are approximately K2,000 per month, which include the costs for air-conditioning, equipment and consumables. The collection houses a large number of species, many of which are endemic to Papua New Guinea. Mr. Krull is in the process of developing a database of the collection, using a system developed in the Netherlands, and which is compatible with the BioNet-supported EcoPort biodiversity database. Copies of the database will be sent to other Papua New Guinea institutions.

The building lacks furniture that would make it into a study and education centre. The few desks that are present are used by the Curator and his assistant; additional furniture (desks, chairs, table lamps, etc) would allow students and researchers to study specimens more conveniently. The facility also lacks facilities and materials for public education, such as a room or area for displays and exhibitions

In addition to the collection, staff have access to some literature, CR ROM tools, and the internet (PestNet) to help with the identification of specimens (M. Ero, personal communication, 2002).

There is also an important large mycological herbarium with specimens collected over several decades by Dr. Dorothy Shaw, which is housed at Kila Kila, but its condition is not known (T. Price, personal communication, 2002).

National Agricultural Quarantine and Inspection Authority (NAQIA)

NAQIA has used the International Mycological Institute of CABI for identification of disease specimens, which is considered reliable but slow. It charges a fee of £50 per identification (E. Philemon, 2002). Taxonomic services other than those provided by institutes are based on personal contacts, and vary in reliability and efficiency. The service provided by one South African institution (SASEX) was reliable, but stopped due to financial constraints (S. Suma, 2002).

Other institutions

There are a number of other institutions that could not be visited during the brief period of the consultancy. These include the Papua New Guinea National Museum, the University of Papua New Guinea, and the Ministry of Fisheries.

Papua New Guinea has offered to provide its internationally accredited laboratory services including disease and pest diagnostics to member countries of the Melanesian Spearhead Group (Fiji, Solomon Islands, Vanuatu) at national rates if additional

funding can be sourced. Currently, PNG is able to provide commercial laboratory services for soil analysis, veterinary disease diagnosis, microbiological services, and water quality testing (S. Suma, 2002).

Samoa

The Ministry of Agriculture, Fisheries, Forests and Meteorology had good arthropod and plant pathogen collections that were developed under the joint Samoan-German Plant Protection Project in the late 1970s to the late 1980s. Due to a lack of maintenance, the collections deteriorated, and two cyclones in 1989 and 1991 ensured their complete demise. Inspections by the consultant over the past decade of the small 'skeleton' collection that remains at the Nu'u Crop Development Station have shown that a considerable number of specimens are beyond repair, with the remainder in urgent need of restoration.

The Alafua Campus, USP, has an arthropod with approximately 100 different species; its condition is unknown (A. Palupe, personal communication, 2002).

Solomon Islands

Ministry of Agriculture and Primary Industries

The insect collection at Dodo Creek Research Station, near Honiara, was destroyed by fire in 2000. The collection contained valuable specimens, from entomological work in the country dating from the early 20th century.

Although no micro-organisms were sent for identification last year, identification services used previously included the Commonwealth Mycological Institute (now a service of CABI Bioscience) which charges £50.per identification (free to many Commonwealth countries), but is reportedly very slow, and HortResearch in Auckland, which is faster. Identification tools include CD-ROMs (CABI Crop Protection Compendium, SafriNet, Global Plant and Pest Information System), and Internet-based tools such as PestNet and the SPC website (J. Saelea, personal communication, 2002). Unfortunately, many texts were lost with the destruction of the library at Dodo Creek Research Station.

A thorough inventory of trees of Solomon Islands was made in association with Kew Herbarium in the 1960s, and keys were published. More than 100 plant specimens collected were identified last year. Specimens are commonly sent to the Australian Museum or to the Papua New Guinea Museum for identification. The Papua New Guinea Museum has assisted with botanical surveys with excellent results (J. Pita, personal communication, 2002).

The Department of Environment has indicated that in view of a lack of adequate curation facilities and continuing economic constraints, it is considering the transfer of herbarium specimens to the USP, Suva, for safekeeping.

Both MAPI and the Ministry of Forests, Environment and Conservation have expressed an interest in becoming the NACI for Solomon Islands.

Tonga

A number of local and international plant protection specialists developed a useful agricultural arthropod collection at Vaini Research Station, Ministry of Agriculture and Forestry. Although in a better condition than those in most other countries, it is in need of maintenance; and some equipment is needed for curation tasks.

Tuvalu

Two visits by the consultant in 1997 showed that, apart from a few arthropod specimens stored in alcohol, there were no collections of significance in the country.

Vanuatu

Department of Forestry, Ministry of Primary Industries and Rural Development

Mr. Sam Chanel is the curator of the Botanical Herbarium, assisted by Philemon Ala. Mr. Chanel worked for ORSTOM previously, and when the organization left Vanuatu he transferred to the Department of Forestry, around 1994. He has extensive training with ORSTOM and is a very experienced taxonomist, so much so that he has helped with identifications in Fiji and a survey in Samoa.

The herbarium has around 6,000 specimens, and these are listed on a database that was provided by the Department of the Environment Australia. It was previously FoxPro-based, now Excel is used. Unfortunately, the hard drive of the computer has broken, and the herbarium is waiting for resources to buy another and for the Department of the Environment to supply a back up copy. Staff from the latter visit twice a year to make collections and to help maintain the database, etc.

The herbarium has target areas, those at altitude and those isolated and without roads. Surveys are limited by a shortage of funds. There is also a shortage of cupboards to store specimens, with many yet to be catalogued. There is a literature collection.

In addition to forest trees, the herbarium contains herbs, mosses, liverworts, lichen and fungi. These were collected by H. Streimann from the Australian National Herbarium, who has since died.

There has also been collaboration with the Department of Environment, New Zealand with a fresh water survey in six islands. This lasted 3/4 months and was implemented through the Environment Unit, with the help of the Department of Forestry. Not only fish were collected and identified, but also weeds, trees and insects.

Duplicates of collections are held at Kew, Laden and Brisbane. There is an MOU between Vanuatu and the National Science Museum, Japan and joint collecting trips are held. Five Japanese scientists came in recent years to collect ferns, cryptocarps, etc.

Wallis and Futuna

No information was available about any collections in the country.

Appendix 5

Institutions visited and people consulted

Date	Place	Contacts
25 February	Nadi, Fiji	Mr. Elijah Philemon General Manager, Technical & Advisory Services National Agriculture Quarantine & Inspection Authority (NAQIA) PO Box 741 Port Moresby, Papua New Guinea Tel: (675) 311 2100 Fax.: (675) 325 1673 Email: naqia@dg.com.pg
		Mr. Roy Masamdu, Principal Entomologist National Agricultural Research Institute (NARI) PO Box 1639 Lae, Morove Province Tel.: (675) 475 1189 Fax.: (675) 475 1034 / 472 2242 Email: spctaro@datec.com.pg
26 February	Nadi, Fiji	Mr. Fernando Sengebau Plant Protection Officer Bureau of Natural Resources and Development PO Box 460, Koror 96940, Palau Tel.: (680) 488 1604 Fax.: (680) 488 1603 Email: ffms@palaunet.com
16 March	Guam	University of Guam, College of Agriculture & Life Sciences, Agriculture Experiment Station Mangilao, Guam 96923 Dr. Ross Miller, Entomologist Tel.: (671) 735 2141 Fax.: (671) 734 4600 Email: rmiller@uog.edu Mr. James McConnell, Associate Professor, Ornamental Horticulture Tel.: (671) 735 2129 Fax.: (671) 734 5600 Email: orchid@kuentos.guam.net
23 March	Pohnpei, FSM	Mr. Konrad Englberger, Plant Protection Trainer Email: ppmicronesia@mail.fm
24 March	Pohnpei, FSM	Dr. Flordeliza B. Javier, College of Micronesia Email: fbjavier@mail.fm
April	Suva, Fiji	Mr. Joseph Cain, Secretary Natural Resources and Development, Nauru. Email: jcain@cenpac.net.nr
16 April	Suva, Fiji	SPC Staff: Dr. Mick Lloyd, Plant Protection Adviser Email: mickl@spc.int

		Mr. Richard Vernon, Plant Protection Information Officer Email: richardv@spc.int Dr. Jacqui Wright, Plant Pathologist Email: jacquiw@spc.int Mr. Luc Leblanc, Consultant Fruit Fly Entomologist Mr. Peter Saville, Animal Health Adviser Email: peters@spc.int
17 April	Suva, Fiji	Dr. Dick Watling, Environmental Consultants Email: watling@connect.com.fj
18 April	Honiara, Solomon Islands	Forum Fisheries Agency: Mr. Feleti Te'o, Director Email: feleti.teo@ffa.int Dr. Barry Pollock, Deputy Director Email: barry.pollock@ffa.int
19 April	Honiara, Solomon Islands	Ministry of Agriculture and Primary Industries: Mr. Ezekiel Walaodo, Deputy Secretary Mr. Jimmie Saelea, Director of Research Email: dor@solomon.com.sb Ministry of Forests, Environment and Conservation Mr. John Pita, Assistant Wildlife Officer
22 April	Port Moresby	Mr. Sidney Suma, Senior Plant Pathologist, NAQIA Email: ssuma@datec.com.pg
22 April	Port Moresby	Mr. Barnabas Wilmott, Assistant Director – Wildlife Enforcement, Conservation Division, Office of Environment and Conservation Email: cons@daltron.com.pg
22 April	Port Moresby	Dr. Ilagi Puana, Chief Quarantine Officer, Animals, and Chief Veterinary Officer, NAQIA Email: pngnaqs@dg.com.pg
22 April	Port Moresby	Mr. Stefan Krull, Curator, National Agricultural Insect Collection, NARI, Kila Kila. Email: narikila@datec.com.pg
	Port Moresby	Mr. Mark Ero, Assistant Curator, National Agricultural Insect Collection, NARI, Kila Kila Email: narikila@datec.com.pg
22 April	Port Moresby	Mr. Peter Wai'in, Senior Microbiologist, National Veterinary Laboratory, NAQIA. Email: naqia@dg.com.pg
23 April	Lae	Mr. Roy Masamdu, Entomologist, NARI Email: spctaro@datec.com.pg
23 April	Lae	Mr. Valentine Kambori, Director-General, NARI, Lae Email: nari@datec.com.pg
23 April	Lae	Mr. John Dobunaba, Scientific Officer – Forest Biology, National Forest Service, PNG Forest Authority, Forest Research Institute

23 April	Lae	Mr. Robert Kiapranis, Program Manager – Forest Biology, National Forest Service, PNG Forest Authority, Forest Research Institute Email: friforbio@global.net.pg
23 April	Lae	Mr. Warea Orapa, Senior Weed Scientist, NARI Email: nariweeds@datec.com.pg
24 April	Lae	Mr. Esekia Warvi, Executive Manager, UNITECH Development & Consultancy Ltd. Email: moc.unitech@global.net.pg
	Lae	Mrs. Dianne Clark, Training Supervisor, The Rainforest Habitat, UNITECH UDC Office, Lae
24 April	Port Moresby	Mr. Matthew'wela Kanua, Acting Secretary, Department of Agriculture and Livestock, Konedobu, Port Moresby Email: kanua@daltron.com.pg
25 April	Port Moresby	Dr. Wari Iamo, Secretary, Department of Environment and Conservation, Boroko, NCD, PNG Email: odir@daltron.com.pg
25 April	Port Moresby	Mr. Vagi Genorupa, Assistant Director – Parks & Wildlife Services, Office of Environment & Conservation Email: cons@daltron.com.pg
25 April	Port Moresby, PNG	Professor Simon Saulei, Executive Dean, School of Research and Postgraduate Studies, University of Papua New Guinea (UPNG) Email: saulei.simon@upng.ac.pg
26 April	Port Moresby, PNG	Professor Lance Hill, UPNG Email: lhill@online.net.pg Dr. Osia Gideon Email: osia.gideon@upng.ac.pg Prof. Ray Kumar Email: ento_raykumar@yahoo.com
6 July	Suva, Fiji: USP	Dr. Kanayathu Koshy, Director, Pacific Centre for Environment and Sustainable Development Email: koshy_k@usp.ac.fj Mr. Marika Tuiwawa, Curator, South Pacific Regional Herbarium Email: tuiwawa_m@usp.ac.fj Mr. Johnson Seeto, Lecturer – Marine Science, Marine Science Programme, Email: seeto_j@usp.ac.fj

Letter of collaboration between CROP organisations

SPREP
Apia, Samoa

Date

To SPC and USP

My Dear Colleagues

Letter of Collaboration: PaciNet - Describing the biological diversity of Pacific Island countries

You will recall that BioNet International was established, following the 1992 Rio Earth Summit, to help developing countries improve taxonomic capabilities. It was realised that many countries do not have the expertise necessary to determine the biological diversity for which they have sovereignty, and thus cannot fulfill their obligations as signatories to the Convention of Biological Diversity. If sharing and use of biological resources is to take place, it has to be underpinned by accurate identification of species.

Since the development of BioNet, there have been two meetings within the region: one in 1996, the other in 2000, to discuss how countries might meet their biosystematic needs. These meetings resulted in the endorsement of a Technical Cooperation Network within BioNet, which became known as PaciNet. Subsequently, the Council of Regional Organisations in the Pacific (CROP), decided that SPREP should take the lead in establishing PaciNet, a decision endorsed by SPREP members in Guam 2000.

SPREP's approach to the establishment of PaciNet is to carry out a needs assessment of member countries, and to suggest the formation of an Interim Coordinating Committee comprising CROP members who wish to take part in this initiative and support its development.

There is now need for CROP members to agree formally to participate in this initiative, and become members of the Interim Coordinating Committee for the development of PaciNet. The Committee will finalise details of collaboration through consultation and negotiation at a later date, the results of which will form a schedule to this letter.

I hope you will join me in starting PaciNet by signing this letter in the place indicated and returning it to me as soon as possible. When this is done, I will convene the first meeting of the Committee with a view to discussing the scope of our work in this important and exciting endeavour.

Yours sincerely

Tamari'i Tutangata
Director

I agree to participate in the Interim Coordinating Committee, and support the development of PaciNet.

.....
Director-General
Secretariat of the Pacific Community

.....
Date

.....
Vice Chancellor
The University of the South Pacific

.....
Date

Royal Botanic Gardens, New South Wales, Australia

Asia-Pacific Biodiversity Initiative

Objectives The primary objective of this program is to discover, document and classify the plants in the vicinity of the Australian continent known as the Asia-Pacific region, and to work with people in these neighbouring regions to better manage and conserve natural resources to the mutual benefit of Australia and participating countries. This is being achieved by knowledge transfer and capacity building with other botanists, particularly from the Asia/Pacific region, and with active collaboration on plant systematics, historical biogeography, plant identification tools, botanical databases, plant conservation, ecology and plant diseases of their flora; by publishing this information in both printed and electronic formats; and by actively providing opportunities for botanists of the region to further develop relevant botanical skills.

Description: Why study Asia-Pacific flora? The Plant Diversity section at the Royal Botanic Gardens Sydney has a statutory responsibility to improve plant classification, as it pertains to Australian native plants, as set out in the Trust Act and the NSW Biodiversity Strategy. Yet the scientifically well-established biogeographical and evolutionary links between the Australian and Asia-Pacific floras means this is best achieved if the floras of neighbouring areas are considered together with that of Australia. The great majority of plant families that occur in Australia are also found in other floras in our region, and indeed, many species are also shared with our neighbours. East Sulawesi, Timor, Papua New Guinea, New Caledonia, Vanuatu, Fiji, and New Zealand are all Gondwanic areas and host close relatives of Australian taxa. Some examples include species of marine algae (seaweeds), mangroves, southern beeches (*Nothofagus*), Sapindaceae, Ericaceae and Myrtaceae. There has also been biotic exchange by dispersal in both directions: SE Asia to Australia and vice versa. Studies of Australian plants, whether the focus be taxonomic, biogeographic, or evolutionary should consider this extra-Australian material. Thus, the *Asia-Pacific Biodiversity Initiative* dovetails with the two other plant diversity research programs at the Gardens (Flora of Australia, and Origins and Evolution of the Australian Flora), completing a triangular research framework that seeks to understand Australia's plant diversity.

But the *Asia-Pacific Biodiversity Initiative* extends beyond its key role in understanding Australia's plant diversity, in that it sees the floras of our neighbouring regions as worthy of scientific research in their own right. Many of our neighbours are custodians of areas characterised as megadiverse and are thus of global importance, but the research, management and conservation of these areas is often prioritised differently. It is important that we engage with our neighbours to further the common cause of biodiversity conservation through knowledge transfer and capacity building. Active programs in biodiversity research are critical to these endeavours.

Role of the Gardens in the Asia-Pacific region. As part of the Gardens' national responsibilities under the *United Nations Convention on Biological Diversity*, the Plant Diversity section is working with neighbouring countries to improve knowledge, management and conservation of natural vegetation. Many Asia-Pacific countries have been identified as lacking the most fundamental biodiversity knowledge. The Gardens is one of the region's prominent botanical institutions and historically has been a provider of the tools and expertise necessary to address this gap. This expertise is not just restricted to terrestrial vascular plants, but also includes marine and freshwater algae, bryophytes and fungi. The international, external review (1999) of the Plant Sciences program highlighted the need for continued research in this region. This was largely due to the many international bodies (GBIF, IBOY, IUCN, etc.) who have pinpointed the South East Asian region as being a biodiverse area in critical need of basic biodiversity information.

Increasingly, specialist knowledge of taxonomy, systematics and biogeography of plants is becoming highly sought after for conservation and economic or commercial purposes, yet such expertise is becoming increasingly rare. The science of these disciplines is being taught in fewer tertiary institutions and universities, and the Plant Diversity section is rapidly becoming one of few groups that can identify, classify and biogeographically evaluate plants from the Asia-Pacific region.

One of the most important reasons for this expertise is that our knowledge is based on more than a million voucher (reference) specimens that are preserved, curated and thus verifiable indefinitely. The National Herbarium of New South Wales has the world's best reference collection of NSW plants, and probably the best for the Australian continent, but there are also many (plant) vouchers that have been collected from countries such as China, Korea, Vietnam, the Philippines, Indonesia, Papua New Guinea, Malaysia, Thailand, and Japan. These specimens have been collected for several reasons; through the Gardens-specific projects on biogeographic relationships and/or taxonomic and systematic groups; through invitational collaborative projects whereby Asia-Pacific countries have sought our help and expertise with a particular group; or have been donated to the Herbarium as recognition of our importance as a repository for scientific specimens in the Asia-Pacific region. Clearly, we are well-positioned, not only geographically but politically and historically to study the plant diversity of the Asia-Pacific region. Consequently, we have become a globally important repository of knowledge, data and collections that document the plant diversity of the region.

With other Australian herbaria, we are internationally acknowledged for developing electronic management and delivery tools for biodiversity data. The future export of those tools to Asia-Pacific nations will hopefully allow the creation of efficient biodiversity databases for the entire region. The Gardens would play a key role in such an initiative.

Future Directions. Continue, where appropriate, to include Asia-Pacific taxa in systematic and phylogenetic studies of Australian groups, contributing directly to the *Flora of Australia* and *Origins and Evolution* programs.

- Strengthen links with other Gardens' research groups, such as conservation, horticulture and plant pathology to facilitate knowledge exchange and to foster efficient research activities.
- Maintain an active involvement in the Asia-Pacific Region in major botanical groups in which we have expertise, including vascular plants, algae, bryophytes, and fungi.
- Continue involvement with California Sea Grant and International Seaweed Association regarding the Taxonomy of Economic Seaweeds of the Asia Pacific region.
- Continue to contribute to the *Flora Malesiana* series with studies on plants from Malaysia, Indonesia, the Philippines and Papua New Guinea.
- Maintain existing strong educational links with Indonesian institutions, and develop such links with other countries/institutions. On this front, utilise established links of Gardens' staff with leading Australian universities.
- Strengthen existing collaborative links with institutions and researchers in New Zealand and New Caledonia.
- Seek new mutually beneficial collaborative research opportunities wherever possible in the Asia-Pacific region. Examples and possibilities include:
 - Develop new collaborative projects with French – Australian Government grants for the Pacific region.
 - Host an international conference on Asia-Pacific biodiversity, possibly in conjunction with the Australian Museum. Researchers and potential collaborators from Asia-Pacific nations would be invited speakers. This could lead to the establishment of an informal Asia-Pacific biodiversity research network based on the successful Southern Connections (Gondwanan biogeography) model.
 - Develop new research initiatives integrating systematics and population genetics (e.g. with the Forestry Research Institute, Lae, PNG) to bring modern techniques to plant conservation workers in Asia-Pacific nations.
 - Conduct an expedition to East Timor, possibly in collaboration with the Australian Museum and foreign aid agencies. This exploratory expedition would aim to conduct surveys of plants from a range of terrestrial and aquatic environments and establish scientific links with the local people.

Current projects:

1) Systematics

Elizabeth Brown	Systematics of liverworts
Barbara Briggs	Evolution, biogeography and classification of Australasian Restionaceae and allied families
Carrick Chambers	Systematics of Blechnaceae
Carrick Chambers	Systematics of <i>Stenochlaena</i>
Barry Conn	Systematics of Urticaceae
Darren Crayn	Systematics and evolution of Ericaceae
Tim Entwisle	Biogeography of the red algal order Batrachospermales
Alistair Hay	Systematics of Malesian Araceae
Ken Hill	Molecular systematics, character evolution and classification of Cycadaceae

Ken Hill	Systematics of extra-Australian <i>Eucalyptus</i>
David Mabberley	Systematics of Malesian plants
Alan Millar	Marine algae of New Caledonia and associated archipelagos and reefs
Alan Millar	Marine biogeographic provinces of the south west Pacific
Christopher Quinn	Systematics of Australian and Pacific Astereae (Asteraceae)
Maurizio Rossetto and Darren Crayn	Systematics and conservation genetics of Sapindaceae
Brett Summerell	Systematics and management of pathogenic fungi
John Thompson	Evolution and taxonomy of bracken ferns
Peter Weston	Phylogeny and biogeography of the Proteaceae
Karen Wilson	Systematics of family Casuarinaceae (she-oaks)
Peter Wilson	Systematics of Myrtaceae

2) Horticulture and conservation

Cathy Offord	Germplasm conservation techniques, including seedbanking and tissue culture
Lorraine Perrins	Developing propagation protocols for <i>Amorphophallus titanum</i> – in collaboration with Kebun Raya (Indonesia)
Brett Summerell	Biology and control of soil borne diseases (Vietnam and Sulawesi)

Itinerary

Sunday 24 February	Suva – Nadi (by car)
Wednesday 27 February	Nadi – Suva (by car)
Wednesday 17 April	Suva – Nadi
Thursday 18 April	Nadi – Honiara
Sunday 21 April	Honiara – Port Moresby
Tuesday 23 April	Port Moresby – Lae
Wednesday 24 April	Lae – Port Moresby
Friday 26 April	Port Moresby – Brisbane – Nadi
Saturday 27 April	Nadi – Suva
Tuesday 7 May	Suva – Nadi
Tuesday 7 May	Nadi – Apia
Tuesday 14 May	Apia – Nadi
Wednesday 15 May	Nadi - Suva