
Environmental Vulnerability Index (EVI) Project:

Data Issues in the Pacific- A Discussion Paper



**Third Sub-regional Training Workshop on Environment
Statistics**

Port Vila, 30 April – 11 May, 2001

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Background

The issue of vulnerability has received growing international recognition as a major disadvantage facing sustainable development of small island developing states (SIDS), arising from an interplay of such factors as remoteness, geographical dispersion, vulnerability to natural disasters, high degree of economic openness, and small internal markets, limited natural resource endowment and fragile ecosystems.

Concern regarding the issue of vulnerability of Small Island Developing States (SIDS) was first brought to international attention during the Global Summit on Small Island States held in Barbados in 1994. At this conference SIDS, with the support of the United Nations, expressed the desire in the Barbados Programme of Action (BPoA) for the development of a vulnerability index that reflects the status of SIDS and integrates ecological fragility and economic vulnerability.

Although efforts to develop vulnerability indices for countries are not new, popular focus has been on economic and social vulnerabilities, these give only a limited understanding of the overall problem. The Environmental Vulnerability Index (EVI), a project being undertaken by SOPAC, looks specifically and for the first time into the issue of environmental vulnerability.

In 1998 with funding from the New Zealand government, a SOPAC EVI study team was put together to develop an environmental vulnerability index that provides a relatively quick and inexpensive way of characterising the vulnerability of natural systems (at the level of a region, state, province or island). The common basis on which the index is being developed will allow comparisons among countries and through time (Annex 1). Several important uses for the EVI have been identified and these include:

- Providing a comprehensive measure of environmental vulnerability of a country
- A predictive value for identifying vulnerability issues, types of hazards and approaches to stewardship of the environment of a state
- Identifying problem areas for external assistance to a country
- Providing performance indicator for donor funding
- Can be used as a measure of change in environmental vulnerability if repeated assessments are made (every 5 years)
- A tool for raising awareness of environmental vulnerability and the actions that increase or decrease it
- A tool for monitoring sustainable development
- Useful for 'State of the Environment Reports' by identifying the mechanisms that would tend to degrade the state of the environment
- Consideration by the United Nations Committee on Development Policy as a possible criterion for classification as a Least Developed Country

The SOPAC EVI is still in development and has been designed as a multi-level model to describe the vulnerability of the natural environment of countries to a range of natural and anthropogenic hazards. The index is being developed in such a way that it can be broken down into sub-indices that describe levels of risk and resilience and the effects of these influences on the health or integrity of a country's environment. Due to the variety of risks and complexities of ecosystem resilience and integrity, an indicator approach was taken to characterise them.

There are currently a total of 49 indicators in the EVI (Annex 2). These indicators encompass a wide range of environmental characteristics from risk to the environment both from natural and anthropogenic sources to resilience of the natural environment. The selection of indicators has been through a process of consultation of country and technical experts and is still subject to development and refinement, on the basis of inputs made by experts from different countries and regions.

The most vital criterion used in the choice of indicators has been that relating to the data and its availability. The availability of appropriate environmental vulnerability data is fundamental to both the development of the EVI and ultimately the final calculation of a country's EVI value. The success of the EVI as a measure of vulnerability is therefore wholly dependent on accessing and obtaining relevant country environmental data for calculation of EVI values.

In light of the key role that data plays in the development of the EVI, this discussion paper has been prepared to provide some insights into the issues that have been faced by the EVI team in the identification and collection of data for the EVI in the Pacific, some of the lessons learnt and the progress that has been made in furthering the development of the EVI.

EVI Approach to the Data Gathering Process _____

The EVI by its very essence attempts to summarise a wide variety of environmental vulnerability data for a country. Much of this environmental data is now only collected and compiled at the national level and reporting and publication of this data internationally is not as yet well-established as the regularised reporting of national economic data. Several international initiatives have been instituted to address this need for international publication of national environmental data and these include such initiatives as the Global Environment Outlook and various others including initiatives such as UNESCAP's Workshop on Environment Statistics.

The data needed for the EVI includes meteorological data, fisheries data, land area, natural hazard data, pollution data, vegetation loss data, mining data and so on. The very diverse and wide-ranging nature of these data means that their sources are widely dispersed and require some effort to identify, collect and compile the information. Some of the indicators require information that can only be provided by the authorities or by experts in the respective country. It has therefore been essential to have full government co-operation in the data gathering process to ensure success. Fortunately, this has been the case in the Pacific.

The two major issues that arose in the initial stages of trying to gather data for the EVI in the Pacific were the difficulty in creating an understanding of the data required to provide responses to EVI indicators, and the lack of capacity to compile the necessary data. Overcoming these initial problems necessitated the provision of in-country assistance to identify the major problems and offering solutions for rendering national environmental vulnerability data profile compilation possible.

The in-country approach to data gathering, while beneficial to the country and rewarding in terms of data collection, is not a sustainable method of data gathering in the long term and would be impossible to extend globally. It was therefore decided that a more simple and directed approach should be developed to assist the governments in the gathering of country data. This approach involved the use of detailed questionnaires for each of the EVI indicators (Annex 3).

Each indicator is presented with its detailed indicator question and is accompanied by an explanation of what the proxy indicator is trying to measure. All indicators require a response and guidance is provided towards the possible agency or agencies that might be sources for the information required. Each indicator is also complemented with a clear indication of what data is needed for a complete response to the indicator question as well as queries about its currency, completeness and quality.

Issues Relating to EVI Data Compilation

The ongoing process of data collection throughout the EVI project is aimed at providing an extensive base of information for the development and testing of a methodology for determining environmental vulnerability of countries. This process has focused primarily on SOPAC member countries, and through the involvement of Pacific countries, efforts have been made to compile environmental vulnerability profiles for each country.

This process of compiling country environmental vulnerability data has involved missions to countries by the EVI team to help build capacity within countries to identify, collect and collate appropriate environmental data. These will be useful in the development of the EVI , in environmental management as well as in decision-making.

During the process of data gathering by the EVI team in the Pacific, several important issues have arisen both during in-country missions and in the course of compiling data for completion of EVI indicator questionnaires. These have hindered compilation of country EVI data profiles. To summarise the EVI team's perceptions and experiences, the following broad issue areas have been identified:

- Identifying Sources of Data
- Accessibility
- Completeness
- Quality
- Capacity

Identifying Sources of Data

The identification of possible data sources and appropriate agencies to approach for the required data has highlighted several issues. Differences in the structure of various governments throughout the Pacific can lead to similar agencies having quite different responsibilities and holding different data sets. This has made the identification of appropriate sources and collection of information more complicated than expected in some countries.

There have been instances where the officers are unaware of the complete set of data held by the agency or do not recognise the relevance of data to the EVI.. This issue has arisen mainly due to a limited understanding of an indicator and its data requirements; high staff turnover ratio or just poor knowledge of the databases held by the agency. In-country missions and direct assistance to countries has helped to overcome some of these related issues.

Accessibility

Collection, analysis and storage of data are expensive exercises. As a result there is an increasing recognition of the importance and true value of data. This has had a significant impact on access to information. As most government agencies are asked to carry out data collection tasks on ever-reducing budgets, many are gradually looking to recover their costs through charges for both data and time taken by personnel to access and compile requested data.

Also in certain cases, a country may consider a particular data sensitive and thus limit access. Although most data required for EVI indicators would not be considered sensitive, there have been several instances where access to information has required special authorisation. The support of government for the EVI and the data gathering process has therefore been essential in overcoming these problems in the Pacific.

In several countries federal governments have delegated responsibility to state or municipal government for the collection and management of environmental data. This creates difficulties in accessing detailed information as only summarised reporting is provided to federal organisations.

Completeness

Despite international recognition of the value and importance of environmental data in decision-making, collection and the maintenance of environmental data sets in Pacific Island countries has not always been given priority. In many countries there is either no data collection, collection is ad-hoc or inconsistent. Where data is collected regularly, there is no proper handling or storage of the data sets leading to incomplete databases and loss of, or poor access to the information. Some countries are also dependent upon external support to maintain databases.

Quality

The issue of data quality is not peculiar to the Pacific. In the course of data gathering, several inconsistencies between local data and international data sets have arisen. The use of different standards or methods of data collection or the use of general assessments based on small-sample-biased data may have contributed to these differences. There is also the potential of inaccurate equipment, lack of proper training in measurement procedures, lack of quality control procedures and many other reasons which could all lead to inaccuracies in data reported.

Capacity

The issue of the limited capacity is a common one throughout SIDS. In Pacific countries this has been one of the main difficulties in the facilitation of EVI data gathering. The lack of capacity is two-fold in that it involves both institutional as well as personnel capacity problems.

In the Pacific, data gathering exercises like the EVI have placed an added burden on existing institutions' responsibilities to provide data and information. With limited resources and few trained personnel this task can often be an impossible expectation. The only way to assist these countries facilitate their country collection of environmental data has been to provide in-country input and assistance. This is extremely costly and it is imperative that alternative approaches are found to provide the assistance needed.

Another issue that has arisen is the difficulties created by an inadequate understanding by personnel of the specific data and information requirements needed for a response to indicator questions. This is due in part to an inadequate understanding of the purpose of the EVI, its mechanics but mainly the inadequate training of personnel in the identification, collection and analysis of data. The EVI in-country missions have made some progress in addressing this issue by strengthening capacity to collate environmental vulnerability information.

EVI Data Profile Progress

The issues summarised above are but some of the various obstacles to the compilation of environmental data in Pacific member countries for use in applications such as the environmental vulnerability index. Progress with the compilation of environmental vulnerability data profiles has been satisfactory but coverage is not yet complete (Figure 1).

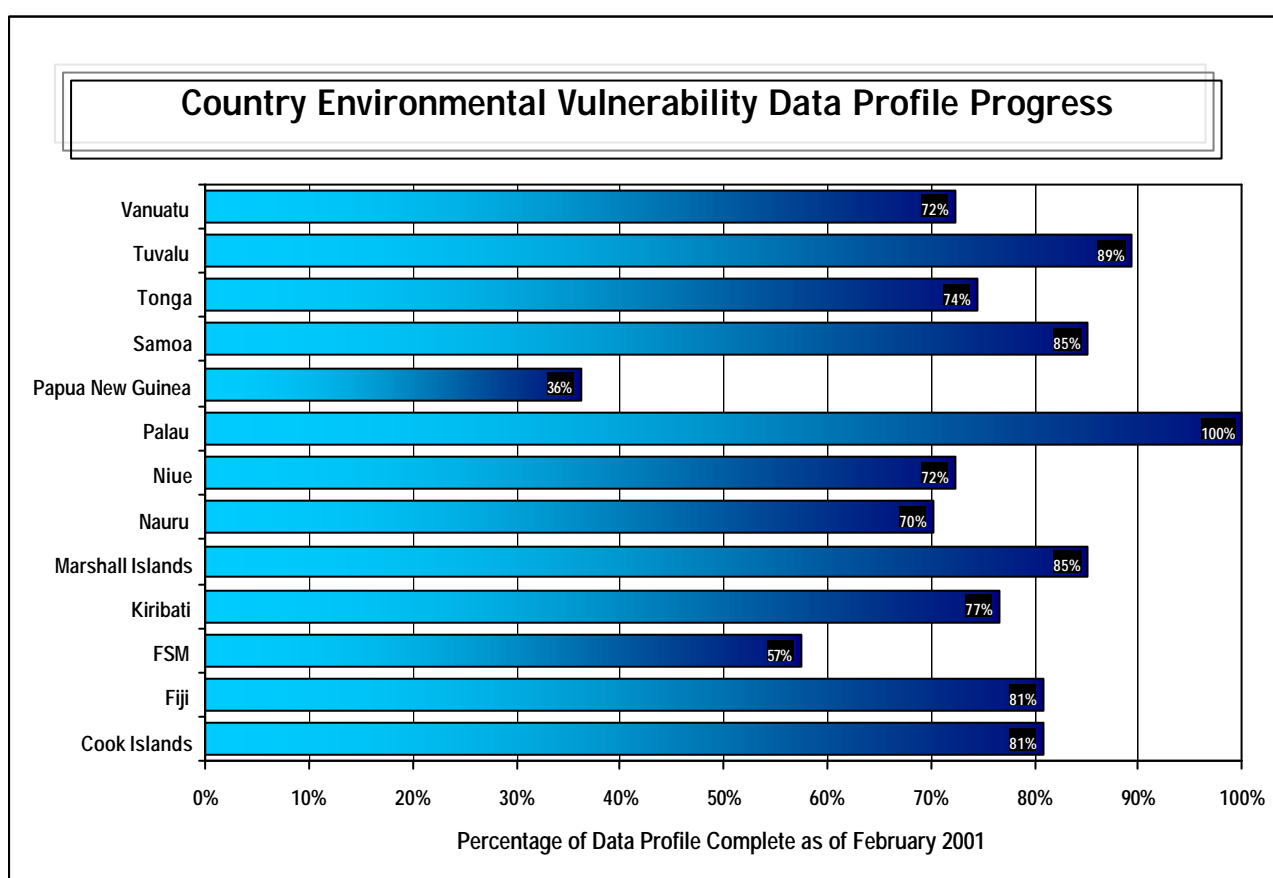
At a meeting of experts on the EVI convened in 1999 in Pacific Harbour, Fiji¹ it was recommended that a minimum of 80% of environmental vulnerability data be compiled before an EVI value is calculated for a country. Pacific countries, for which EVI data profiles fulfil this data requirement, include: Cook Islands, Fiji, Marshall Islands, Palau, Samoa and Tuvalu. Other Pacific countries whose EVI data profiles have been initiated and are as yet incomplete include: Federated States of Micronesia, Kiribati, Nauru, Niue, Papua New Guinea, Tonga and Vanuatu. Follow up efforts are still in progress to ensure compilation and completion of all country environmental vulnerability data profiles. The significantly low data

¹ SOPAC Technical Report 299

profile progress for Papua New Guinea is due to fact that the EVI mission to the country has only recently been undertaken (11 – 16 February 2001).

It is also important to note here that the EVI has been built as a flexible tool that is able to cope both with raw data as well as educated guesses from experienced professionals. Therefore, although some countries are currently indicated as satisfying the minimum 80% data requirements, the data profile may still be largely dependent upon best guess or data from questionable sources, thus greater efforts may still be required to establish baseline data for a more accurate assessment of a country’s environmental vulnerability.

Figure 1: Summary of Country Environmental Vulnerability Data Profile Compilation



Delays in successful completion of the various countries’ environmental vulnerability data profiles have been due to variety of issues ranging from no responses to no available data as well as due to the several other issues already discussed. Figure 2 provides a summary of the environmental data that has been successfully compiled for the various EVI indicators for each country.

Figure 2: Summary Table of Issues for Pacific Island Countries with Incomplete EVI Data Profiles (See also Annex 2 for explanation of Indicator Numbers)

Country	# Indicators Not Answered	% Indicators Not Answered	No Data	Data Not Provided
<i>Cook Is.</i>	9	19%	24, 28, 36	1, 2, 9, 15, 22, 42
<i>Fiji</i>	9	19%	14, 15, 24, 36	1, 9, 39, 46
<i>FSM</i>	20	43%	1, 2, 36, 45	7, 8, 9, 16, 19, 20, 21, 22, 23, 24, 28, 37, 38, 39, 40, 43
<i>Kiribati</i>	11	23%	2, 18, 36	1, 7, 8, 9, 22, 28, 42, 43,
<i>Marshall Is.</i>	7	15%		17, 18, 19, 28, 31, 36, 43
<i>Nauru</i>	14	30%	20, 21, 31, 36	1, 2, 9, 17, 18, 22, 27-29, 41
<i>Niue</i>	13	28%		1, 2, 7, 8, 9, 17, 16, 18, 19, 21, 33, 36, 40,
<i>Palau</i>	0	-	-	-
<i>PNG</i>	30	64%	-	1-6, 11, 12, 14, 15, 18, 19, 20, 21, 23, 24, 25, 26, 27, 31, 33, 34, 35, 36, 37, 38, 39, 40, 43, 44, 45, 46
<i>Samoa</i>	7	15%	1, 2, 17, 30, 36, 39	32
<i>Tonga</i>	12	26%	36	1, 8, 14, 15, 21, 22, 23, 28, 30, 40, 43
<i>Tuvalu</i>	5	11%	2, 36, 39	1, 8
<i>Vanuatu</i>	13	28%	14, 15, 28, 36	1, 2, 3, 4, 5, 6, 17, 18

[NB: Status of Country EVI Data Profiles as at 28 February 2001]

As shown above, examples of environmental vulnerability data that are commonly unavailable in Pacific Island countries include sea surface temperature, high winds, SO₂ concentration, stocks of fisheries over-fished, number of new fisheries stocks or expanded fisheries efforts, removal of natural vegetation, land area up to 10 metres above sea-level and potential for species introductions.

To address the need to complete all participating country environmental vulnerability data profiles, the EVI team will need to address the issues summarised above. Further efforts by the EVI team will be necessary to elicit responses from country representatives to collect data where available or more importantly identify where data gaps exist. The identification of data gaps or inadequacies in current data are important benefits of the EVI development process and although it is beyond the scope of this exercise to address all these aspects of data problems in countries, the importance of environmental information cannot be understated.

The fundamental basis of the EVI is data and to get an accurate measure of a country's vulnerability of its environment requires good quality, complete and current environmental data.

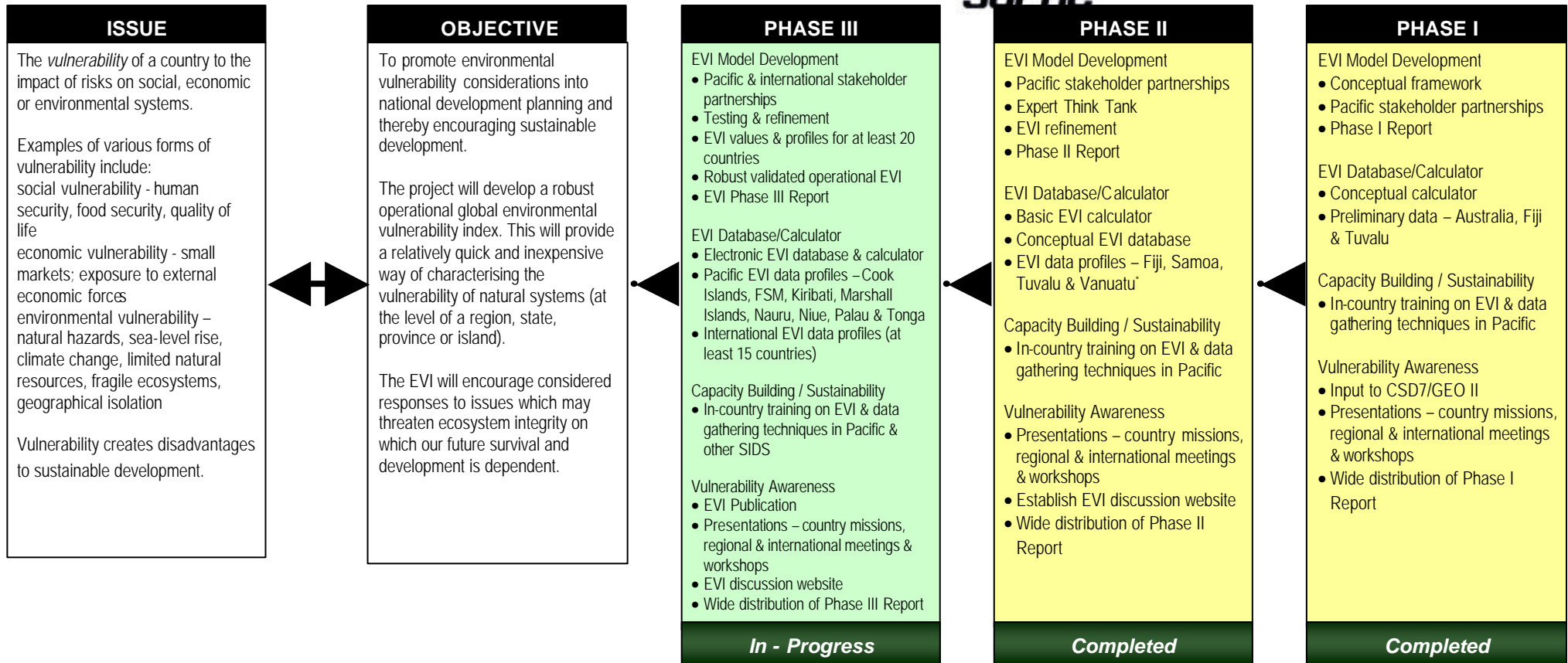
Future Directions

The development of an approach to data gathering that is simple and can be easily adopted by countries both large and small is critical to the overall process of collecting environmental vulnerability data for the EVI. SOPAC has developed an EVI questionnaire approach to facilitate country environmental data gathering. It is undergoing improvement and refinement to ensure that users of the EVI are able to get a better understanding of the purpose of the EVI, the data requirements and answers to frequently asked questions to the questionnaires.

A handbook will prove useful as a possible way to provide a detailed background to the EVI, its mechanics and specific instructions and assistance in how to identify and gather the required information so as to reduce the need for continued assistance and support in the data gathering process.

ANNEX 1: EVI Project Summary

Project Title	Environmental Vulnerability Index (EVI) Study
Project Type	Development of a global environmental vulnerability index
Lead Implementing Agency	South Pacific Applied Geoscience Commission [SOPAC]
Key Stakeholders	<p>SOPAC Pacific member and non-member countries</p> <ul style="list-style-type: none"> • Australia • Cook Islands • Federated States of Micronesia • Fiji • French Polynesia • Guam • Kiribati • Marshall Islands • Nauru • New Caledonia • New Zealand • Niue • Papua New Guinea • Palau • Samoa • Solomon Islands • Tonga • Tuvalu • Vanuatu <p>Small Island Developing States (SIDS) – Barbados, Jamaica, Maldives, Malta, St Lucia, Mauritius, Trinidad & Tobago</p> <p>Supporting Countries - Ireland, Italy, Norway</p>
Project Goal	To develop a robust operational global environmental vulnerability index which provides a relatively quick and inexpensive way of characterising the vulnerability of natural systems (at the level of a region, state, province or island). The common basis on which the index is developed will therefore allow comparisons among countries and through time
Project Purpose	To enhance national capacity, technical skills and knowledge in environmental vulnerability and management
Project Benefits	<ul style="list-style-type: none"> • Development of a robust internationally recognised and acceptable EVI. • Promotion tool for sustainable development through identification of key environmental vulnerability issues and examining the relative vulnerabilities of states. • Empower countries through strengthened capacity across all project components.
Project Components	<ol style="list-style-type: none"> 1. Refinement & Comprehensive Testing of the EVI 2. Pacific Country EVI Capacity -Building 3. Sustainable Data Collection Process for the EVI (through in-country and international agencies) 4. Computer EVI Interface 5. EVI Validation Exercise
Project Duration	The project is expected to have a duration of 2 years
Location	The project office will be located at the SOPAC Secretariat in Suva. Project staff will be required to travel within the Region and elsewhere as necessary, for the duration of the project
Donor Inputs	Donor inputs are primarily directed toward funding project activities, which include the resources required to carry out project activities, enhance national capacity within participating countries and, costs for two full-time equivalent positions to coordinate and implement key project activities
SOPAC Inputs	The Secretariat will provide: a framework for administrative, financial and other reporting for the project; accommodation and access to facilities and services such as logistics support, library and publications, computer networks and databases; and representation to the Pacific Island Forum and CROP meetings
Achievements to Date	Sufficient data for a valid EVI (minimum 80% data requirements) have been collected for 6 out of 13 countries included so far. Palau is a model example, having provided 100% of its EVI data, showing that the EVI is achievable



Project Summary

Environmental Vulnerability Index (EVI) Study

PROJECT BENEFITS	
<p>EVI Tool</p> <ul style="list-style-type: none"> • Operational globally robust EVI which provides a comprehensive measure of environmental vulnerability of a country • Established Pacific & International partnerships in EVI development • Can be used as a measure of change in environmental vulnerability if repeated assessments are made (every 5 years) • Tool for monitoring sustainable development • Strengthen ability to prioritise environmental vulnerability issues of concern; useful for environmental management and planning • Useful for state of environment reporting by identifying mechanisms that would tend to degrade the environment 	<p>Capacity Building/Sustainability</p> <ul style="list-style-type: none"> • Strengthened country capacity in compiling environmental data • Improved data collection & handling • Improved understanding of the EVI, its uses, mechanics and application as a management tool <p>Vulnerability Awareness</p> <ul style="list-style-type: none"> • Increased awareness/debate on the importance of environmental vulnerability and implications for sustainable development • Raise awareness about the actions that increase or decrease environmental vulnerability • Increased awareness of the important development work being carried out by SOPAC

ANNEX 2: Summary Table of EVI Indicators

Each indicator is accompanied by a short form key name, detailed definition, list of key words that describe the main factors for which it is a proxy. Cat = Categorisation where: REI = Risk exposure sub-index; IRI = Intrinsic resilience sub-index; EDI = Environmental degradation sub-index; Met = Meteorological; G = Geological; CC = Intrinsic country characteristics; B = biological and A = Anthropogenic indicators.

#	Cat	Key name	Indicator text	Main proxy factors
1	REI Met	Sea Surface Temperature	Greatest average annual deviation in Sea Surface Temperatures (SST) in the last 5 years as compared with the long term mean (30 years)	Coral bleaching; fisheries; currents; eddies; ENSO; cyclones
2	REI Met	High winds	Number of days over the last five years during which the maximum recorded wind speed (3 sec wind gusts) is greater than 20% higher than the average maximum wind speed for that month. (Use 30-year average for each month as reference points and data to be accumulated over all reference climate stations and be divided by the number of stations)	Cyclones; tornadoes; storms; erosion
3	REI Met	Dry periods	Number of months over the last five years during which rainfall is greater than 20% lower than the 30 year average for that month (over all reference climate stations / number of climate stations)	Droughts; dry spells; water resources
4	REI Met	Wet periods	Number of months over the last five years during which rainfall was greater than 20% higher than the 30 year average for that month (over all reference stations / number of climate stations)	Floods; wet spells; coral reefs; pollution; erosion
5	REI Met	Heat waves	Number of days over the last five years in which the maximum temperature was greater than 5°C higher than the mean monthly maximum (reference mean is from the 30 year average) (over all reference stations/ number of climate stations)	Heat waves; desertification; water resources; temperature stress
6	REI Met	Cold snaps	Number of days over the last five years in which the minimum temperature was greater than 5°C lower than the mean monthly minimum (reference mean from the 30 year average) (over all reference stations/ number of climate stations)	Cold snaps; temperature stress
7	REI G	Volcanic eruptions	Number of volcanoes with potential for eruption greater than or equal to Volcanic Explosive Index of 4 (VEI 4) within 100km of country land boundary per area of land	Eruptions; landslides; geysers; gas; fires; ash; dust; marine kills
8	REI G	Earthquakes	Cumulative earthquake energy within 100km of country land boundaries per land area with Local Magnitude (ML) greater than or equal to six (>= 6.0) and less than or equal to depth of fifteen kilometres (<= 15km) over 5 years	Earthquakes; landslides
9	REI G	Tsunamis	Number of tsunamis or storms surges with run up greater than 2 metres above Mean High Water Spring tide (MHWS) per 100km coastline since 1900	Tidal waves; erosion; habitat disturbance and organism kills
10	IRI CC	Land area	Total land area (km ²)	Richness of habitat types; refugia; species redundancy and richness
11	IRI CC	Fragmentation or "islandness"	Ratio of length of shoreline or land border to total land area	Fragmentation; erosion; exposure at borders or coasts
12	IRI CC	Isolation	Distance to nearest continent within 10 degrees latitude (km)	Proximity to refugia; recolonisation; biodiversity
13	IRI CC	Vertical relief	Altitude range (highest point subtract the lowest point in country)	Biodiversity of habitats and species
14	IRI CC	Lowlands	Percent of land area less than 10 metres above sea level	Floods, areas of accumulation of pollution, sensitive habitats
15	IRI CC	Coastal vulnerability	Percent of land area below 10 metres in elevation within 2 kilometres to coast composed of unconsolidated sediments (excluding coral reefs)	Storm surges, cyclones, erosion by waves, rivers, storms
16	IRI CC	Endemic species	Number of known endemic species per square kilometre land area	Biodiversity; unique species
17	REI B	Pathogens and plagues	Number of reported (and verified) organism outbreaks (pathogens, blooms, plaques etc) over the last five years per land area	Ecosystem stress; eutrophication; pollution; introductions; disturbance
18	REI B	Potential for introductions	Total tonnage of freight imported per year per square kilometre of land area	Potential risk of introductions, oil, pollution
19	EDI B	Introductions	Number of introduced species per square kilometre land area (IUCN Definitions)	Past introductions; biodiversity
20	EDI B	Endangered species	Number of endangered and threatened species per square kilometre land area (IUCN Definitions)	Biodiversity; keystone species
21	EDI B	Extinctions	Number of species known to have become extinct since 1900 per square kilometre land area (IUCN Definitions)	Biodiversity; ecosystem structure and function
22	EDI B	Natural vegetation	Percentage of natural and regrowth vegetation remaining (e.g. forests, mangroves, prairies, saltmarshes, tundra, desert, savannah)	Ecological redundancy; biodiversity; ecosystem services and goods
23	EDI B	Intensive farming	Tonnage of intensively farmed animal products (includes aquaculture, pigs, chickens, cattle, etc.) produced per year per square kilometre land area	Pollution; eutrophication
24	EDI B	Fisheries	Percent of fisheries stocks over-fished (FFA/FAO definitions)	Resource depletion

25	EDI A	Coastal settlements	Density of people living in coastal settlements (i.e. with a city centre within 100km of the coast)	Stress on coastal ecosystems, pollution, eutrophication, resource depletion, habitat degradation
26	REI A	Human population density	Total human population density (number per km ² land area)	All incidental damage caused by human activities
27	REI A	Human population growth rate	Annual human population growth rate (average over last five years)	Potential for future incidental damage caused by human activities
28	REI A	Rate of loss of natural vegetation	Net percentage of land area changed by removal of natural vegetation over the last five years	Potential for future loss of natural vegetation, habitat loss
29	REI A	Tourists	Annual number of international tourists multiplied by the average length of stay in the country over one year per land area (over the last five years)	Additional load of all human impacts not reported in population statistics
30	REI A	Wastewaters	Litres of untreated industrial and domestic wastewater discharged per day per square kilometre of land area	Eutrophication; water pollution
31	REI A	Production of hazardous and municipal wastes	Total net tonnage of generated and imported toxic, hazardous and municipal wastes per square kilometre land area average last 10 years	Pollution; habitat destruction; groundwater damage
32	REI A	Waste treatment	Mean percent of hazardous, toxic and municipal waste "effectively" managed or treated per year	Proportion of wastes rendered less harmful
33	REI A	Oil spills	Number of spills of oil and hazardous substances greater than 1000 litres during the last five years on land, in rivers or within territorial waters per square kilometre of land area	Pollution
34	REI A	Toxic industries	Number of nuclear, chemical and other major industrial facilities (e.g. oil rigs) that could cause significant environmental damage per square kilometre land area	Pollution; acid rain
35	REI A	Vehicle Pollution	Number of vehicles per square kilometre of land area	Habitat damage; habitat fragmentation; pollution; hazardous wastes
36	REI A	SO ₂ concentration	Maximum 24 hour SO ₂ concentration (microgram/m ³) (average over last five years)	Pollution; attenuation rates; acid rain
37	REI A	Fertilisers	Tonnes of nitrogen (N), phosphorus (P) and potassium (K) fertilisers used per year per square kilometre of agricultural land (average last five years)	Eutrophication; pollution; soil damage; loss of arable land
38	REI A	Pesticides	Tonnes of pesticides used per square kilometre of agricultural land (average last five years)	Pollution; soil damage; damage to reproductive systems of organisms
39	REI A	Fisheries stocks	Number of new fisheries stocks or expanded fisheries efforts (greater than 20% increase in catches) added to the country over the last five years (within territory)	Rate of resource depletion
40	EDI A	Land degradation	Percent of land area degraded	Rate of habitat loss
41	EDI A	Water resources	Mean percentage of water usage per year met from renewable and non-declining sources	Sustainable use of surface free water and groundwater; damage (including salinisation) of functionally non-renewable groundwater, rivers, lakes etc; habitat damage
42	REI A	Sub-surface mining	Tonnes of mining material (ore + tailings) extracted per square kilometre per land area per year average last five years	Pollution; habitat disturbance; heavy industry
43	EDI A	Surface mining	Percentage of land, rivers and coastal zone affected by mining and quarrying	Habitat disturbance
44	EDI A	Terrestrial reserves	Percent of terrestrial zone set aside as reserves	Increases resilience, pollution attenuation, limits loss of biodiversity
45	EDI A	Marine Reserves	Percent of marine zone set aside as reserves (mean high tide to continent shelf)	Increases resilience, pollution attenuation, limits loss of biodiversity
46	EDI A	War / civil strife	Number of war or civil strife years over the last 50 years within the territory	Habitat disturbance; pollution; habitat degradation
47	EDI A	Legislation (discarded)	Environmentally related legislation with regulations	Controls; management of goods and services
48*	EDI A	Sanitation	Percentage of population with access to safe sanitation	Eutrophication, groundwater pollution
49*	EDI A	Genetically modified organisms	Area of land engaged in the agriculture or field testing of any genetically modified organisms	Genetic diversity, genetic pollution

*New additional EVI indicators

ANNEX 3: Example of EVI Indicator Questionnaire Form

EVI Indicator 1

Greatest average annual deviation in Sea Surface Temperatures (SST) in the last 5 years as compared with the long term mean (30 years)

Indicator Key Name: Sea Surface Temperature
 Main Proxy Factors: Coral bleaching, fisheries, currents, cyclones, eddies, ENSO, cyclones
 Notes: Changes in sea surface temperatures impact on wind patterns, corals causing bleaching and fisheries. Deviations in SST can cause severe environmental stress. This indicator mainly applies to countries with coastlines.
 Possible data sources: Meteorological office, NOAA
 Information required: Information Colour map of deviations from 30 year mean in SST for entire EEZ for last 5 years, greatest annual deviation in SST, five years data

Please fill in all the following boxes and attach copies of the data for reference.

Long term 30 year SST mean

Year

2000
1999
1998
1997
1996

Greatest annual average deviation in SST

* If your data are from different years, please indicate which years

Notes or comments:

EVI Indicator 1 - Characteristics / Quality of the data

1. Currency – Please tick one

- 1. Most recent data are older than 1995
- 2. Most recent data are from between 1995 and 1999
- 3. Most recent data are <2 years old

2. Completeness – Please tick one in each column

- 1. Data are not available for this indicator for the country
 - 1a. Capacity is limited and/or there is dependence on external sources
 - 1b. Capacity exists, but collection and collation does not occur
 - 1c. Other – please describe _____
- 2. Partial data are available for some regions and/or some years
- 3. Data are complete and relevant for the time frame required

3. Quality – Please tick one

- 1. Data are based on best guesses
- 2. Data are based on incomplete information and/or are completed through statistical projections (interpolation or extrapolation)
- 3. Data are well supported by publications, records or other documentation and are considered accurate.

Sources

Source of Data (Dept / Contact):
Reference of any publications used:
Title, name and contact details (Phone / Fax / E-mail) of person filling this form:
Department / Position:
Signature and Stamp

REFERENCES: Complete List of EVI Publications

Briguglio L and Kaly U. 1999. *Extending SOPAC's Environmental Vulnerability Index to the IMA and Caribbean Regions*. Background Paper for UNEP Meeting of Experts on the Environmental Vulnerability Index, Malta, 1999.

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