## 7. How are countries ranked?

The EVI ranks countries into categories to provide information on overall environmental vulnerability. The ranking is as follows: Extremely vulnerable (365+); Highly vulnerable (315-365); Vulnerable (265-315); At risk (215-265); and Resilient (<215). Groups of countries that fall into these categories are presented in alphabetical order. The purpose of this ranking is to help identify countries with overall high or low vulnerability, without focusing on the smaller (and non-instructive) differences among them. The overall EVI score is calculated by averaging all values obtained for individual indicators and multiplying by 100 to remove the decimal point.

## 8. Is there a problem of non-independence of data in the EVI?

No. Statistically, there is no requirement that the data for indicators are independent of one another. The requirement of independence of data is associated with statistical significance tests which rely on underlying assumptions of how data are distributed and how they are dispersed. The EVI uses only descriptive statistics that do not imply or require these assumptions and are never used to carry out significance tests. In terms of logic, the EVI is being used to describe and summarise the vulnerability of the natural environment. This, by its very nature, is a complex interactive system in which we fully expect to see various levels of interdependence of its parts. The EVI's indicators have been selected to provide information and to identify issues. The relationship among indicators is the same across countries and repeated evaluations and is part of how the EVI tool is defined.

## 9. What happens when there are no data for an indicator?

Indicators for which no data have been obtained (for now) are given a "ND" (no data) value. This implies, correctly, that no information on vulnerability can be obtained for that indicator at that time. This means that when the sub-indices and overall EVI are calculated such indicators are excluded from the calculation and do not contribute to the overall mean. A similar argument applies to several indicators that can score "NA" (not applicable, and only applies to land-locked countries for which an indicator can never be evaluated). The EVI has been built to allow for some indicators to be treated in these ways – this is the purpose of the 80% data requirements for a valid EVI.

## 10. How accurate are the data, and how does accuracy relate to an overall EVI score?

The EVI largely uses public data sources that have been selected because the organisations collecting and storing the data are recognised data providers and have applied quality control mechanisms (e.g. FAO, WRI, WCMC, NOAA and many others). Some data are also collected from official in-country sources, particularly if they are not available from global datasets. The accuracy of the EVI, as for all national and international data-related processes and agreements (e.g. census, ESI, SOE, IPCC, CDB), depends on the accuracy of the data obtained from both of these sources. Improving the availability and accuracy of data should be an on-going process, and is needed in a greater context than just the EVI. It is the future intention of the EVI Project to examine ways of formalising data collection and checking, and to create a 2-way dialogue between countries and international data providers. This will allow countries to correct and update their data as required, while allowing for independent organisations to provide the quality control needed for international processes.

## 11. Is it possible to use a mix of in-country and international data?

Yes. The EVI could be evaluated wholly from either source. The benefit of using international, quality-controlled data will be to provide transparency and known quality for international processes, and data that have been collected in the same way and on the same scales for each country.

## 12. Is it possible to add more indices and sub-indices?

Yes. Special indices that might be needed for particular purposes may be added at any time. It is much more difficult to add new indicators because they need to be investigated to create and set the EVI scale (also not impossible). Different combinations of existing indicators can be calculated by any user simply by averaging the EVI scores of relevant indicators needed for the issue they are investigating.

# Environmental Vulnerability Index (EVI)

# Frequently Asked Questions (FAQ)

SOPAC

# Frequently Asked Questions (FAQ)

## 1. What are vulnerability and resilience?

Healthy, productive and protective environments, social systems and economies are the three pillars or foundations of sustainable development and human welfare. All of these can, however, be damaged, overloaded or prevented from meeting our needs. Natural and human events and processes such as cyclones, droughts, pollution, over-extraction of resources, civil unrest, globalisation and trade can affect the abilities of these three systems to support us. The risk and extent that our environments, social systems and economies can be damaged is termed vulnerability, and their ability to resist damage and/or recover quickly is called resilience. Vulnerability and resilience are really two sides of the same coin, so that we would say that an environment which is highly vulnerable has low resilience.
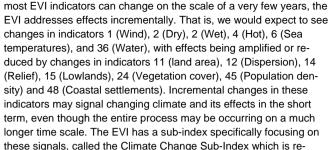
## 2. Why focus on vulnerability and resilience?

If our environmental, social and economic systems are subject to damage through disasters and good or bad management by humans, then planning for and implementing sustainable development strategies will require a way of identifying issues of vulnerability. This is especially important for us to be able to and optimise trade-offs between the three pillars of sustainability. It would be impossible to work towards good quality of life and growth for countries under a sustainable development model if no account were made of the damage that can occur from internal and outside influences. Vulnerability is a new way of looking at an age-old problem. Instead of focusing just on what has been going wrong in the past and the impacts of hazards, vulnerability gives us the opportunity to focus on getting things right for the future. As a future-focused approach, vulnerability is a way of identifying and preserving strengths (resilience) and strategically improving weaknesses. With this kind of information at hand we can look forward to a future in which we could identify optimum development pathways and outcomes, without unwittingly compromising the environment and other systems that support us.

## 3. Are climate change and sea-level rise included?

Climate change and sea-level rise are considered in the EVI, but are only a part of it. Because the effects of climate change are expected on a scale of up to 100 years, and most EVI indicators can change on the scale of a very few years, the EVI addresses effects incrementally. That is, we would expect to see changes in indicators 1 (Wind), 2 (Dry), 2 (Wet), 4 (Hot), 6 (Sea temperatures), and 36 (Water), with effects being amplified or reduced by changes in indicators 11 (land area), 12 (Dispersion), 14 (Relief), 15 (Lowlands), 24 (Vegetation cover), 45 (Population density) and 48 (Coastal settlements). Incremental changes in these indicators may signal changing climate and its effects in the short term, even though the entire process may be occurring on a much longer time scale. The EVI has a sub-index specifically focusing on these signals, called the Climate Change Sub-Index which is reported with the overall EVI score and other policy-relevant sub-indices.
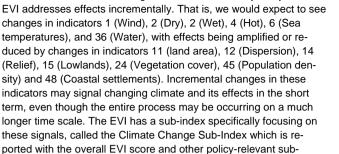
## 4. Does the EVI focus on long-term environmental change?

The EVI emphasises short-term environmental risks, rather than longer term trends. It is an 'instantaneous' expression of vulnerability, describing the risks to and resilience of the environment of a country now, rather than attempting to model or predict impacts expected in the future (it is not a state of the environment statement nor an impact assessment). This approach is in keeping with an overall aim to provide information that will allow governments, funding agencies and others to adaptively respond to the vulnerabilities of countries as they stand at any point in time. The recommended 5 year re-evaluation period serves several functions: (i) it scopes vulnerability over the next few years based on what the environmental systems have 'experienced' over the past 5 years. That is, the conditions over the last 5 years are those most likely to affect short term trends in environmental vulnerability and how ecosystems may respond to hazards – more than those that occurred in the years preceding them. This does not imply that that there are no effects of older events; (ii) with repeated evaluations, the EVI will pick up on large events like cyclones as they occur. The outcome of this will be an understanding that for a while after the event, vulnerability to future hazards, related or not, is elevated; (iii) is suitable for detecting temperature, wind and rainfall shifts due to climate change. These may be seen as measurable deviations from the 30 year moving average; and (iv) allows improvements to be measured quickly for indicators that can be directly influenced by human action.

## 5. What is considered natural?

Risks to the natural environment include any events or processes that can cause damage to ecosystems and lower their resistance to future damage. These include natural and human events and processes, such as the weather and pollution. Some researchers have identified natural hazards as those in which environmental conditions depart from 'normal' to such an extent that the systems of interest (human or environmental) are adversely affected. Others have argued that unless we identify certain natural events as being altered by humans (e.g. human-induced sealevel rise resulting from the greenhouse effect), all natural events must be 'normal' and should not be included in the EVI. Both of these views imply that natural hazards operate more-or-less in isolation. Given that the world environment is changing at an unprecedented rate, with most of the changes being mediated by humans, we consider the approach of including natural hazards in the EVI necessary. Natural and human hazards affect the environment in interactive ways. For example, the effects of cyclones on natural communities are worse where marine and shoreline ecosystems have been degraded by pollution and over-harvesting. High levels of natural disturbance can drive populations of organisms down to low levels or make their populations more variable. This in turn, makes the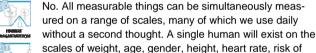 risk of local extinction from other hazards more likely. The frequency and intensity of natural disturbances can not be separated from the effects of human disturbances and both need to be incorporated in the EVI.

## 6. Does the EVI compare apples and oranges?

No. All measurable things can be simultaneously measured on a range of scales, many of which we use daily without a second thought. A single human will exist on the scales of weight, age, gender, height, heart rate, risk of cancer etc. Note that the last of these is a vulnerability measure. All of these scales are valid and exist at the same time. Consider the volcano depicted below, shown simultaneously on 5 separate scales. The last scale shown is the EVI scale which shows its potential to damage the environment that surrounds it. All of the EVI's indicators are expressed on this EVI scale and thereby have the same units and can be easily combined.

| | |
|---|---|
| 0 — 34 | Number |
| 0 — 8 | VEI |
| 0 — 200 | Lava (km3) |
| 0 — 4000 | Height (m) |
| 1 — 7 | Damage to the environment (EVI) |