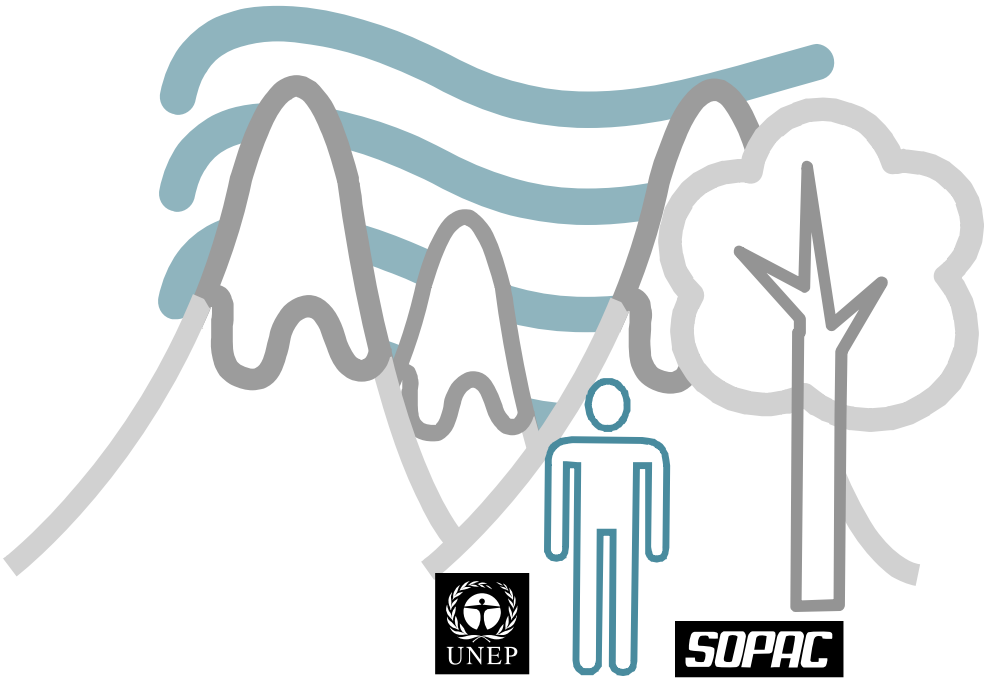
Environmental
Vulnerability Index

Report on the Environmental Vulnerability Index (EVI) Think Tank II,

4 – 6 October 2004, Suva, Fiji



Report on the Environmental Vulnerability Index (EVI) Think Tank II, 4 – 6 October 2004, Suva, Fiji

Dr Jackie Alder[1], Dr Arthur Dahl[2], Dr Ursula Kaly[3],
Jonathan Mitchell[3], Ned Norton[4], Craig Pratt[3], Dr Michael Witter[5]

October 2004

SOPAC Technical Report 377

This project was supported by the United Nations Environment Programme, Ireland, Italy, New Zealand, Norway and various organisations

[1] The University of British Columbia, Canada
[2] Global Indicators Expert, Switzerland
[3] South Pacific Applied Geoscience Commission (SOPAC), Fiji
[4] National Institute of Water and Atmospheric Research (NIWA), New Zealand
[5] University of the West Indies, Jamaica

Cataloguing-in-publication data (authors in alphabetical order):

Alder, J., Dahl, A., Kaly, U., Mitchell, J., Norton, N., Pratt, C. and Witter, M., 2004. Report on the Environmental Vulnerability Index (EVI) Think Tank II, 4 – 6 October 2004, Suva, Fiji. SOPAC Technical Report 377. pp7; 1 Appendix.

1. Vulnerability index – environment

Contents

Introduction

The Environmental Vulnerability Index (EVI) is an indicators-based method which has been developed in partnership by SOPAC, UNEP, Ireland, Italy, New Zealand, and Norway in collaboration with the Alliance of Small Island Developing States (AOSIS), Small Island Developing States (SIDS) institutions and experts. The EVI was developed in response to a call made in the 1994 Barbados Programme of Action for the Sustainable Development of Small Island Developing States to prepare a composite vulnerability index that incorporated both economic and ecological concerns.

The EVI concentrates on measuring ecological vulnerability and seeks to support other vulnerability indices initiatives, including the economic vulnerability index and a soon-to-be-developed social vulnerability index, as part of the global move towards determining how development could be achieved sustainably.

The EVI model can be used to quantify the vulnerability of the natural environment to damage from natural and anthropogenic hazards at national scales. It is the first global attempt to develop such an ecological index. The EVI will support decision-makers by providing a pragmatic approach that will enable them to "see" the problem, as well as identify actions that could be taken to manage vulnerability and protect or build environmental resilience of a country.

Purpose of Think Tank II

The purpose of this meeting was to assemble a small group of internationally recognised scientists to examine the EVI and its indicators in order to obtain critique on its design and function and seek recommendations for refinements to improve the EVI and its robustness. The Think Tank was run between the dates of 4 – 6 October 2004 at the SOPAC Secretariat, Suva, Fiji. The overall aims of the Think Tank were to:

- To obtain peer-review and commentary from experts;
- To obtain constructive technical inputs to improve the EVI to make it acceptable and/or operational in the international community;
- Provide expert reference towards the setting and justification of sustainable thresholds of EVI indicators
- Outline an action plan for future international research and work towards sustainable thresholds and indicators that will help in steering the international community towards sustainability

Meeting Agenda

The several discussion topics were divided into two output categories which were presented to the Think Tank as guidance for their discussions and submissions. The outputs focused primarily on the review of the EVI and obtaining guidance from the experts on how the EVI should be promoted globally. The following list of topics were presented to the group for discussion.

Output 1: Technical Review: Endorsements, Improvements, Thresholds

- Thresholds / scaling for individual indicators
- Data quality
- Inherent weighting in the index

Output 2: Action Plan for Mauritius

- Obstacles so far (how to deal with them?)
- Recommendations (is the EVI a reasonable response to BPoA?)
- Pathways for international adoption
- Pathways for national adoption
- Report Outline

Proceedings of the EVI Think Tank

The EVI was reviewed by a panel of international experts. Following discussions several important recommendations were made by the EVI Think Tank.

Overall Recommendation

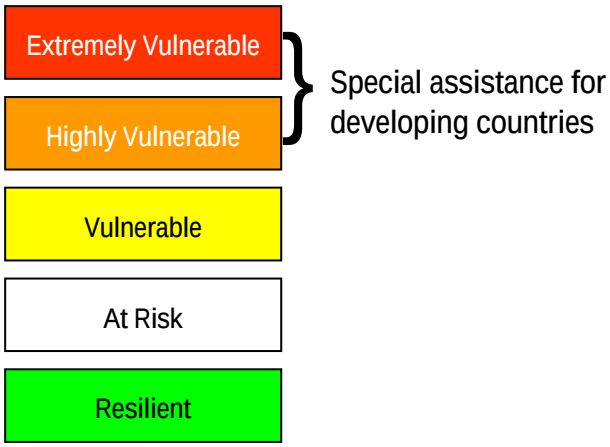
The EVI is sufficiently well-developed to begin national implementation. Within the limitations of the available data, it successfully captures the nature and scope of environmental vulnerability, enabling countries to manage their vulnerability and protect and build their resilience. It is quantitatively robust and highly policy relevant at national and international levels. Countries could now be called upon to trial the index to test it under various national conditions and determine how well it defines their vulnerability and meets their national objectives.

With respect to the BPoA, the EVI captures the environmental vulnerability of SIDS and emphasises their ecological fragility. It can also assist in national reporting for international processes, such as the Millennium Development Goals and priorities set at WSSD. It can generate outputs useful for reporting to international conventions such as the UN FCCC, CBD, CCD, etc, as well as many regional processes. At the national level it provides environmental profiles that can be used for priority–setting and for identifying areas for urgent action. It is designed to capture short-term trends, changes and improvements (on a 5 year scale) and thus to provide early warning of major risks and to support adaptive management. Indicators within the EVI may also be used for state of environment reporting.

The EVI will meet BPoA requirements for the environmental area, but needs to be complemented by economic and social vulnerability indices for a complete measure of vulnerability. The environmental and economic indices need to be piloted together at the national level, and the social index developed, leading to harmonisation of all three indices.

International Recommendations

1. The EVI needs an international organisation responsible for its continuing development & implementation.
2. SOPAC should approach UNEP and other potential organisations officially to determine their interest in taking over the EVI after the Mauritius meeting.
3. SOPAC should go back to countries that have expressed concern about aspects of the EVI, showing how their concerns have been taken on board. A sub-index for climate change has been designed to identify environmental risks and monitor how rapidly climate change impacts are affecting a country. A classification method has been developed to identify highly vulnerable countries. Governments could be sent a general letter on enhancements such as the policy-relevant sub-indices, aids in reporting to conventions, and other ways the EVI can be used.
4. SOPAC should report to interested donors and governments explaining how the EVI could be carried forward at Mauritius, and the need to adopt a decision on its implementation, encouraging UNEP or another organisation to take it on. This will require some additional funding for the transition and initial implementation.
5. Various parts of UNEP such as GRID-Arendal, GPA, WCMC, Division of Early Warning and Assessment, should be also be approached unofficially with details of the possible transition to back up the official letter to UNEP.
6. NGOs should be kept informed through preparatory press releases before Mauritius. Other intergovernmental partners (Forum Secretariat, CROP, SPREP, CARICOM, etc) should also be consulted about bridging activities to carry on supporting implementation of the EVI at the regional level.
7. The three elements of vulnerability indices (economic, social, environmental) should be assembled and presented together at the Mauritius meeting.
8. Close liaison should be maintained with the UN SIDS Unit in New York.
9. SOPAC should prepare a handover manual and materials to hand the EVI over to the receiving organization. Handover funding needs to be found.
10. An effort is now needed to gain acceptance of the EVI by the statistical community (UN Statistics Division and national statistical services).
11. Now that the EVI has been developed, there is a need for further effort to promote acceptance at the political level to gain support for its application.
12. Developing countries in the RED and ORANGE categories should be identified as needing special consideration within the international community for dealing with their vulnerability issues and for protecting and building resilience.
13. The EVI demonstrates that some vulnerabilities are inherent, others are a consequence of past environmental problems and can be managed locally, and others are the result of global environmental mismanagement, requiring international solutions.
14. Countries should be classified into the following relative vulnerability categories – extremely vulnerable, highly vulnerable, vulnerable, at risk and resilient. It is recommended that developing countries in the first two categories – extremely and highly vulnerable are likely to require special assistance to manage their vulnerability. This information can be presented as follows:



National Recommendations

1. EVI requires regional coordinating bodies to support national uptake and build capacity, and to assist with EVI applications for regional processes.
2. The EVI could be used in sustainable development plans (e.g. Pacific Regional Sustainable Development Plan, Mediterranean Action Plan, Climate Change Centre Belize, regional SOE reporting, etc).
3. Each country could consider adopting and adapting the EVI for internal use to simplify and standardise existing national & international reports. This may begin as a trial after Mauritius to road-test it.
4. An electronic method and/or manual is needed for EVI use at the National level, to be maintained by SOPAC until another organisation takes it over.
5. Each country should ensure their internationally-relevant data are regularly transmitted to the appropriate agencies responsible for the data sets used in each EVI indicator

Records of general and detailed comments on the EVI and suggested refinements for its indicators are outlined in the appendix.

Appendix

EVI Think Tank II: General Comments / Interventions

1. Presentation of the EVI globally by SOPAC should be simpler and more intuitive and provide the EVI as the state of the art to that date.
2. The global maps of the EVI might be clearer using shading of whole countries, though dots or labelling are also needed for small countries

3. The EVI should remain flexible enough to be used for comparative purposes as well as be adaptable for different uses in-country, depending on requirements. This will help with political acceptance.
4. The EVI is flexible enough to be applied at any scale. As the EVI has been developed for global application the associated indicator thresholds are an average the EVI may require adaptation of thresholds for national use.
5. Need core list of indicators that have data for all countries so that there is a common basis for comparison given the 80% data requirements
6. The EVI should not be oversensitive to small changes. The first Environmental Sustainability Index was too sensitive and later became too unresponsive. Need a balance.
7. Although the individual indicators may need to be adjusted from time to time with needs and data improvements, the EVI needs stability and standardisation to be accepted.
8. The importance of being able to see changes through time through recalculations is acknowledged. The EVI can be used to capture change by recalculation every 5 years.

9. **Vulnerability ← → inherent characteristics of a country + forces of nature + human use + climate change**
10. The "issues" sub-indices need to mesh with international initiatives through selection of appropriate indicators. There is a need to highlight water issues for Africa. (A special sub-index has now been included see 11).
11. **Climate change sub-index**: 1, 2, 3, 4, 6, 11, 12, 14, 15, 24, 36, 45, 48. This captures climate impacts, flooding impacts & human populations most at risk
12. **MDG**: EVI responds to Target 9. environmental sustainability goal in MDG, and Target 14 SIDs / landlocked / Target 13 LDC concerns.
13. **Biodiversity sub-index**: 6, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29. This capture biodiversity vulnerability issues.
14. **Water sub-index**: 2, 3, 24, 25, 27, 28, 31, 32, 36, 39, 43, 45, 46. This captures water vulnerability issues.
15. **Agriculture and fisheries sub-index**: 2, 3, 6, 17, 18, 19, 21, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36. This captures agriculture and fisheries vulnerability issues.
16. **Human health aspects sub-index**: 31, 32, 36, 37, 39, 43. This captures human health vulnerability aspects of the EVI.
17. **Desertification sub-index**: 1, 2, 3, 4, 5, 14, 15, 24, 25, 27, 36. This captures desertification vulnerability issues.
18. **Exposure to Natural disasters sub-index**: 1, 2, 3, 4, 5, 7, 8, 9, 10, 45, 48. This captures exposure vulnerability to natural disasters.

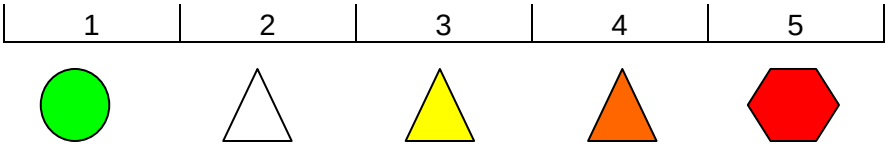
19. The sub-indices should be re-named (REI, IRI, AVI = hazards, resistance, damage)
20. The 3 sub-index approach which recognises types of vulnerability may be useful in economic and social vulnerability. There are potential benefits of using the same framework across all three pillars for gaining recognition and acceptance. The economic index is not at present categorised in the same way.
21. The EVI needs to be complemented by economic and social vulnerability measures to assess overall vulnerability and tradeoffs.
22. Acknowledged that EVI is not a data provider and that any problem of quality of data is a common problem to all similar processes and assessments. Responsibility for each data set remains with the provider. To maintain transparency the EVI cannot address data quality but should pass on all information to providers.
23. International data collection mechanisms need to be formalised. There is a need for all assessment bodies, structures and governments to respond internationally to the need for better data mechanisms.
24. Certain data providers may be better placed for establishing thresholds for the relevant indicators. This may strengthen their own activities and lead to international standards.

25. An organisation is needed to retain the responsibility for storing past EVI data and being able to back calculate past values based on new data sets and thresholds as they are developed. This will ensure that changes through time can always be examined, regardless of improvements in the EVI through scientific advancements. UNEP-WCMC may be an appropriate coordinating body for archiving international EVI data.
26. The EVI should continue to use the best international quality-controlled, recognised data sources.

27. Weighting of EVI indicators is inherent in the EVI structure since it has a broad mandate and covers an extremely broad range of attributes. Weighting explicitly could introduce bias into the index. The principal selection criterion has been to maximise the amount of information using the smallest number of indicators.
28. The selection of EVI indicators is based upon global relevance across countries. National refinement of the EVI may be appropriate for national usage.
29. A few indicators in the EVI currently do not have data. They are retained because of their importance to overall environmental vulnerability. The minimum data requirement set at 80% enables flexibility in calculation of the EVI.
30. When vulnerability scaling of indicators is not equally distributed scientific support should continue to be provided where possible to justify the mapping scale. Scales should be policy relevant so that decisions move in the right direction.

31. For presentation of the EVI to Mauritius explanations for indicators should be simplified. Detailed indicator analysis should be included as a separate volume. Each indicator summary should be provided with the following: final indicator text, signal capture information, policy relevance, its usefulness for convention reporting where appropriate, data source for reassurance for data quality and how to respond. The use of symbols could help to make identification and understanding of indicators user friendly.

32. A category approach for ranking countries was agreed to with five categories. The categories range from lowest vulnerability to the highest vulnerability starting at green (circle), white (triangle), yellow (triangle), orange (triangle) and red (hexagon).



33. For relevance in Mauritius there is a need to focus on SIDS and how they fit into the global environmental vulnerability scene.

34. **REPORTS FOR MAURITIUS**: Include box explanation of PSR link using catching a cold analogy for EVI
35. **PEDIGREE** Short report to conference on process to develop EVI – consultations, experts, govts etc. Only formality of it – what steps taken. This report closes BPoA circle. More work to be done linking with Economic/social
36. **ANATOMY** Description of EVI – popularised 10 pages, graphs, examples of country profiles, outputs, meet conventions, SOE, 2-3 lines description of indicators, para on policy relevance – biodiversity – time series – short term changes – reporting – managing – POLICY oriented. Issues of data quality – some are robust, others have gaps that need filling, even with gaps results already useful in profiles – show possible future results with improvements / change. Link with Economic & social. Link between vuln and SD (see GEO3 para)
37. **PROFILES** Send each country their own profile; other materials of outputs (aggregate categories for SIDS / Regions)
38. **RESULTS** Results – listing of countries in 5 categories, Regional breakdown into sub-indices / issues. Regions-SIDS; SIDS, LDCs, Landlocked, Cityscapes.

EVI Think Tank II: Indicator Refinement Comments

1. Indicator 2 Dry periods: (i) create the scale as annual average, not total over 5 years; (ii) use graphics for scales, evenly spaced
2. Indicator 4: (i) ecological impacts need further investigating for calibration
3. Indicator 7: (i) incollude definitions for VEIs; (ii) re-evaluate on the basis of cumulative VEI (VEI2*2+VEI3*3+…+VEI8*8)
4. Indicator 8: (i) As data improve, scale should stretch
5. Indicator 9: (i) need to try and avoid arbitrary scale. Is 2m significant?
6. Indicator 10: (i) address good landuse practices; (ii) include submarine slides, subsidence; (iii) flag problem with this indicator – forced to use text 1 as proxy; (iv) remote sensing could help to develop an indicator more relevant – possible deletion when next reviewed
7. Indicator 11: (i) look at possible inflection points in island biodiversity theory / plots
8. Indicator 12: (i) Clarify fractal scale – use WRI new database for better data
9. Indicator 13: (i) Remove constraint of 10 degrees and recalculate; (ii) 2 transforms to scales OK

10. Indicator 14: (i) edit range X<=10 needs to be 50 in table. Set scale 50m; (ii) add countries as examples; (iii) use GIS for topographic diversity looking at pixel classification in future? Slope analysis? Jackie with appropriate language from MA; (iv) remove low relief from EVI=7.
11. Indicator 15: (i) 10m ASL is better measure, but 50m OK because of limits on data; (ii) update as new information available; (iii) scale is OK
12. Actual versus total vulnerability. Should irrelevant / Non-applicable indicators be included in country profiles? Discussion to be made later. Lowlands may not be relevant to countries without them. Work after Mauritius should investigate this question and the 80% data requirements again. Is vulnerability a fixed number (arbitrary – no not arbitrary, just unknown) or is it a proportion of the relevant issues? Focus on relevant issues would reduce indicators?
13. Indicator 16: (i) openness to other countries' environmental management
14. Indicator 17: (i) drop this indicator and replace with trophic level change
15. Indicator 18: (i) this indicator would be better as tonnages, not $ values; rename as environmental openness
16. Indicator 19: (i) assumption that obvious species provide some indication for unknown species (smart indicator)
17. Indicator 20: (i) check spreadsheet; (ii) additional data from UNEP Islands Database
18. Indicator 21: (i) leave thresholds till data improves
19. Indicator 24: (i) the final form of the indicator is needed this proxy is not good for countries without forests, but which had other forms of natural vegetation (ii) check spreadsheet for countries that had zero which should be NA only in this proxy form
20. Indicator 25: (i) 0 or + = EVI 1; penalise steeply as rate of loss increases
21. Indicator 26: (i) Good proxy; (ii) GIS may improve in future; (iii) include in text divided by land area
22. Indicator 27: (i) rescale Severex1+Very severex2 to give room for improvements; (ii) >80% is EVI=7
23. Every indicator needs text on how to respond to poor EVI score
24. Indicator 28-29: (i) include references for the threshold
25. Indicator 30: (i) indicator is sensitive to pigs – check data
26. Write a general note on all data issues
27. Indicator 31: (i) Review cut-offs for this indicator. EVI 1 may be 50kg/ha/yr; (ii) set EVI 4 at 5000
28. Indicator 33: (i) start scale at 4<X<10 then exponentially increase; or linear; (ii) needs text In the absence of data on the other aspects of biotechnologies that could represent potential impacts GMO was selected for data availability reasons
29. Indicator 34: (i) change name to productivity:fishing ratio
30. Indicator 35: (i) improve data to include all fishers; (ii) include lakes
31. Indicator 36: (i) check water resources for China
32. Indicator 39: (i) this is an important indicator; (ii) it is expected that data will become available
33. Indicator 41: (i) rename just to spills; (ii) include text to per million sq km coastline; (iii) possible source looking at imports of fuels; (iv) change denominator to land area + territorial seas
34. Indicator 42: (i) check data for Norway oil
35. Indicator 44: (i) clarify definitions for vehicles
36. Indicator 49: (i) may be able to use UNEP environmental law database