The expert elicitation method for state of marine environment assessment and reporting

GRID ARENDAL
A Centre Collaborating with UNEP

National drivers for SoME reporting

- National need to understand and measure the state of marine environment to meet SDG's
  - Integration of indicators
  - Identify issues and knowledge gaps
  - Monitor consequences of policies and legislative actions taken
- UNCLOS Article 192 "States have the obligation to protect and preserve the marine environment."
- Participation in global and regional assessments
  - GEO-6
  - UN World Ocean Assessment
  - Regional seas

The approach

- **Expert Elicitation (EE)** – knowledge and judgements provided by regional experts in a workshop setting (elicit = to draw out or bring forth, educe, evoke)
- **Broad knowledge base** – The EE method uses conventional scientific data and knowledge and also captures unconventional and traditional knowledge
- **Workshop** is the centre-piece of the iterative assessment process; ideal for situations with limited resources and/or limited time
- **Outputs =** assessment of the state of the marine environment plus risk assessment
- **Workshop procedures**

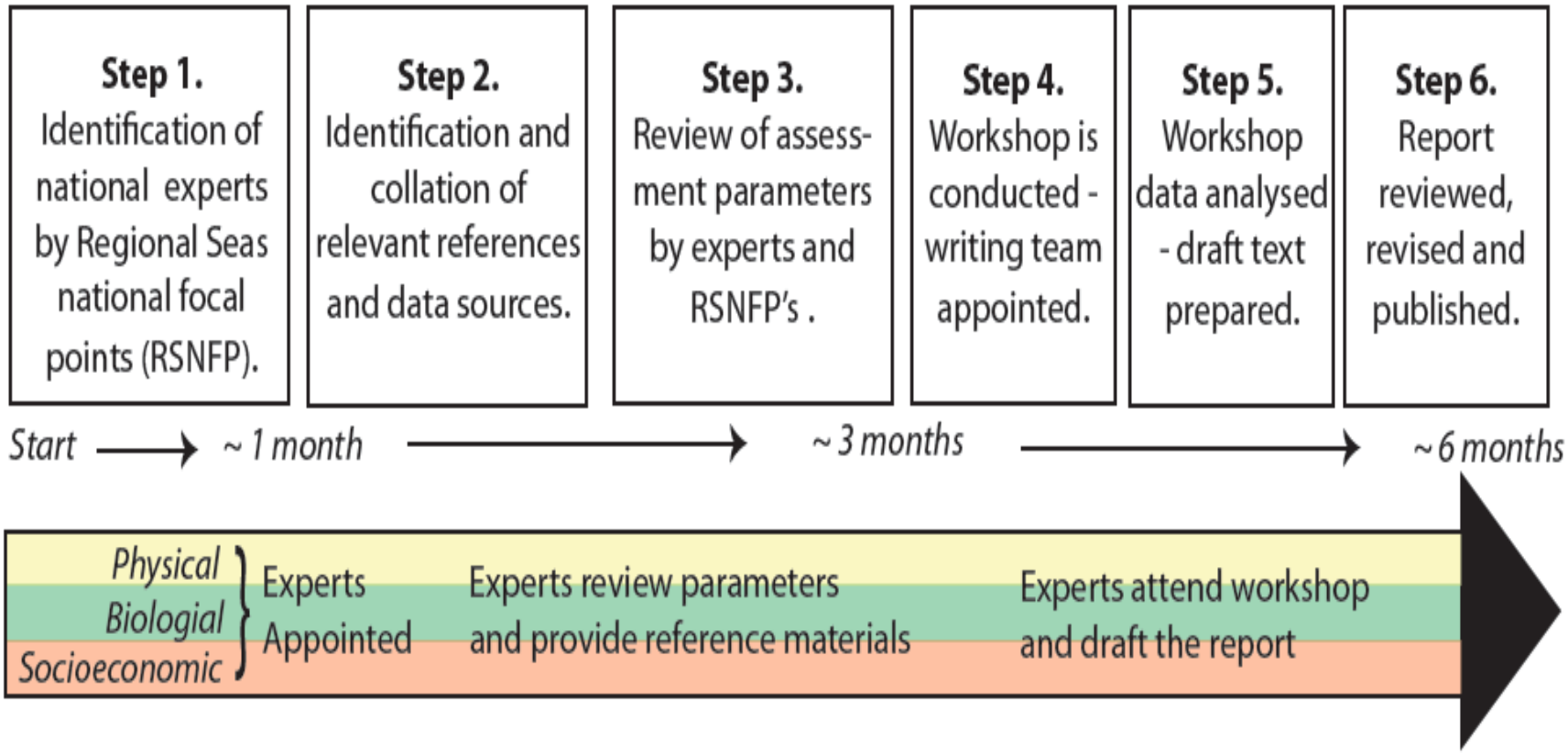
  Day 1 - Plenary exercise to familiarise delegates with method

  Day 2 - Sub-groups, to input data to the matrices

  Day 3 - Plenary report-back to review/refine/agree; risk analysis

Post Workshop confirmation of participants' details: locating maps, data and documents identified during the workshop; peer review.

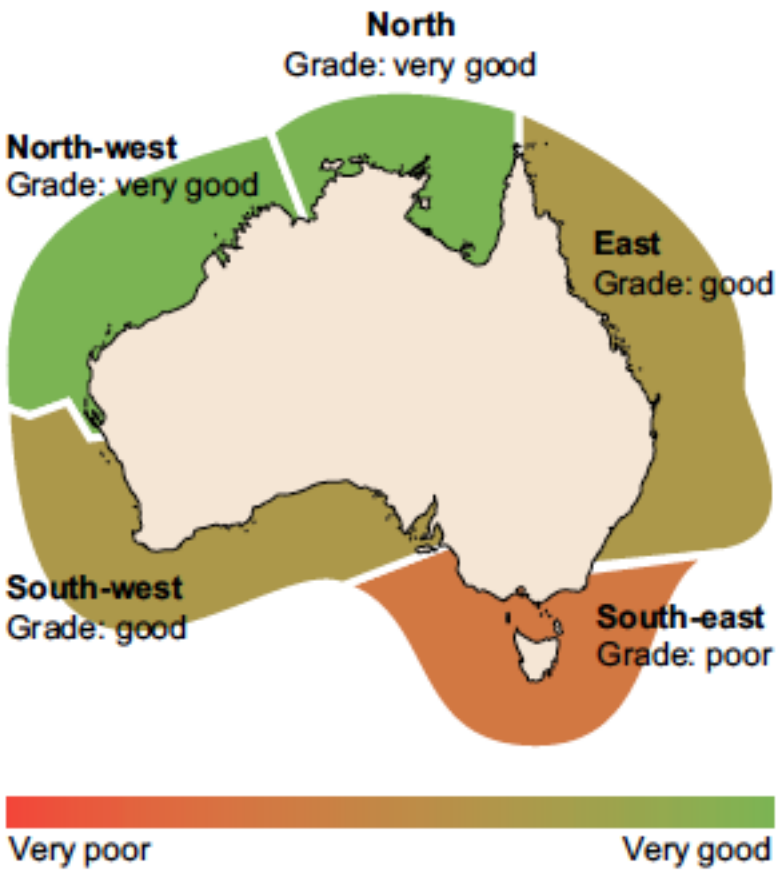
Workshop is PART of the process



Example of output (from Australia SOE 2011):

Component	Summary	Assessment grade (Very poor / Poor / Good / Very good)	Confidence: In grade	Confidence: In trend
Gulfs, bays, estuaries, lagoons	South-east, south-west and east regions heavily degraded in many places; north region in very good condition	–		
Water column, shoreline (0–20 m), not estuaries	East region in poor condition	↙		
Great white sharks	Condition continues to decline in the east	↗		
Fishing	Pressures are decreasing overall, although in the worst areas of the south-east, east and south-west, pressures are widespread and causing serious degradation, and the east continues to degrade	↗		

Examples of outputs



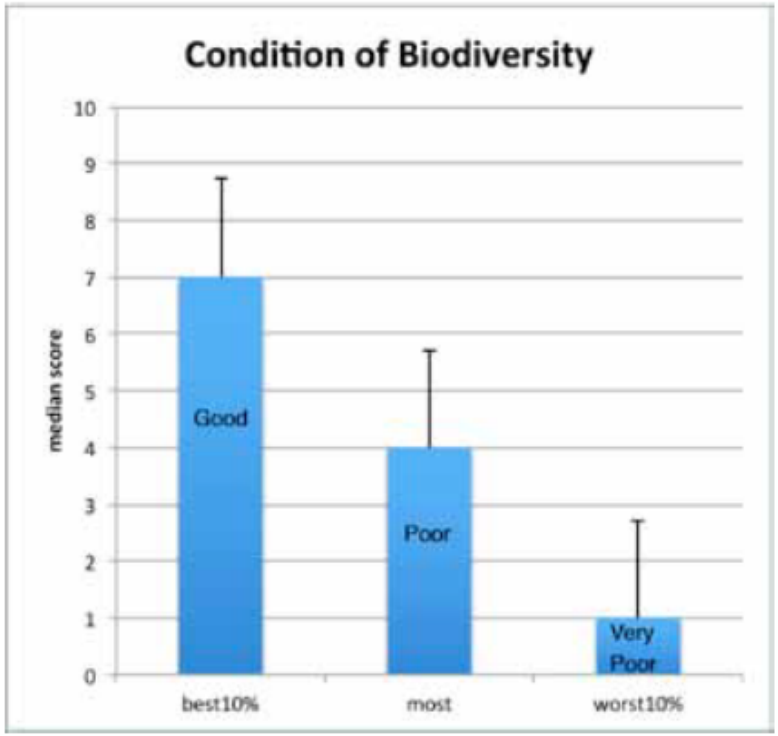


Figure 2. Median score and grade for the condition of all biodiversity parameters (habitats, species and species groups, ecological processes) in the Best10%, Most, and Worst10% places/occurrence in the South China Sea region. The uncertainty bar (derived across all the biodiversity parameters) represents an average level of confidence of 1.7 of a scoring unit.

Decision hierarchy

OVERALL STATE OF MARINE ENVIRONMENT (sum of data below)

Biodiversity

- Habitats
- Species

Ecosystem Health

- Physical and chemical processes
- Ecological processes

Pressures

- Human activities (marine industries) detrimentally affecting biodiversity and environmental values

Socioeconomic aspects:

- Environmental pressure posed by industry
- Employment, wages, taxes, education and training
- Cost/benefit analysis by sector

Data-driven (DD) versus EE methods

- Not mutually exclusive (EE method includes data where available and DD involves expert interpretation)
- Access data (eg. UNEP Live) during workshop
- DD approach is commonly beyond the means of developing countries (too expensive)
- DD time consuming but scientifically valid
- DD age of data used in reports (eg. OSPAR 2010 based on data from ~2006, USEPA 2008 based on data from ~2003, etc.)
- EE better reflects state as a snapshot in time
- EE validity wholly dependent upon expert participation
- EE allows for integrated assessment including local-traditional knowledge

Benchmark

- Establish explicit basis for condition assessment (condition relative to point in time _____)
- Assists to recognise, avoid, sliding baselines
- Not a management target
- Common benchmark: conditions likely to have prevailed in/around 1900

Scoring condition

- Score for Worst 10% [*think spatially – 10% of WHOLE area; record places, occurrences, examples of*]
- Score for Best 10% [*ditto*]
- Score for Most [*ditto*]

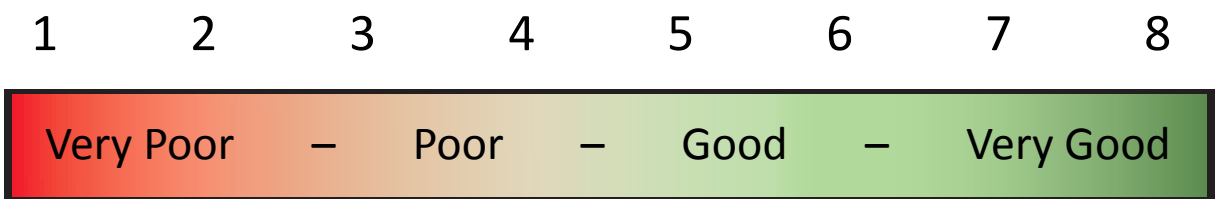
Assigning Uncertainty

- Many forms of uncertainty may affect the scores (*adequacy of data and knowledge base is just one of many*)
  - High confidence (within a single grade) = range of +/- 1

    *Published government reports, peer-reviewed papers (**anchors**)*
  - Medium (within 2 grades) = range of +/- 2

    Un-interpreted data available, assessed by experts (unpublished)
  - Low (within 3 grades) = range of +/- 3

    Little or no data, expert judgment only



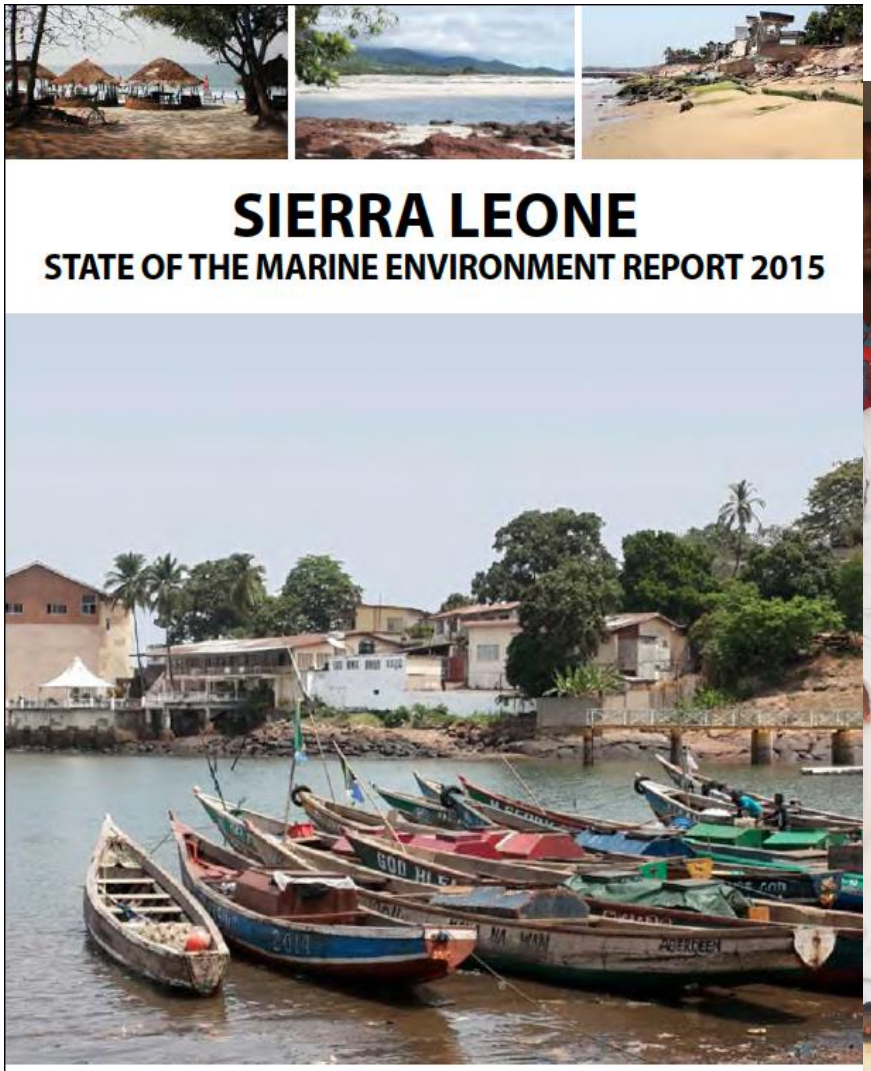
Scoring Habitats

- For a specific habitat: consider current size, structure, distribution, function
  - Spatial extent of habitat, *relative to the benchmark (eg. spatial extent of habitat in 1900)*
  - Biogenic - density, productivity, cover, abundance of component species, *relative to the benchmark*
  - Substrata – structural aspects (such as grain size distribution in sediments), *relative to the benchmark*
  - Water – productivity, clarity, absence of pollution, *relative to the benchmark*

Habitat Grading Statements

Habitats	Grading statements for habitats that occur in the state and/or region under consideration.
Very Good (7-8)	The habitat type is essentially structurally and functionally intact and able to support all dependent species
Good (5-6)	There is some habitat loss or alteration in some small areas, leading to minimal degradation but no persistent substantial effects on populations of dependent species
Poor (3-4)	Habitat loss or alteration has occurred in a number of areas, leading to persistent substantial effects on populations of some dependent species
Very Poor (1-2)	There is widespread habitat loss or alteration, leading to persistent substantial effects on many populations of dependent species

Sierra Leone, 5-7 Feb 2014

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Habitat quality assessment

Example from Sierra Leone 2014

Component	Summary	Assessment grade				Trend	Confidence	
		Very poor	Poor	Good	Very good		In grade	In trend
estuaries and deltas				⊟		⊟		
small bays				⊟		⊟		
beaches (sandy beaches)				⊟		⊟		
rocky coasts, including non-coral reefs fringing coasts (intertidal and subtidal)					⊟	⊟		
seabed inner shelf (0-50m)				↗		↗		
water column shoreline (0-20m)				⊟		⊟		
water column inner shelf (20-50m)				⊟		⊟		
water column outer shelf (50-200m)				⊟		⊟		
mangroves				⊟		⊟		
mudfats				⊟		⊟		
offshore banks, shoals, islands					⊟	⊟		
seabed outer shelf (50-200 m)					⊟	⊟		
coastal lagoons					⊟	⊟		

Species Assessment

Example from Sierra Leone 2014

Component	Summary	Assessment grade				Trend	Confidence	
		Very poor	Poor	Good	Very good		In grade	In trend
Dolphins					—	—		
West-african manatee (Trichechus senegalensis)				—		—		
Sharks and rays - targeted and bycatch			—			—		
Sharks and rays - non exploited				—		—		
Blue shark (Prionace glauca)			↗			↗		
Scalloped hammerhead (Sphyrna lewini)				—		—		
Common tern (Sterna hirundo)			↙			↙		
Sandwich tern (Sterna sandvicensis)			↙			↙		
Tuna and billfish				↗		↗		
Inner shelf (0-50m) demersal fish assemblages			↙			↙		
Outer shelf (50-200m) demersal & benthopelagic fish assemblages				—		—		
Slope - demersal fish assemblages (>200m)				—		—		
Meso-pelagic fish assemblages				—		—		
Small pelagics - inner shelf (0-50m)			↙			↙		
Small pelagics - outer shelf (50-200m)								
Inner-shelf reef fish assemblages (0-50m)				—		—		
Inner-shelf demersal fish assemblages (0-50m)								
Inner shelf – squid etc				—		—		

(3) Ports

Example from Sierra Leone 2014

Component	Summary	Assessment grade				Trend	Confidence	
		Very poor	Poor	Good	Very good		In grade	In trend
Environmental Impacts: land development, dredging, pollution				▬		▬	■	■
Social & Economic aspects - communities, employment taxes, communications and access to goods	Costs and benefits to society				↗	↗	■	■

CONCLUSIONS

- GRID-Arendal has developed a web-based tool for the conduct of workshops designed to capture state of environment information using the expert elicitation method.
- The tool and associated methodology have been demonstrated in pilot studies carried out for marine environmental assessments in Abidjan, Sierra Leone and Norway.
- Ideally suited to data-poor areas
- Can accommodate local and traditional knowledge.

BLUE SOLUTIONS

giz GRID ARENDAL A Centre Collaborating With UNEP IUCN UNEP On behalf of Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany

A **five year global cooperation project** on marine and coastal biodiversity and development implemented by **GIZ** in a partnership with **GRID-Arendal**, **IUCN** and **UNEP**.

QUESTIONS?

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