

# Advancing an Ecosystem-Based Management Decision Support System (EBM-DSS) Approach in the Caribbean



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## 1. Traditional Management

The well-being of humans are tied to the existence and maintenance of healthy ecosystems, which provide many valuable services such as food security, livelihoods, ecosystem services and reservoirs of biodiversity (UNEP 2011). Humans are key components of ecosystems, depending heavily on the goods and services they provide while significantly impacting them via various anthropogenic factors (e.g. pollution, habitat destruction and overfishing). Effective governance and management of ecosystems, in particular human actions, are crucial requirements for maintaining the balance between the demands placed on ecosystems and the capacity to continue providing the goods and services necessary for survival of life on earth.

Traditional management:

- managing commodities
- single sector management
- individual species
- small spatial scales
- short-term perspectives
- excluding humans as components of ecosystems
- absence of research/knowledge
- overlooking the value of ecosystem services

**Outcome: continual decline in biodiversity and degradation of ecosystems**

## 2. Ecosystem-Based Management (EBM)

Borne out of the ecosystem approach (CBD 2004), EBM goes beyond examining single issues, species, or ecosystem functions in isolation, and recognises ecological systems as a rich mix of elements that interact with each other in important ways (UNEP 2011, Aburto *et al.* 2012; Figure 1).

Key elements of EBM:

- inclusion of humans as part of ecosystems
- joined approach (inter-sectoral coordination)
- participatory process (involves stakeholders)
- adaptive
- precautionary approach
- involves spatial planning
- utilises best available knowledge (natural and social)
- takes into account cumulative impacts
- placed based approach

Issues:

- lack of clarity (Fanning *et al.* 2011)
- lack of available advice to inform management (Levin *et al.* 2009)

**Outcome: implementation of EBM remains low (Figure 2)**

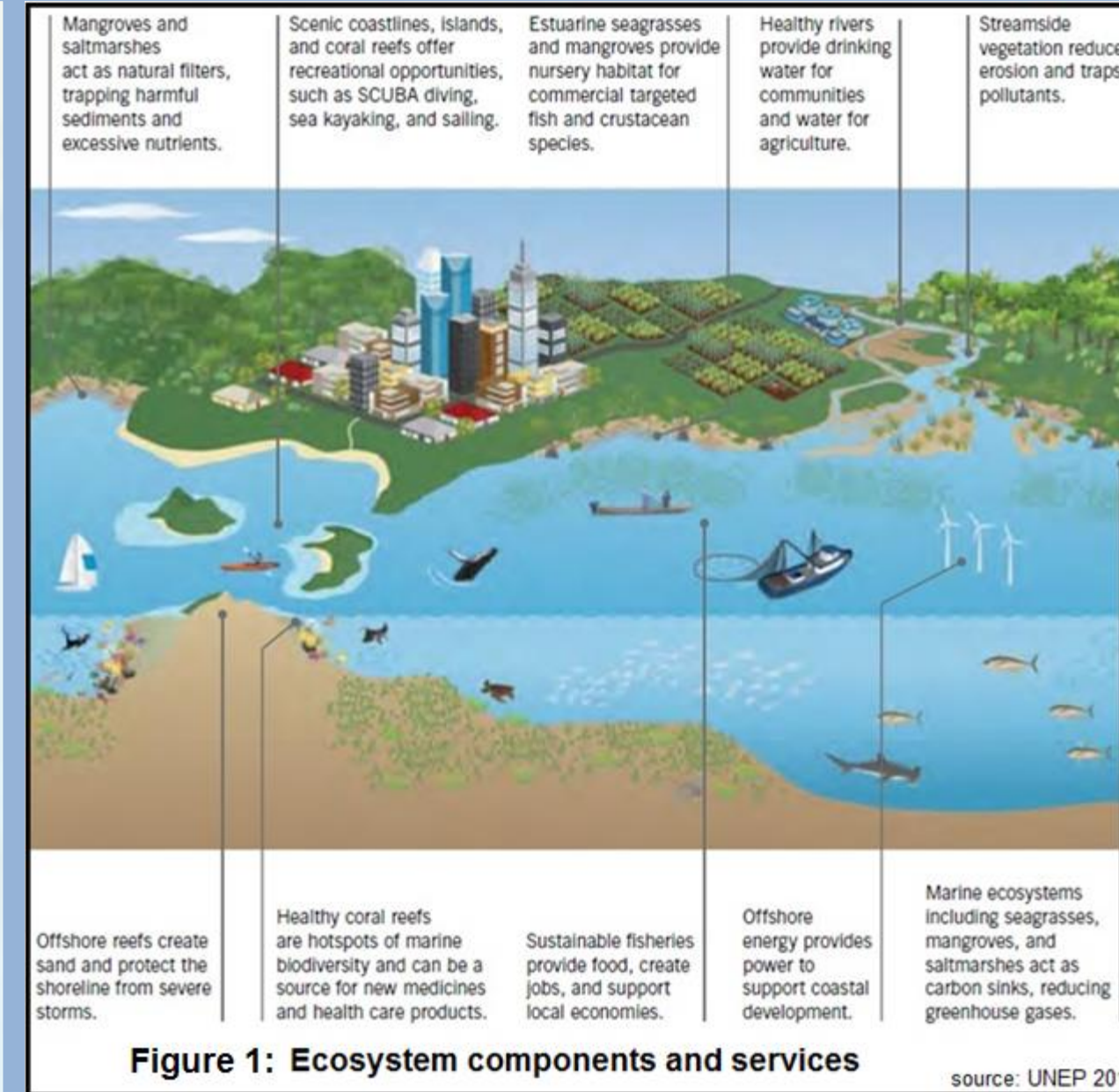


Figure 1: Ecosystem components and services source: UNEP 2011

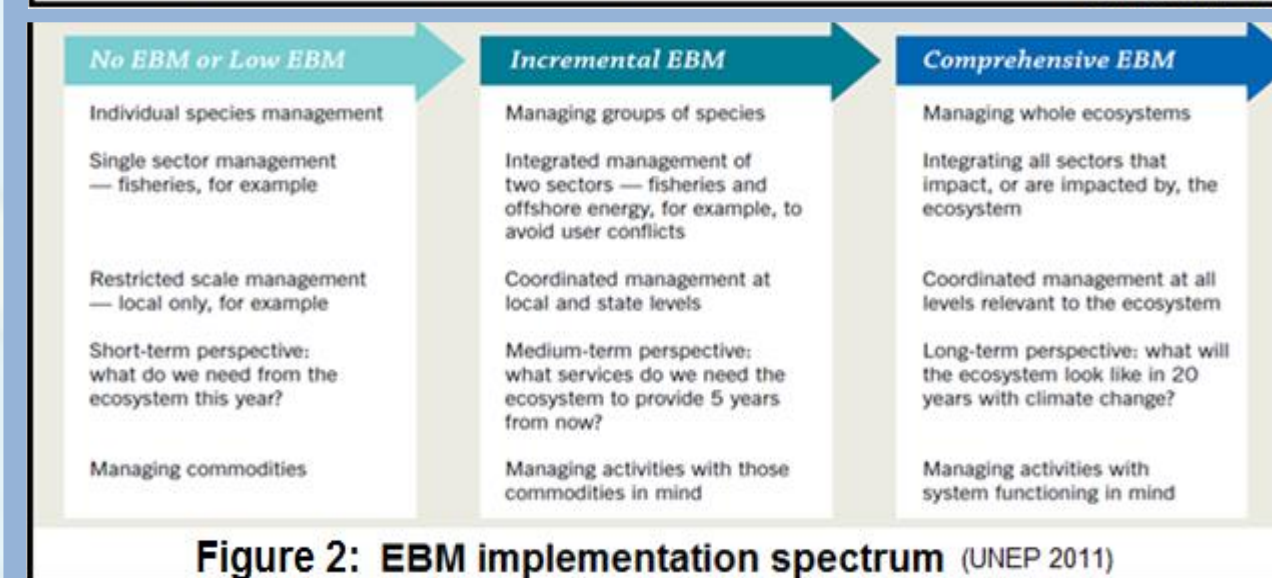


Figure 2: EBM implementation spectrum (UNEP 2011)

## 3. Innovative EBM-DSS Approach

Involves a guided methodological framework (developed by PROGES Consulting) consisting of five steps (Figure 3).

The approach facilitates the implementation of EBM in a simplified way through a straight-forward steered path by:

- identifying and assessing the relationships between ecosystem components, along with associated human activities

The approach can be enhanced via the use of a decision support system (DSS):

- a systematic process of making choices
- based on information
- organised within an interactive computer-based application

The Integrated Spatial Planning (ISP) DSS was developed by PROGES Consulting to compliment and simplify the guided, methodological approach.

**Potential Outcome: simplified implementation of EBM for decision makers and stakeholders and ultimately improved management**

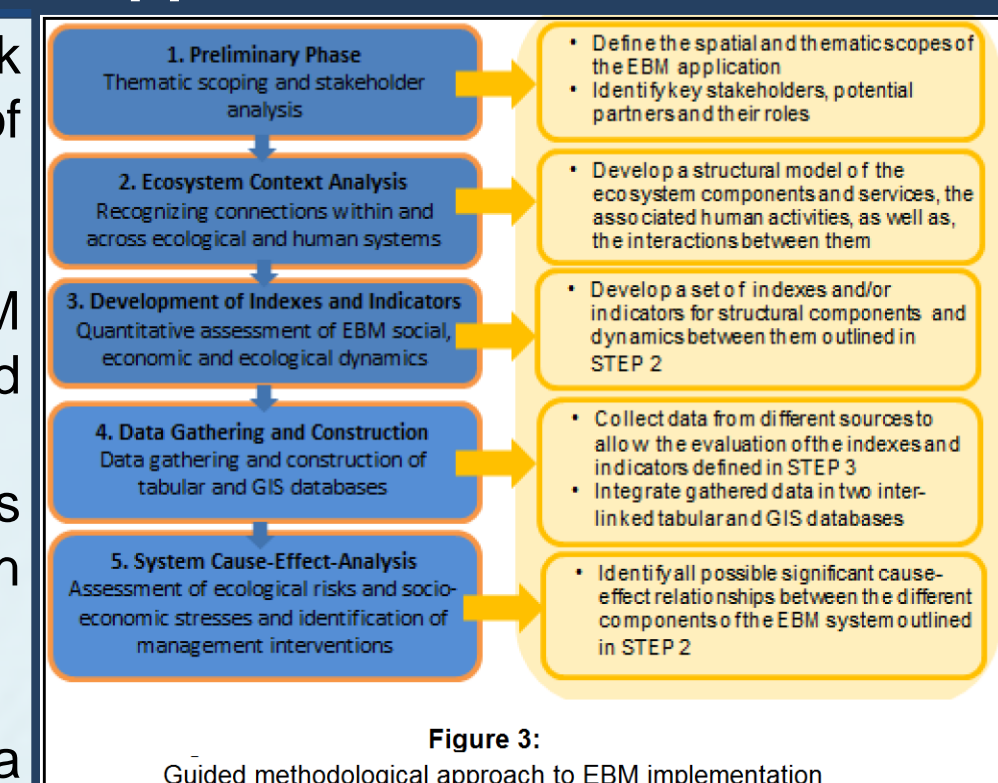


Figure 3: Guided methodological approach to EBM implementation

## 7. References

- Aburto, M.O., de los Angeles Carvajal, M., Barr, B., Barbier, E.B., Boesch, D.F., Boyd, J., Crowder, L.B., Cudney-Bueno, R., Essington, T., Ezcurra, E. and Ganey, S. 2012. Ecosystem-based management for the oceans. Island Press.
- Convention on Biological Diversity. 2004. The Ecosystem Approach, (CBD Guidelines) Montreal: Secretariat of the Convention on Biological Diversity 50 p.
- Fanning, L., Mahon, R., & McConney, P. (Eds.). 2011. Towards marine ecosystem-based management in the wider Caribbean (Vol. 425). Amsterdam: Amsterdam University Press.
- Levin PS, Fogarty MJ, Murawski SA, Fluharty D. 2009. Integrated Ecosystem Assessments: Developing the Scientific Basis for Ecosystem-Based Management of the Ocean. PLoS Biol 7(1): e1000014. <https://doi.org/10.1371/journal.pbio.1000014>
- UNEP. 2011. Taking Steps toward Marine and Coastal Ecosystem-Based Management - An Introductory Guide. 67pp

## 8. Acknowledgements

Special thanks to the main donor, the Italian Ministry of Foreign Affairs.

## 9. Useful Links

- Regional node (CERMES): - <https://goo.gl/QyfdR5>
- UNEP-CEP - <https://goo.gl/72a3jD>
- PROGES - <https://goo.gl/BZx3QT>
- CaMPAM - <https://goo.gl/HzSkJQ>
- IUCN - <https://www.iucn.org/>
- BIOPAMA - <https://biopama.org/>
- Caribbean Protected Areas Gateway - <http://caribbean-ris.biopama.org/>

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## 4. Integrated Spatial Planning (ISP) Tool

- desktop-based application
- runs in Microsoft Windows
- provides a user interface (Figure 4)
- back-end utilises Microsoft Visual Basic
- designed for use by non-technical and non-scientific persons
- incorporates geospatial data (e.g. shapefiles)
- generates box and arrow diagrams (ecosystem linkages)
- incorporates data and indicators
- utilises images
- generates reports

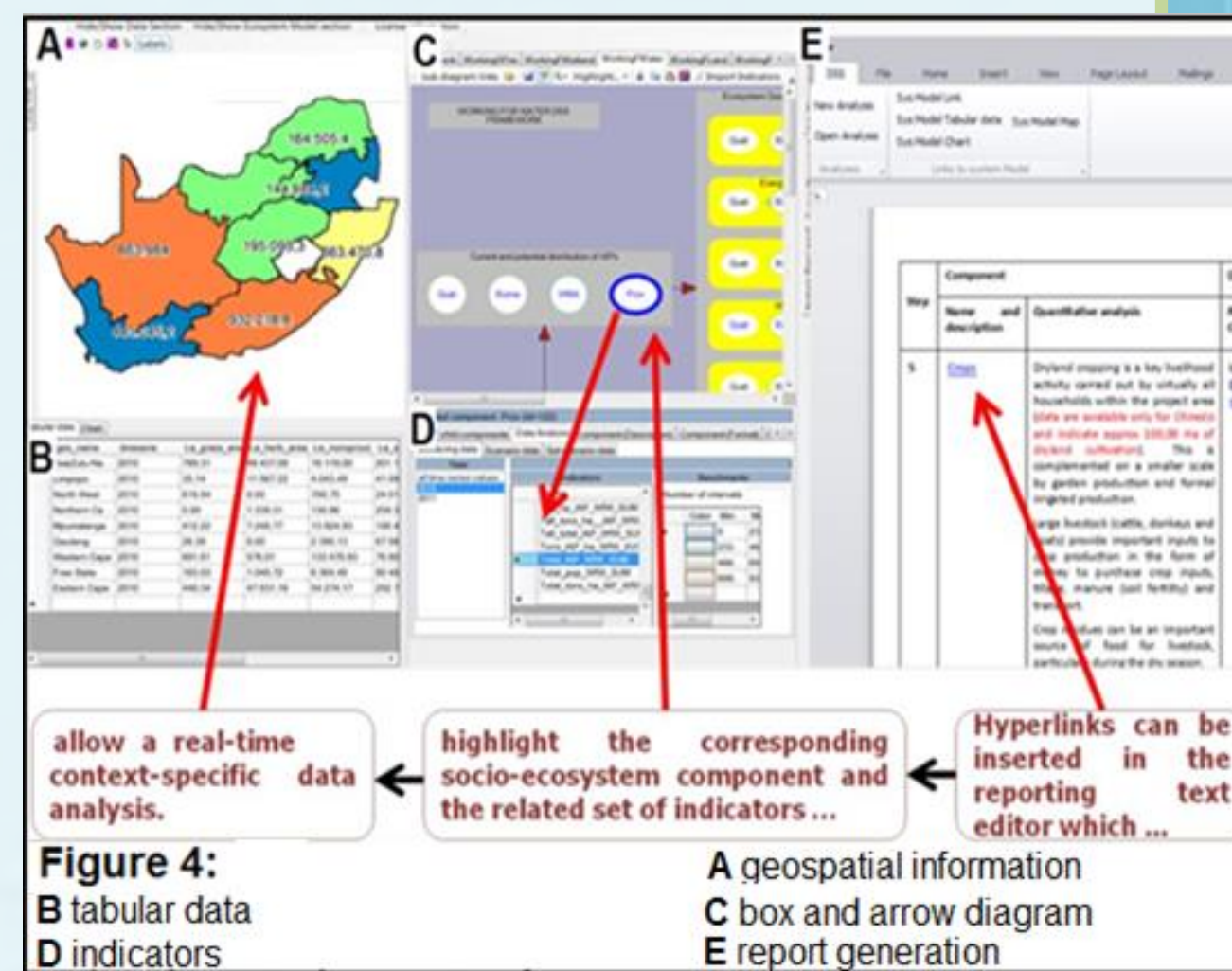


Figure 4:  
A geospatial information  
B tabular data  
C box and arrow diagram  
D indicators  
E report generation

## 5. Implementation of the EBM-DSS Approach

The implementation of the EBM-DSS approach and methodology proposes the key following steps:

- establishment of an interdisciplinary working group
- training of stakeholders in the use of the ISP software
- workshop 1 – thematic scoping and stakeholder analysis
- workshop 2 – ecosystem analysis
- workshop 3 – development of indicators and data sourcing
- workshop 4 – cause effect analysis and identification of priority management activities

The EBM-DSS approach has been used in different countries and with different objectives, to guide responses to the degradation of ecosystem services and the improvement of conservation strategies.

In the Caribbean, as an integral part of an EBM-DSS funded by the Italian Ministry of Foreign Affairs, it is being tested at two pilot sites in the Dominican Republic (i.e. Monte Cristi and Puerto Plata; Figure 5).

Key outcomes (to date):

- increased awareness
- increased capacity
- identification of priority management actions
- improved functionality of the ISP tool
- institutionalisation of the EBM-DSS approach

Key lessons learned (to date):

- data gathering can be quite challenging due to formats, accessibility and gaps

Recommendations (to date):

- establish an interdisciplinary working group
- develop institutional capacities to facilitate institutionalisation of the EBM-DSS approach
- promote inclusivity and encourage active participation

## 6. Advancing the EBM-DSS Approach

To-date, efforts of advancement have included:

- two regional workshops to increase awareness and provide initial training – 2017 (Figure 6)
- establishment of a regional node (CERMES-UWI) - 2018
- integration of the EBM-DSS approach into existing initiatives (i.e. XIII Training of Trainers on Marine Protected Areas Management Course) – 2018

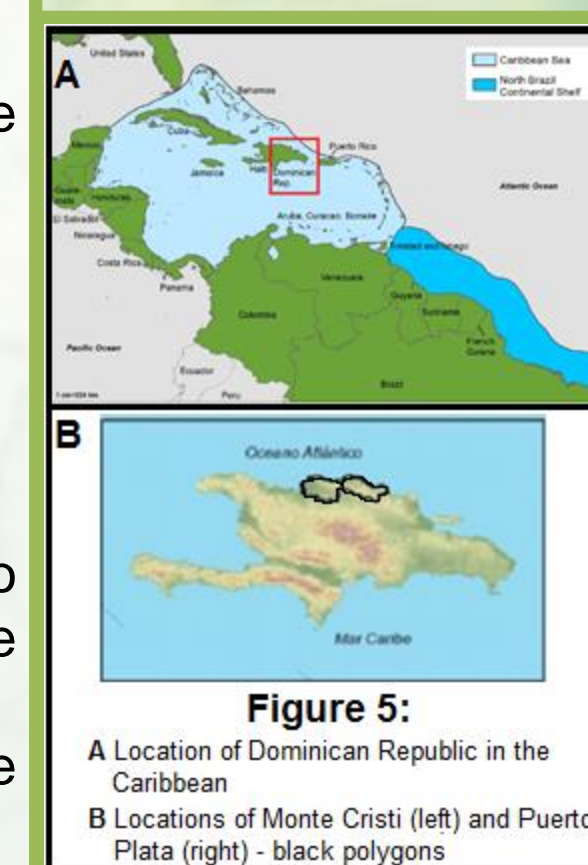


Figure 5:

A Location of Dominican Republic in the Caribbean  
B Locations of Monte Cristi (left) and Puerto Plata (right) - black polygons

The goal of the regional node is to function as a central hub for EBM-DSS implementation and incorporation into regional management systems (e.g. Caribbean Protected Areas Gateway).

Main steps for advancing EBM - DSS application in the Caribbean include:

- public awareness and education
- capacity development (trainings)

- dissemination of informative materials
- development of small-scale pilot applications
- development of templates for replication
- development of concepts for further application



Figure 6: Sessions from each workshop