

Socio-Ecosystem Diagnostic Analysis - Content, Structure and Guidelines

Overview of the Socio-Ecosystem Diagnostic Analysis (SEDA) process:

First and foremost it needs to be noted that this process is being modified from the existing standard TDA-SAP development and implementation process that has been tried-and-tested and refined over nearly three decades. This will be the first time it will have been modified for application beyond the traditional GEF 'transboundary' ecosystem (shared river basin, LME, lake, aquifer, etc.) context to an ecosystem context not involving national borders (e.g. in ABNJ). Nevertheless, the overall stepwise approach remains quite similar to that for the TDA.

In the context of the Sargasso Sea, the main technical role of an SEDA is to identify, quantify, and set priorities for environmental problems that threaten the long-term integrity and sustainability of the ecosystem. In particular, the SEDA aims to:

- A. Identify, quantify & prioritise the problems within the ecosystem.
- B. Gather and interpret information on the environmental impacts and socio-economic consequences of each problem. The latter can include estimation of both the socioeconomic costs of the main threats, as well as an overall socioeconomic valuation of the goods and services provided by the Sargasso Sea.
- C. Analyse the immediate, underlying, and root causes for each problem, and in particular identify specific practices, sources, locations, and human activity sectors from which environmental degradation arises or threatens to arise.
- D. The root cause analysis is often accompanied by a comprehensive governance analysis since the underlying causes of the vast majority of environmental problems stem from selected policy and other governance failures and gaps.

Ultimately, the SEDA provides the **factual basis** for the formulation of a Strategic Action Programme but the SEDA is also part of a larger, facilitative process of engagement and consultation with all the key stakeholders from the initial SEDA steps through to the subsequent development of alternative solutions during the formulation of the Strategic Action Programme. The SEDA is a mechanism to help the participating stakeholders to 'agree on the facts'. Often, conflicts and disagreements are driven by perceptions and removing these can be an enormous step in itself. Furthermore, the SEDA should be seen as more than just an analysis of data and information. It is a powerful process that can help create confidence and trust among the partners involved and can help to create strong partnerships and interactions. Importantly, the process needs to capture experience from other TDA processes (see 'Large Marine Ecosystems and Sustainable Development: A review of Strategic Management Processes and Goals' 2017¹). Providers of information, as stakeholders, will need to help to define and establish principles and guidelines for Data and Information Management which will become an Appendix to the SEDA Document and which will address such issues as intellectual property, ownership, custodians, restrictions on commercial gain, quality control, etc. These data and information frameworks can in turn provide and inform the creation of monitoring frameworks for short, medium and long-term monitoring of SAP implementation progress

¹ <http://www.undp.org/content/undp/en/home/librarypage/poverty-reduction/global-environmental-finance/large-marine-ecosystems-and-sustainable-development--a-review-of.html>

Proposed Contents with appropriate guidance:

1. **Executive Summary:**
Needs to be an overall summary of the status of the Sargasso which captures all of the detailed science into one commentary. This should effectively be a Summary for Managers and Policy-Makers on the SEDA process and the conclusions prior to development of a SAP.
2. **Background & History:**
Brief background to the Sargasso Sea Commission; how this relates to BBNJ ILBI.
3. **SEDA Approach:**
Explanation of how the SEDA-SAP approach had evolved; Methodology and comparison/linkage to DPSIR. approach Overall Objective and Activities to achieve this. Partner and Stakeholder Engagement (refer to Annex)
4. **The interim Management/System Boundary:**
The final definition of the Ecosystem Boundary for the SAP can only realistically be agreed once all of the pertinent information on the ecosystem (including drivers and impacts which may lie external to these geographic boundaries) has been captured. Even once a 'management' area boundary has been agreed the SEDA-SAP process will need to recognize the significant connectivity beyond this boundary, even connecting to the estuaries and rivers which represent the home ranges for eel species. Whatever management strategies are adopted within the agreed SAP, these will need to consider and address how elver fisheries are managed in those countries that place depend on the that fishery or which import the young stages of the eels for aquaculture.
5. **Communication and Stakeholder Participation**
A description of the mechanisms used for involving appropriate stakeholders into the SEDA process and how the needs and results of the process has been communicated to the various stakeholders and partners.
6. **Environmental Status:**
Current status regarding oceanography, productivity, biodiversity, pollution, etc.
Each section needs to identify gaps in the science that need to be addressed as well as ongoing, new and additional monitoring needs to keep a handle on existing and emerging issues and enable effective monitoring of SAP implementation progress. Also need to consider interactions and impacts beyond the ecosystem boundaries, for example, land-based plastics pollution affecting the Sargasso. This capture of 'interactive' effects and influences also applies to some of the following sections. Section 6 will need clear subsections including:
 - 6.A. **Physical Oceanography:**
 - Meteorology and seasonality of the upper ocean
 - Decadal changes in temperature and salinity of the upper ocean, and influence of modes of climate variability
 - Properties of and changes in intermediate depth waters in the Sargasso Sea including subtropical mode water (STMW)
 - Current regimes defining the Sargasso Sea Large Marine Ecosystem
 - Mesoscale eddy features and influence on Sargasso Sea variability

- Physical characteristics and changes in the deep water of the Sargasso Sea

6.B. Chemical Oceanography:

- Nutrients in the Sargasso Sea – seasonality and decade changes
- Dissolved oxygen seasonality and deoxygenation in the Sargasso Sea
- Trace element cycling in the Sargasso Sea
- Carbon cycle (inorganic and organic) in the Sargasso Sea; ocean carbon pump
 - Presence and impact of anthropogenic CO₂ emissions including ocean acidification, warming and deoxygenation
- Anthropogenic contaminants in the Sargasso Sea (organics, metals)
 - Plastic contaminants in Sargasso Sea

6.C. Biological Oceanography:

- Food web overview including ocean optics and remote sensing
- Trophic index – status and trends
- Microbial ecology, genomics and eDNA
- Phytoplankton diversity and productivity
- Zooplankton ecology
- Crustacea, Mollusca and other marine invertebrates
- Vertebrates – Fish, Elasmobranchs, Marine Mammals, Sea Birds
 - Species with important life cycle stages beyond the ecosystem boundary (e.g. glass eels)
- Decadal changes in the Sargasso Sea

6.D. Summary of the Current Status of the Sargasso Sea ABNJ as a Large Marine Ecosystem

- Sea Surface and Water Column as a habitat
- The Deep Sea and Seabed including seamounts
- Species presence, dependence and interactions
- Biological Interconnectivity and interaction (within and beyond the Sargasso Sea ABNJ)

7. Socio-Economic Status

This section will focus particularly on the key Sargasso Sea-related industries and associated livelihoods (fisheries, tourism, energy, mining, shipping, etc.). It will include an assessment of how the ecosystem is exploited by the various industries, the impacts of these sectors on the ecosystem, how this is managed (Linking into the section below on Governance, Management, and Policy), what livelihoods the ecosystem supports, noting that important elements of many of these (such as glass eel fishery) may actually be outside of the ecosystem.

7A. Fisheries (including section devoted to Glass Eels/Elvers)

- Target species, annual catches and trends by species and country
- Stock status (level of overfishing)
- Economic value of catches
- By-catch
- Number of livelihoods supported including by country if possible (fishers, processors, etc.)

7B. Energy

- Existing or potential for oil and gas extraction in or adjacent to the Sargasso Sea
- Annual volume(s) extracted
- Known oil/gas operation spills and accidents in or adjacent to the Sargasso Sea

7C. Mining

- Known or possible mineral deposits of economic interest within the Sargasso Sea
- Existing or possible future mining initiatives

7D. Shipping

- Volume of and trends in international shipping traffic through the Sargasso Sea
- Incidence of and trends in oil or other chemical spills in the Sargasso
- Actual or proposed PSSAs in the Sargasso Sea
- Handling of ship ballast water within or adjacent to the Sargasso Sea

7E. Tourism

- Annual numbers and trends for tourism in the Sargasso Sea (whale watching, etc.)

7F. Ecosystem Valuation and Cost Benefit Analysis

- This analysis will consider both a. the actual 'value' of the sectors, e.g. actual annual nominal revenue of fisheries etc. as well as b. the cost of bad management practices (lost economic values). It will assist in informing the issue/threat prioritization exercise as well as the definition and promotion of actions required under the SAP. This section will also consider the relationship to food security and livelihoods. The Cost Benefit Analysis would arise from the Ecosystem Valuation to demonstrate the value of a potentially more efficient collaborative stewardship approach (to include options and associated expectations for addressing the root causes and consequent impacts) in order to further justify the need for an effective SAP by examining the costs of both action and inaction. The CBA may also provide some initial 'thoughts' on sustainability of any monitoring/management/stewardship process that would later be expanded and defined in the SAP. (N.B. See IW:LEARN Manual on Economic Valuation of Ecosystems).

8. Connectivity within and beyond ABNJ System Boundary

This section will consider connectivity within the main system boundary (horizontal and vertical) and across the system boundary (cross-boundary). Internal connectivity will consider such aspects as current regimes and their effects on e.g., the flow of nutrients. It will also consider the influence of the upper pelagic and mesopelagic on the seabed ecosystem and species and vice versa. Cross-boundary connectivity across the adopted system boundary will consider the importance of the Sargasso Sea Geographical Area of Collaboration to external oceanic systems as well as to jurisdictional coastal areas.

9. Management, Policy and Governance (Legislation, institutional/administrative arrangements)

Identifying the status quo on management and decision-making mandates and bodies that already exists (e.g. NAFO, ICCAT, IMO MEPC) including linkages into existing treaties. This section will also need to identify capacity shortfalls and requirements. The section will also identify the main entities that are supporting and/or undertaking scientific studies and data collection within the ecosystem. This section can be helpful in identifying possibilities for 'anchoring' the implementation and actions of a future SAP.

10. Causal Chain Analysis

The CCA involves creating various flow charts that link the 'immediate' causes of the priority threats (e.g. overfishing, ship oil spills, etc.) to their upstream 'root' causes e.g. lack of necessary policy and regulatory frameworks, weak or non-existent implementation of existing policy and regulations, weak or non-existent institutions assigned responsibility for addressing such threats, etc. As with all EDA/TDA exercises, the truly 'ultimate' causes of the vast

majority of environmental threats to ecosystems fall within large scale demographic and macroeconomic spheres such as population growth, income growth, international trade, etc. but these lie beyond the scope of exercises such as these.

11. Summary of Threats and Impacts (Pollution, Overfishing and IUU, climate change, oil/gas/mineral exploitation, etc.)

This section will list (and to degree possible, prioritize) each of the most significant threats to the Sargasso Sea ecosystem and their current and possible future impacts on the overall health of the ecosystem and associated socioeconomic sectors. Prioritisation will be done through an appropriate stakeholder consideration and consensus.

12. Cross-cutting issues such as gender mainstreaming, poverty reduction, employment practices
Links to SDG 14 and other SDGs

Gender equality

Threats to livelihoods

Poverty-related concerns

Safe labour conditions and practices

13. Linkage of SARGADOM DPSIR to GEF EDA/SAP process

In parallel to the SEDA/SAP process, the SARGADOM project will be undertaking the DPSIR (Driver-Pressure-State-Impact-Response) process for the Sargasso Sea. There are a number of similarities and overlaps, as well as differences, between the DPSIR and SEDA/SAP processes; taking advantage of this, selected outputs from the DPSIR approach will provide input to relevant elements of the SEDA and SAP. For example, DPSIR Drivers relate directly to the immediate, root and ultimate causes identified within the SEDA Causal Chain Analysis; the DPSIR State and Impact pertain to the SEDA environmental and socioeconomic status and trends analysis; the DPSIR Response links to the specific reforms and other actions proposed under the SAP.

14. Socioeconomic and -Ecosystem Quality Objectives and Targets:

These will be based on how the partners and stakeholders would wish to see improvements in the ecosystem and associated socioeconomic linkages or even maintain the status quo against possible deteriorating conditions. They would ultimately need to be agreed and adopted by the signatories to the final Strategic Action Programme. The ecosystem quality objectives might include a reduction in the number of shipping collisions with vulnerable species, or an improvement in a particular water quality parameter which is currently below acceptable levels for a health oceanic environment (e.g. a reduction in levels of a specific pollutant). On the socioeconomic side, it could include parameters such as an increase in overall fisheries income from a fishery allowed to recover from historic overfishing.

15. Monitoring Indicators

Based on the Causal Chain Analysis and the various impacts, select primary (priority) and secondary environmental and socioeconomic indicators will be determined that need to be monitored for change as well as to capture any new, emerging concerns. Such Indicators should also and inform short and longer-term monitoring of the SAP implementation towards its Ecosystem Quality Objectives as selected and agreed. In the broader TDA/SAP experience for shared waters systems, GEF has supported the development and monitoring of Process,

Stress Reduction and Environmental & Socioeconomic Status Indicators and this framework can be applied for the Sargasso ecosystem. Where possible this section should also identify responsible parties and scheduling.

16. **Marine Spatial Planning and Area Based Management Tools - Preliminary Recommendations**
The EDA/SAP, as an overall ecosystem 'fact finding' (EDA) and recommendations for governance reforms (SAP), is not intended to be a Marine Spatial Planning exercise, but may include potential recommendations for MSP and other Area-Based Management tools as possible actions under the SAP. The aim would be to provide an initial overview of the spatial and temporal distribution of human activities in the Sargasso Sea Ecosystem boundary (taking into account also ecosystem effects emanating from outside the system boundary) in order to understand and aim to balance ecological, economic, and social aims and objectives (N.B. GEF LME:Learn Toolkit on Marine Spatial Planning). Appropriate ABMTs will also be identified.
17. **Final justification for the proposed Management/System Boundary for the SAP**
Although the SEDA process will have adopted an 'interim' boundary for the ecosystem, the information gathered during the SEDA may suggest modifying this boundary for management/stewardship purposes when developing and implementing the SAP, or it may confirm it. Can the area that has been studied and analysed thought this SEDA be treated as a single system for management/stewardship purposes? Obviously, there are no clear 'permanent' boundaries around a large and highly dynamic ecosystem of this nature. As in the sections above, there needs to be a consideration of the external impacts on the ecosystem as the Sargasso clearly cannot be treated as an isolated ecosystem.
18. **The Socio-Ecosystem Analysis Knowledge and Data Gaps**
Identification of current gaps in environmental and socioeconomic data and knowledge along with proposed sources and potential providers of information to fill such gaps. This analysis would be linked to the development of the SAP monitoring framework described in section 15.

Proposed Appendices:

- I. Communications and Stakeholder Participation Plan
- II. Data and Information Policy and Management Plan
- III. The status of ratification of conventions and agreements pertaining to the Sargasso Sea Ecosystem
- IV. Results of the stakeholder prioritisation of areas of concern
- V. DPSIR flow-chart
- VI. Causal Chain Analysis Flow Chart.
- VII. Bibliography of information and data used for the SEDA