Oil Spill Response Planning

Coastal and Marine Environmental Sensitivity Mapping

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Overview

- **What are sensitivities and why do we map them?**
- **Environmental sensitivity mapping approach**
- **Challenges for sensitivity mapping projects**
- **Lessons learned and next developments**
- **Questions**

What Are Environmental Sensitivities?

IMO/IPIECA Definition

- Resources, habitats, sites or activities are considered sensitive to oil spills because they are:
  1. of environmental, economic, or cultural importance;
  2. at risk of coming in contact with spilled oil; and
  3. likely to be affected once oiled or affected by the oil even without direct contact.
  - (Michel, Christopherson and Whiple, 1994).

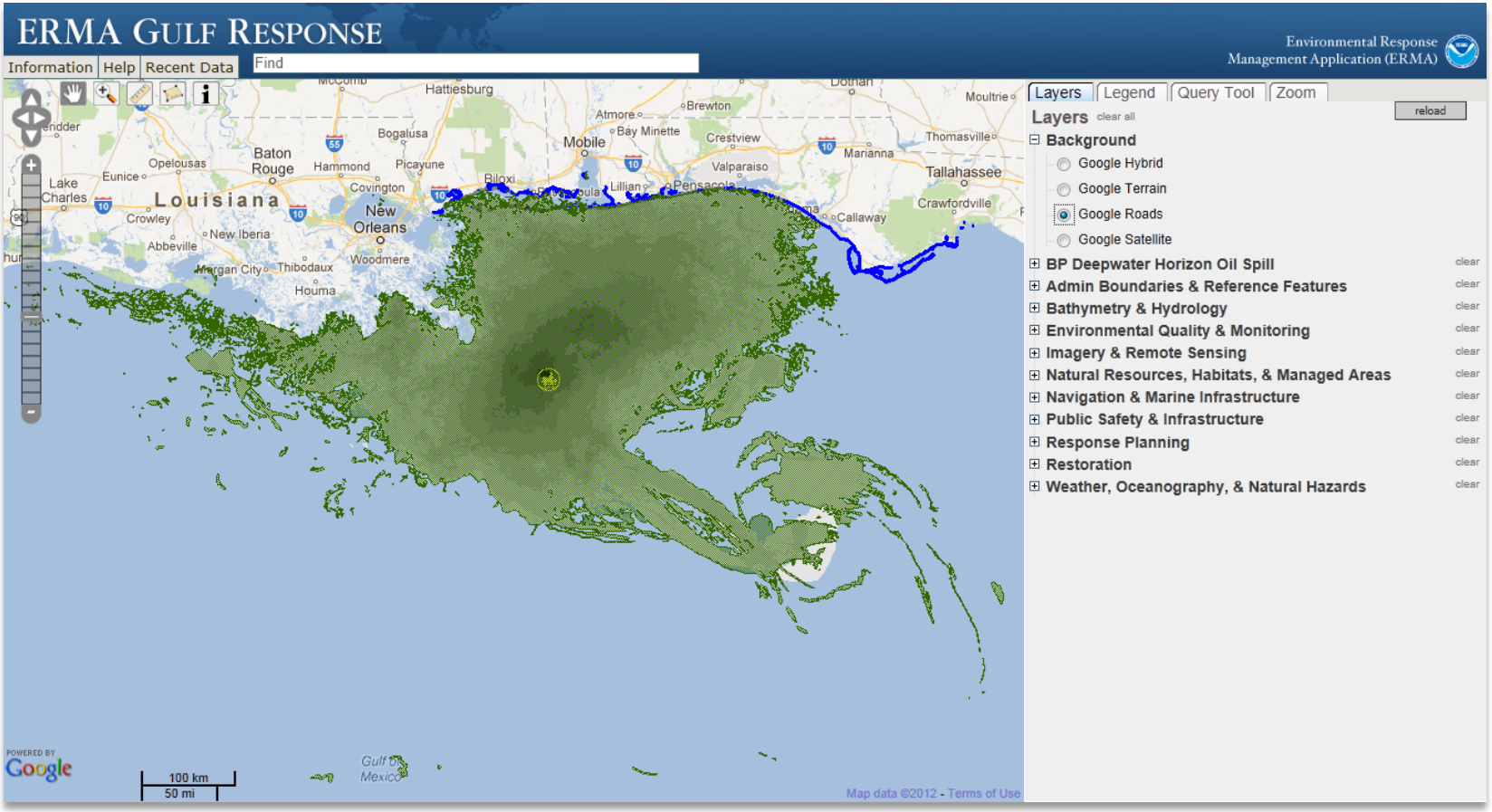
Why Map Environmental Sensitivities?

- **Sensitivity mapping enables:**
  - Most sensitive sites/resources to be identified
  - Priorities for spill response and clean up to be defined
- **Successful sensitivity mapping informs the development of:**
  - Oil spill response strategy and contingency plans
  - Waste management strategies
  - Response equipment deployment
  - Response maps and databases

ESM – A generalized approach

- **5 stages for creating sensitivity maps:**
  1. Define the Study Area
  2. Identify potential sensitive resources and constraints
  3. Acquire baseline data for analysis
  4. Conduct sensitivity assessment
  5. Share and apply results

ESM: 1. Define the Study Area



- http://gomex.erma.noaa.gov/erma.html (Map Data © Google 2012)

ESM: 2. Identify resources and constraints

- **Characterize the Study Area**
  - General environmental characteristics
    - » Identify key environments
    - » Build appropriate assessment team
  - Regulatory environment and stakeholders
    - » International, National, Oil Company
  - Project schedule and budget
    - » Does schedule allow for field surveys, seasonality?
    - » What type of data can be purchased (e.g. satellite imagery)?

ESM: 3. Acquire baseline data

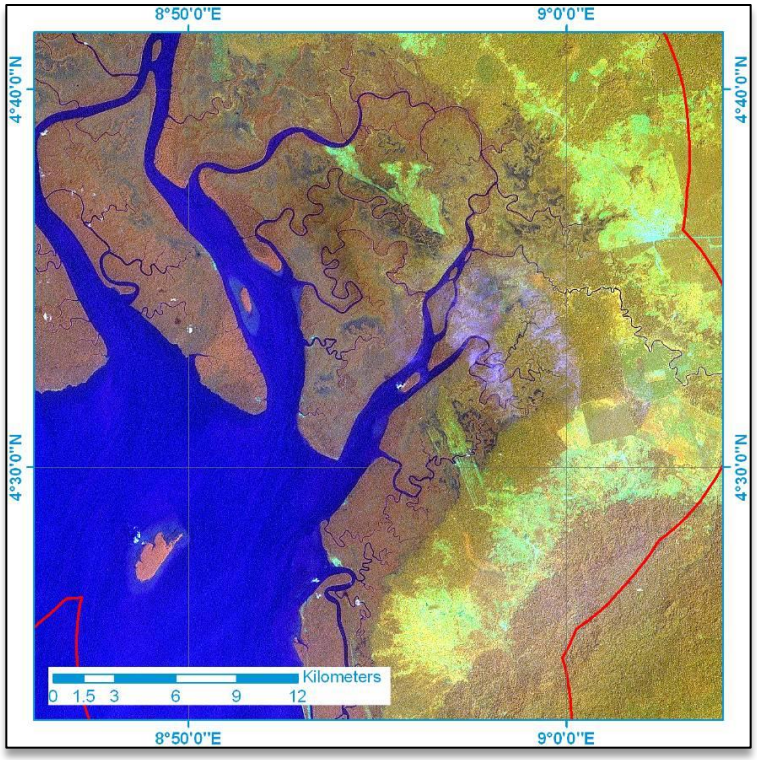
- **Define the data model:**
  - GIS Data Management (formats, coordinate systems, quality control procedures)
  - Document data procedures at project outset
- **Typical data categories:**
  - Shoreline Type
  - Ecological/Biological Resources
  - Social/Cultural Resources
  - Marine Resources

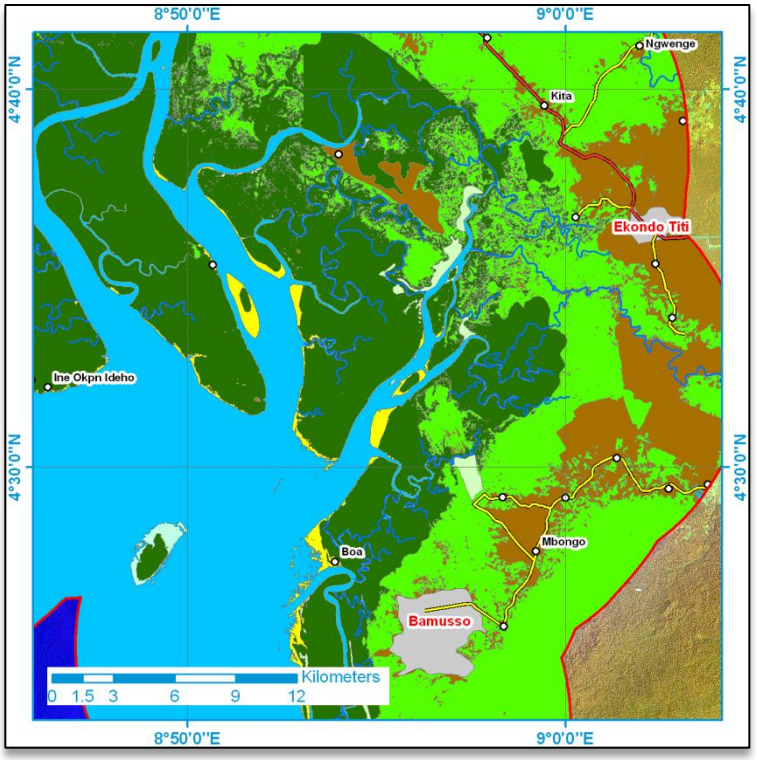
ESM: 3. Acquire baseline data

- **Typical Data Sources**
  - Existing ESMs – do they meet requirements (e.g. GIWACAF)
  - Remote Sensing – satellite/aerials.
  - National/International databases (e.g. UNEP, WCMC)
  - Scientific literature and online databases (e.g. OBIS)
  - Field survey

ESM: 3. Existing ESMs

ESM: 3. Remote Sensing: Regional





AOI	River	Industrial Area Polygon	Mangrove
River Crossing	Primary route	Cliff	Intertidal Sediment and Offshore Sediment
Industrial Area Point	Secondary route	Beach and River Deposits	Water Body
Port/Harbour	Local route	Exposed Ground	Agriculture
Settlement Point	Settlement Polygon	Forest	
Airport	Oil Terminal	Low Level Vegetation	

ESM: 3. Remote Sensing: Detailed

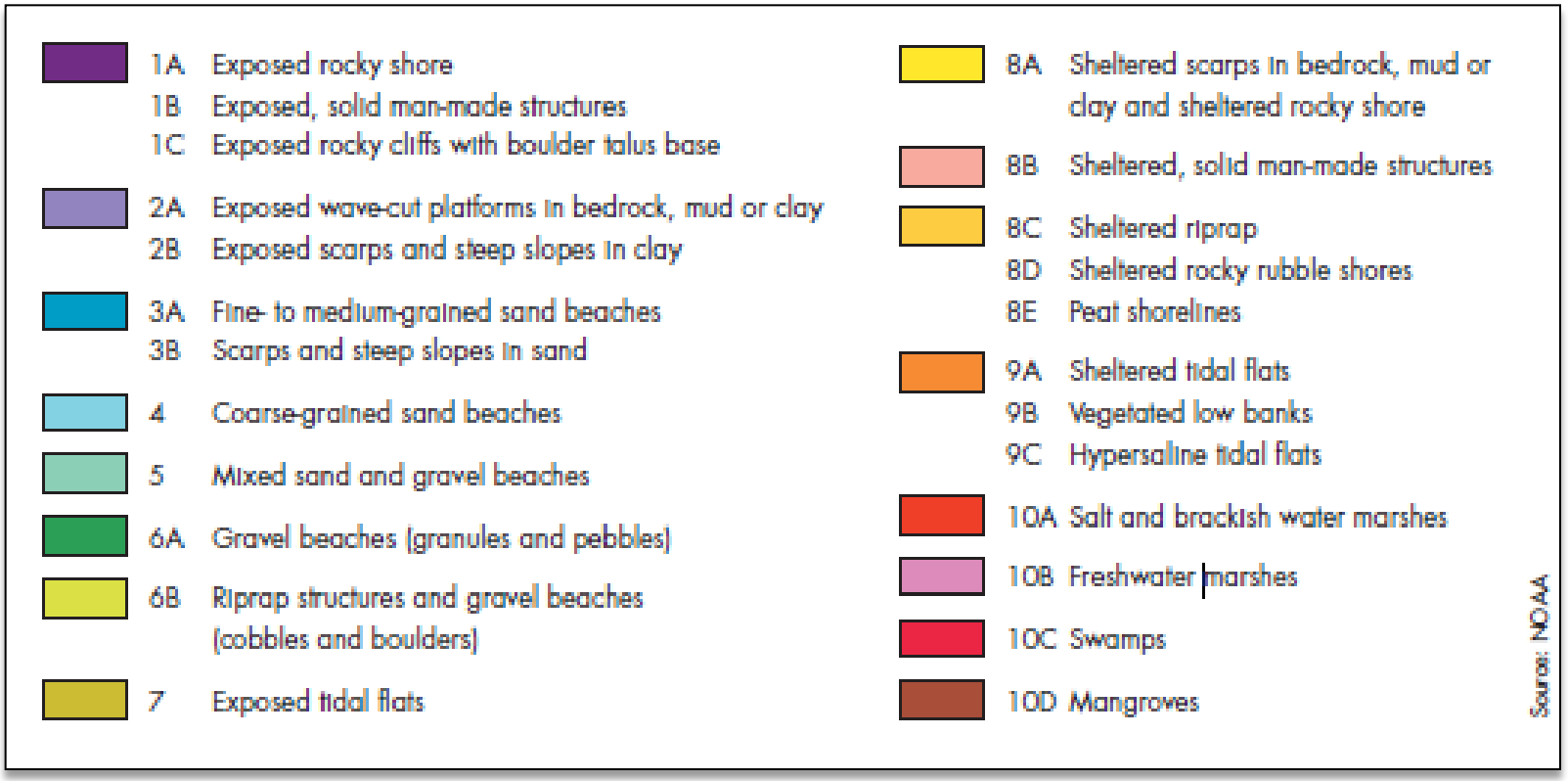
- http://gomex.erma.noaa.gov/erma.html (Map Data © Google 2012)

ESM: 4. Sensitivity Assessment

- **Map resources with respect to sensitivity to spill**
- **Sensitivity criteria will vary by location/environment/project**
- **Existing international guidelines define maps not methods**
  - Standard symbology
  - Standardized terminology
  - High/Medium/Low etc. requires definition

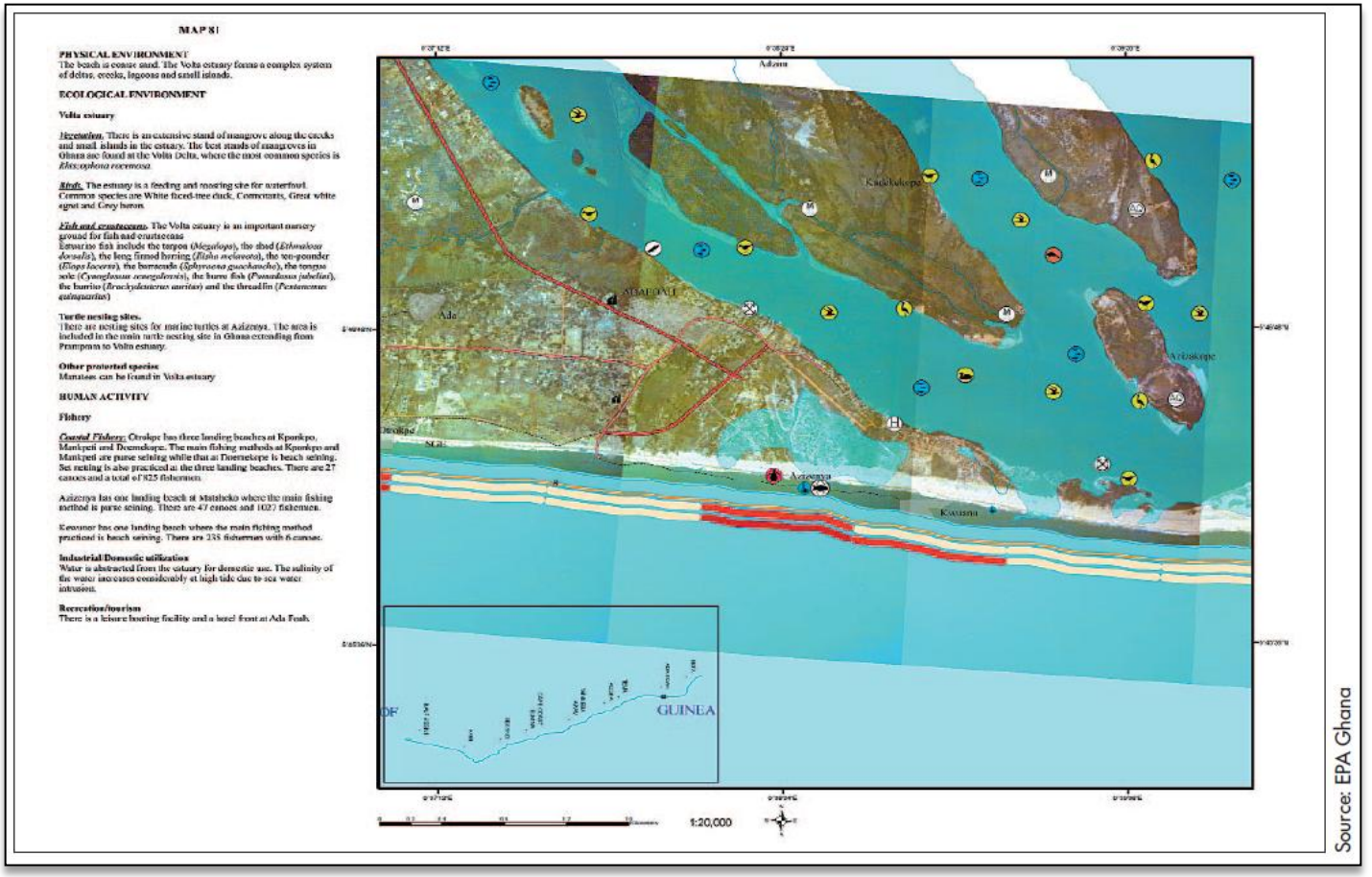
ESM: 4. Sensitivity Assessment - Shoreline

- **Well defined International Guidelines (IMO/IPIECA from NOAA)**



ESM: 4. Sensitivity Assessment

- **Example – Biological/Ecological Resources:**



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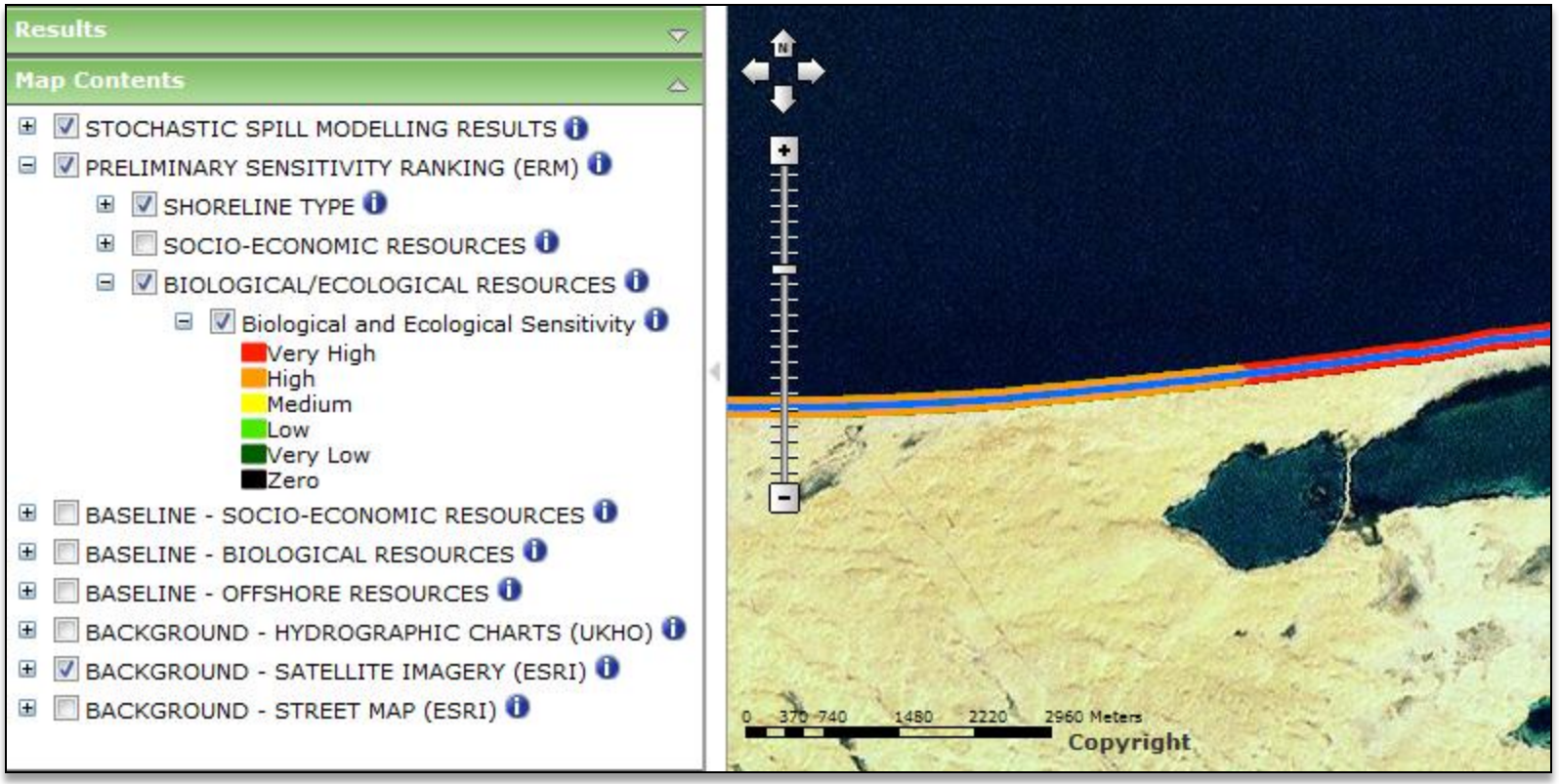
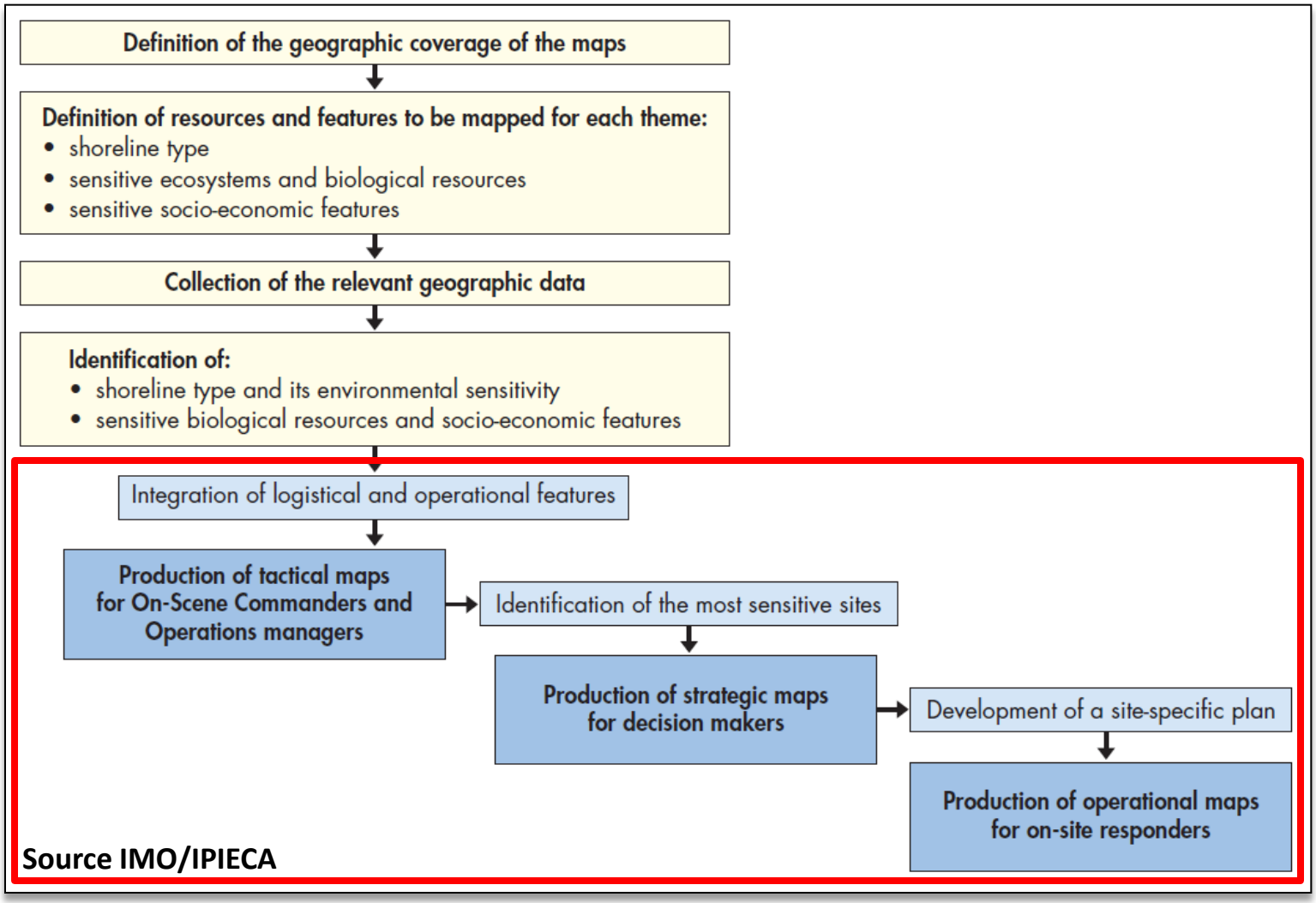
ESM: 4. Sensitivity Assessment

- **Example – Biological/Ecological Resources:**



ESM: 5. Share and Apply Results



ESM: 5. Intelligent Map Production

- **Potential map production at 1:50,000 scale**

ESM: 5. GIS data Sharing

- **For the potential geographic scale the web is the best solution – particularly in planning stage:**
  - User defines area of interest
  - Can zoom to any scale, produce maps on demand
  - Integrated planning tools – online editing, data upload
  - Automate common analysis
  - Can link to existing databases directly (inc. base maps)
  - Integrate with mobile devices
  - Rapidly scalable to response situation
  - Continuously updatable

Lessons learned and next developments

- Defining GIS data standards, data models and workflows is critical for a successful ESM project
- Use existing standards wherever possible
- Identify potential project stakeholders early in the process (data providers, regulators, responders)
- Maintain flexibility for different operating environments (countries, clients, new guidelines, new GIS platforms)

- Questions