

Brussels RP Workshop, Biophysical Data Working Group

The task of the working group was to provide an inventory of the assessments that have been conducted in the North Atlantic, Baltic Sea, Mediterranean Sea and Black Sea Regions that contain biophysical information. Biophysical data are necessary to assess the condition of benthic and pelagic ecosystems and the services they provide, as well as to help quantify human impacts on the environment resulting from marine industries, land-se interactions and climate change. Biophysical data include, but are not limited to, oceanographic (waves, tides, currents, sea ice cover, chlorophyll, Temp. Sal., DO, nutrients, etc.; observations and modelling), meteorological (observations and modelling), bathymetry, seafloor substrate and benthos characteristics (seabed samples, video and acoustic data), sediment geochemistry (sediment composition, including anthropogenic pollutants), satellite and aerial remotely sensed data, river discharge data plus any other type of biophysical data used in making environmental assessments.

The working group went through each chapter of the World Ocean Assessment report outline and took note of existing assessments that have been carried out containing biophysical information in each of the four broad geographic regions. Special attention was given to assessments that are not included in the GRAMED database, either assessments carried out prior to 2008 that were overlooked or assessments that have been carried out since 2008. In cases where the working group was unable to identify any assessment relative to the subject of a given chapter, then existing data sets were listed. In this way a gap analysis was carried out, identifying areas lacking in assessments and/or available relevant data. Finally the capacity building needs for the regions were considered in relation to each chapter and each region.

NORTH ATLANTIC

| Chapter | Existing Assessments (where no assessments exist, available data) | Knowledge Gaps and Capacity Building Needs | Comments |
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| <p><i>Chapter 3. Scientific understanding of ecosystem services</i> Overview of the state of scientific understanding of <u>ecosystem services</u>, including data collection, information management, differences between different parts of the world and research needs.</p> | <ul style="list-style-type: none"> • UK national ecosystem assessment 2011 and 2010 (uknea.unep-wcmc.org) • CP2 - chartingprogress.defra.gov.uk • Scotlands atlas - http://www.scotland.gov.uk/Publications/2011/03/16182005/0 • MSFD national initial assessments (for all chapters) • ICES cooperative reports, working group reports (for all chapters) • QSR 2010 report (all chapters) • Danish assessment reports • 2003 Ecosystem Report ICES • Advice book ICES – ecosystem overview • Norwegian Seas (Barents Sea) Assessments • MAREANO program (Norway) | | |
| <p><i>Chapter 4. The oceans' role in the hydrological cycle</i> 4 A. interactions seawater and freshwater; changes in ice sheets and glaciers, dam-building, ice coverage, sea level changes. 4 B. ocean warming, sea-level change 4 C. Chemical composition of seawater:</p> | <ul style="list-style-type: none"> • CP2 - chartingprogress.defra.gov.uk • Scotlands atlas - http://www.scotland.gov.uk/Publications/2011/03/16182005/0 • OSPAR QSR 2010 • Ocean Climate Report ICES (annually, including Baltic Sea) • Climate change report ICES (cooperative | | |

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| <p>nutrient content 4 F. Heat transportation, circulation patterns, oceanic oscillations (eg. El Niño).</p> | <p>report) 2011</p> <ul style="list-style-type: none"> • Monitoring report (Norwegian and Barents Sea, annually) • Marine morphology dataset (WFD) • Recent literature on Greenland ice sheet • Arctic Council reports and assessments • MyOcean FP7 (hydrodynamics) (research project) | | |
| <p><i>Chapter 5. Sea/air interaction</i> 5 A. atmospheric fluxes concentration of oxygen and carbon. 5 B. Coal industries. 5 C. Meteorological phenomena 5 D. Ocean acidification</p> | <ul style="list-style-type: none"> • Report CRR290 (ICES) • Outcome Monaco meeting on Ocean acidification 2010 • SOLAS project solas-int.org • Arctic Council assessments | | |
| <p><i>Chapter 6. Primary production, cycling of nutrients, surface layer and plankton</i> 6 A. Global distribution of primary production, variability and resilience changes (eg. ultra-violet radiation from ozone-layer changes). 6 B. Surface layer and plankton, variations in plankton species.</p> | <ul style="list-style-type: none"> • Annual reports on status of continuous plankton surveys (SAHFOS-UK) • ICES assessments (integrated working group for North Seas) (working group on ecosystem functioning) • Arctic Council • Norway • Remote-sensing community | | |
| <p><i>Chapter 7. Ocean-sourced carbonate production</i> Atolls and beaches –impacts of acidification.</p> | <ul style="list-style-type: none"> • Bermuda | <p>Information on carbonate beaches (Scotland – corals)</p> <p>Data Gap?</p> | |

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| <p><i>Chapter 34. Scale of marine biological diversity</i> Main gradients of species, communities and habitats.</p> | <ul style="list-style-type: none"> • Arctic Council ABA (2013) • Danish report/mapping exercise of habitats in North Sea • Strategic initiative on biodiversity (ICES, report available?) • European fauna and flora Directives • OSPAR ICG COBAM (Biodiversity Advice Manual) • OSPAR QSR 2010 | | |
| <p><i>Chapter 35. Extent of assessment of marine biological diversity</i> Proportion of major groups of species and habitats in different regions that are assessed on a systematic basis for status, trends and threats.</p> <ol style="list-style-type: none"> a. Coastal rock benthic habitats b. Coastal sediment habitats, c. Shelf rock biogenic reef habitats d. Shelf sediment habitats e. Bathyal and abyssal habitats f. Water column habitats | <ul style="list-style-type: none"> • Census of Marine Life http://www.coml.org/ • European Water Framework Directive (coastal habitats) • Marine Strategy Framework Directive reports • Natura2000 reports • OSPAR QSR • CP2 - chartingprogress.defra.gov.uk • Infomar seabed mapping (Irish EEZ) • MARIANO program and dataset • SEAPOP seabird program (mapping and status) • EIA for industrial offshore activities • Cooperative research report CRR288 (2007) (ICES) • GEOHAB Atlas • EUNIS level 2 • Zooplankton status report ICES • Integrated assessment working group reports (ICES) | <ul style="list-style-type: none"> • Seamounts • FAO report on VMEs • CBD report on EBSAs | |

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| | <ul style="list-style-type: none"> • Literature on habitats of Mid-Atlantic Ridge • INTERRIDGE program • Coastal seabed classification of ICES CRR286 • Seabirds CRR258 (ICES report) • MAR-ECO North and Mid Atlantic http://www.mar-eco.no/ • ACES project • Norwegian program on cold-water corals <ul style="list-style-type: none"> • HERMES project http://www.eu-hermes.net/ • SAC special areas of conservation (Natura2000) | | |
| <p><i>Chapter 36. Overall status of major groups of species and habitats</i> Summary, by major group and marine region, of the status, trends and threats, including the cumulative effects of pressures, shown by those assessments.</p> <ol style="list-style-type: none"> a. Coastal rock benthic habitats b. Coastal sediment habitats, c. Shelf rock biogenic reef habitats d. Shelf sediment habitats e. Bathyal and abyssal habitats f. Water column habitats <p>Coral (and other biogenic) reefs Hydrothermal vents & cold seeps Kelp forests</p> | <ul style="list-style-type: none"> • Arctic Council ACIA reports (e.g. sea ice habitat) • Wadden Sea Treaty assessments (Common Wadden Sea Secretariat) • Ramsar Convention | | |

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| Mangroves, salt marsh and other macro-vegetation areas Migratory marine species Seagrass and eel-grass beds <u>Sea ice habitat</u> <u>Tidal flats</u> <u>Contamination !</u> | | | |
| <i>Chapter 37-42. Marine ecosystems, species and habitats identified as threatened, declining or otherwise in need of special protection.</i> <i>Chapter 37. Coastal rock benthic habitats</i> | <ul style="list-style-type: none"> • FFH EU Habitats Directive (Natura2000) • IUCN assessments on species • BirdLife International • Bonn Convention • ASCOBANS • CMS • WFD and MSFD • Norwegian valuable and vulnerable areas | Decreasing trend in-situ observations Biodiversity knowledge/data Biological and environmental standards and criteria (what is good/bad?) | |
| <i>Chapter 38. Coastal sediment habitats</i> | <ul style="list-style-type: none"> • Wadden Sea • Ramsar wetlands | | |
| <i>Chapter 39. Shelf rock biogenic reef habitats</i> | | | |
| <i>Chapter 40. Shelf sediment habitats</i> | | | |
| <i>Chapter 41. Bathyal and abyssal habitats</i> | | | |
| <i>Chapter 42. Water column habitats</i> | | | |
| Coral (and other biogenic) reefs | | | |
| Hydrothermal vents & cold seeps | | | |
| Kelp forests | <ul style="list-style-type: none"> • Kelps on coast of Norway (Pollution and Climate Control Authority, KLIF) | France national assessments (IFREMER?) | |

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| Mangroves, salt marsh and other macro-vegetation areas | <ul style="list-style-type: none"> • Wadden Sea Treaty • WFD UK (on salt marshes) | Bermuda | |
| Migratory marine species | <ul style="list-style-type: none"> • ASCOBANS • National surveys of whales (IR) • EIA for wind farms (impact) • Stock assessments • BirdLife International • Bonn Convention • SCANS Surveys for Cetaceans in EU waters • IWC (cetaceans) • ICES (seals) | | |
| Seagrass and eel-grass beds | <ul style="list-style-type: none"> • OSPAR recommendation for protection (reports WFD) • Wadden Sea Treaty | | |

BALTIC SEA

| Chapter | Existing Assessments (where no assessments exist, available data) | Knowledge Gaps and Capacity Building Needs | Comments |
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| <p><i>Chapter 3. Scientific understanding of ecosystem services</i></p> <p>Overview of the state of scientific understanding of ecosystem services, including data collection, information management, differences between different parts of the world and research</p> | <p>Assessment of Sweden “What can the sea give us?” (Swedish Environmental Agency)</p> | | |

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| needs. | | | |
| <p><i>Chapter 4. The oceans' role in the hydrological cycle</i></p> <p>4 A. interactions seawater and freshwater; changes in ice sheets and glaciers, dam-building, ice coverage, sea level changes.</p> <p>4 B. ocean warming, sea-level change</p> <p>4 C. Chemical composition of seawater: nutrient content</p> <p>4 F. Heat transportation, circulation patterns, oceanic oscillations (eg. El Niño).</p> | <ul style="list-style-type: none"> • Studies on exchange of water between Baltic and North Sea, fauna and flora (Denmark, Sweden, Germany) Danish Environmental Protection Agency, SEPA • HELCOM (compilation) indicator fact sheets • Flow information from rivers and coastal point sources (in HELCOM Pollution Load Compilation reports and indicator fact sheets) • BACC Assessment of climate change for the Baltic Sea Basin • Balticseportal.fi • ICES on Oceans Climate • Bonus project on oil spill (including circulation) • Assessments of nutrient input from industry • Nutrients: Baltic Nest Institute and HELCOM assessments • (List sent by Samuli Korpinen) | | |
| <p><i>Chapter 5. Sea/air interaction</i></p> <p>5 A. atmospheric fluxes concentration of oxygen and carbon.</p> <p>5 B. Coal industries.</p> <p>5 C. Meteorological phenomena</p> <p>5 D. Ocean acidification</p> | <ul style="list-style-type: none"> • BACC report and ICES CRR290 report • Swedish Meteorological Institute • IOW Status Reports (mainly oxygen) • HELCOM Acidification Report • Balticseportal.fi • EMEP transboundary transport of air pollutions | | |
| <p><i>Chapter 6. Primary production, cycling of nutrients, surface layer and plankton</i></p> <p>6 A. Global distribution of primary</p> | <ul style="list-style-type: none"> • Paper on long-term changes in phytoplankton communities (1966-2008) Olli <i>et al.</i> (2011) Boreal Environmental Research | | |

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| <p>production, variability and resilience changes (eg. ultra-violet radiation from ozone-layer changes). 6 B. Surface layer and plankton, variations in plankton species.</p> | <ul style="list-style-type: none"> • ICES Expert group on integrated assessment, cooperative research group report 2010 CRR302 • Indicator report on phytoplankton (List) • Danish assessments | | |
| <p><i>Chapter 7. Ocean-sourced carbonate production</i> Atolls and beaches –impacts of acidification.</p> | | | Not Relevant |
| <p><i>Chapter 34. Scale of marine biological diversity</i> Main gradients of species, communities and habitats.</p> | <ul style="list-style-type: none"> • IUCN Red list species and biotopes report by HELCOM (2013) • Benthic Habitat Map EUSEA mapping project | | |
| <p><i>Chapter 35. Extent of assessment of marine biological diversity</i> Proportion of major groups of species and habitats in the different marine regions that are assessed on a systematic basis for status, trends and threats. a. Coastal rock benthic habitats b. Coastal sediment habitats, c. Shelf rock biogenic reef habitats d. Shelf sediment habitats e. Bathyal and abyssal habitats f. Water column habitats Hydrothermal vents & cold seeps Mangroves, salt marsh and other macro-vegetation areas</p> | <ul style="list-style-type: none"> • IUCN Red list species and biotopes report by HELCOM (2013) • Breeding birds by HELCOM • Check list of all macro species by HELCOM • Scientific study on micro species: Status of biodiversity in the Baltic Sea, Henn Ojaveer (Strategic biodiversity) PLOS One • Check ICES Expert group on integrated assessment • GEOHAB Atlas case studies • Thermogenic methane in Danish and Swedish waters: papers and reports under Habitats Directive • Institute of Baltic Sea Fisheries reports (seagrasses) • EEA summary report and WFD reports on | | |

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| <p>Migratory marine species Seagrass and eel-grass beds <u>Sea ice habitat (seasonal)</u> <u>Anoxic bottom masses</u> (seasonally and interannually variation – stratification) <u>Contamination !</u></p> | <p>seagrasses and seaweeds</p> <ul style="list-style-type: none"> • Wintering (migratory) seabirds report from Nordic Council of Ministers (SOWBAS) • EIA for offshore wind farms in Germany • Check BFN (Federal Agency for Nature Conservation) book on German waters • Habitats Directive reports (Natura2000) • HELCOM offshore macrobenthic assessment • WFD (AMBI indices) • Paper on systematic ecological approach Rintila (2009) (on sea ice) • HELCOM indicator fact sheet (sea ice) • Red list IUCN assessment (fish) • ICES stock assessments • Coastal fish assessments (HELCOM) • Seal assessment HELCOM (june 2013) and harbor porpoise assessment • IUCN assessment on harbor porpoise in Baltic Sea • WFD and/or Habitats Directive report on salt marshes • Swedish assessment on anoxic bottom masses • Danish reports on anoxic deficit • BALANCE project balance-eu.org on anoxic waters • Thematic assessments on hazardous substances (HELCOM) | | |
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| <p><i>Chapter 36. Overall status of major groups of species and habitats</i> Summary, by major group and marine region, of the status, trends and threats, including the cumulative effects of pressures, shown by those assessments.</p> <p>a. Coastal rock benthic habitats b. Coastal sediment habitats, c. Shelf rock biogenic reef habitats d. Shelf sediment habitats e. Bathyal habitats f. Water column habitats</p> <p>Hydrothermal vents & cold seeps Mangroves, salt marsh and other macro-vegetation areas Migratory marine species Seagrass and eel-grass beds</p> <p><u>Sea ice habitat</u> <u>Contamination !</u></p> | | <ul style="list-style-type: none"> • Lack on knowledge on connectivity between open sea and coastal waters • Data on spawning grounds • Harbor porpoise population data (in Baltic Sea) • Impact of litter and underwater noise • Need of taxonomists | |
| <p><i>Chapter 37-42. Marine ecosystems, species and habitats identified as threatened, declining or otherwise in need of special protection.</i> <i>Chapter 37. Coastal rock benthic habitats</i></p> | <ul style="list-style-type: none"> • IUCN Red list species and biotopes report by HELCOM (2013) • Habitats Directive reports • German national offshore parks • Marine biosphere reserves (UNESCO) | | |
| <p><i>Chapter 38. Coastal sediment habitats</i></p> | | | |
| <p><i>Chapter 39. Shelf rock biogenic reef habitats</i></p> | | | |

MEDITERRANEAN SEA

| Chapter | Existing Assessments (where no assessments exist, available data) <u>comprehensive list of assessments in IOC analysis</u> | Knowledge Gaps and Capacity Building Needs | Comments |
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| <p><i>Chapter 3. Scientific understanding of ecosystem services</i> Overview of the state of scientific understanding of ecosystem services, including data collection, information management, differences between different parts of the world and research needs.</p> | <ul style="list-style-type: none"> • Assessment on state of marine environment • Sustainable development outlook • UNEP/MAP Initial integrated assessment 2012 • www.rac-spa.org (assessment on fisheries, MPAs,...) • www.unepmap.org (links to other websites included) • Report Medwet (at Mediterranean scale) (wetlands services) • Reports on seagrass meadows for protection against coastal erosion | | |
| <p><i>Chapter 4. The oceans' role in the hydrological cycle</i> 4 A. interactions seawater and freshwater; changes in ice sheets and glaciers, dam-building, ice coverage, sea level changes. 4 B. ocean warming, sea-level change 4 C. Chemical composition of seawater: nutrient content</p> | <ul style="list-style-type: none"> • UNEP/MAP Integrated assessment 2012 includes elements related to hydrographical cycle, nutrients and eutrophication level • EU projects f.i. SESAME www.sesame-ip.eu • Sea level monitoring network (managed by ISPRA) and report on sea level variation • EMODNET for physical parameters and | <ul style="list-style-type: none"> • Information on deep currents, mixing phenomena is lacking | |

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| <p>4 F. Heat transportation, circulation patterns, oceanic oscillations (eg. El Niño).</p> | <p>biochemistry (data) (assessment by ISPRA, in MSFD reports)</p> <ul style="list-style-type: none"> • Operational oceanography network MedGOOS (forecast, temperature, information portal) • MyOcean http://www.myocean.eu/ • Ludwig 2009 Flow regimes of rivers and river discharges of nutrients in the Mediterranean • International Hydrographical Organisation (information on river flows) • WISE information system, or EEA | | |
| <p><i>Chapter 5. Sea/air interaction</i> 5 A. atmospheric fluxes concentration of oxygen and carbon. 5 B. Coal industries. 5 C. Meteorological phenomena 5 D. Ocean acidification</p> | <ul style="list-style-type: none"> • Reports on oxygen production and primary production by MyOcean | <ul style="list-style-type: none"> • Lack of accurate data on ocean acidification (only 1 lab in France with specific study) • Knowledge and data gap on all topics | |
| <p><i>Chapter 6. Primary production, cycling of nutrients, surface layer and plankton</i> 6 A. Global distribution of primary production, variability and resilience changes (eg. ultra-violet radiation from ozone-layer changes). 6 B. Surface layer and plankton, variations in plankton species.</p> | <ul style="list-style-type: none"> • Reports on oxygen production and primary production by MyOcean (modelling included) • UNEP/MAP Initial integrated assessment 2012 • Ligurian Sea: assessment of species composition of phytoplankton • Check on work of IFREMER | | |
| <p><i>Chapter 7. Ocean-sourced</i></p> | | | |

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| <p><i>carbonate production</i> Atolls and beaches –impacts of acidification.</p> | | | |
| <p><i>Chapter 34. Scale of marine biological diversity</i> Main gradients of species, communities and habitats.</p> | <ul style="list-style-type: none"> • UNEP/MAP Initial integrated assessment 2012 • Specific studies on biodiversity, link with climate change by www.rac-spa.org • Jacques Blondel 2010: The Mediterranean Region: general study on Mediterranean (marine) biodiversity (Oxford University Press) • Reports from ISPRA (in MSFD reports) • 2002 EEA report on biodiversity (Med) (not included in GRAMED!) • PLoS ONE Vol 5 M. Coll 2010 The biodiversity of the Mediterranean Sea: Estimates, Patterns and Threats | | |
| <p><i>Chapter 35. Extent of assessment of marine biological diversity</i> Proportion of major groups of species and habitats in the different marine regions that are assessed on a systematic basis for status, trends and threats.</p> <p>a. Coastal rock benthic habitats b. Coastal sediment habitats, c. Shelf rock biogenic reef habitats d. Shelf sediment habitats</p> | <ul style="list-style-type: none"> • Reports for Habitats Directive 2007 • Reports of ISPRA for MSFD • EUSeaMap for seabed habitats • Ligurian Sea: assessment of species composition of phytoplankton • GEOHAB Atlas: Seagrass meadows <i>Possidonia oceanica</i>; seeps in Adriatic; submarine canyons • www.rac-spa.org (technical reports) | <ul style="list-style-type: none"> • Data on deepsea habitat | |

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| <p>e. Bathyal and abyssal habitats f. Water column habitats Coral (and other biogenic) reefs Hydrothermal vents & cold seeps Kelp forests Mangroves, salt marsh and other macro-vegetation areas Migratory marine species Seagrass and eel-grass beds <u>Contamination !</u></p> | | | |
| <p><i>Chapter 36. Overall status of major groups of species and habitats</i> Summary, by major group and marine region, of the status, trends and threats, including the cumulative effects of pressures, shown by those assessments. a. Coastal rock benthic habitats b. Coastal sediment habitats, c. Shelf rock biogenic reef habitats d. Shelf sediment habitats e. Bathyal and abyssal habitats f. Water column habitats</p> | | | |
| <p><i>Chapter 37-42. Marine ecosystems, species and habitats identified as threatened, declining or otherwise in need of special protection.</i></p> | <ul style="list-style-type: none"> • Reports for Habitats Directive 2007 • Reports of ISPRA for MSFD • <i>Caretta caretta</i> studies and IUCN Red list | <ul style="list-style-type: none"> • Link between pollution or other pressures and status of habitats or species • Geographical gap, most analyses are close to hotspots and coasts | |

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| Chapter 37. Coastal rock benthic habitats | <ul style="list-style-type: none"> • UNEP/MAP Special Protected Areas: Assessment and prospectives 2010 • Ecologically protected area: assessment in MSFD reports (of Italy, France, Spain) • Contamination information in UNEP/MAP Initial integrated assessment 2012 • Microbial pollution 2008 • Atlas of wintering water birds in Libya 2005-2010 survey | <ul style="list-style-type: none"> • Integrated monitoring program is lacking (chemical monitoring is sufficient, biodiversity monitoring is poor) • Availability/communication of data should be improved • Assessment of benthic communities, and not-commercially exploited fish species • Approach/methodology/structure of assessments is not always useful – need for more appropriate assessments in line with most recently developed methodologies • <u>Regional cooperation could be improved</u> (even between EU MS) – <u>need for common monitoring approaches, methodologies</u> | |
| <i>Chapter 38. Coastal sediment habitats</i> | | | |
| <i>Chapter 39. Shelf rock biogenic reef habitats</i> | | | |

BLACK SEA

Further information:

1. State of Environment Report 2001-2006/7 (blacksea-commission.org)

Publications at Information&Resources on Black Sea Commission Website

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Link to data center and library: <http://nodc.ibss.org.ua/>