

# Working Group 5

## Marine Ecosystem Change

### Introduction

*SBA “language” added up front to address policy/decision makers and implicitly make connection with other SBA’s such as Ecosystems, Climate, Health, Disasters, Agriculture*

-Marine Biosphere:

- 71% of the Earth’s surface
- average water depth: 3.8 km;
- subsurface marine biosphere: > 1 km

-- (Microbial) diversity extremely high

-- 1 l Sea water:

10<sup>9</sup> bacteria; 10<sup>9</sup> Archaea; ca. 10<sup>3</sup> microbial eukaryotes

-- 20,000 bacterial “species” in 1 l. Sea water

--- Very much and very different ecosystems

--- Determines Biogeochemical cycles and climate

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### Activities

#### **-5.3.1. Defining Marine Realms and Associated Ecosystems (Ecosystem Classification)**

*It was decided to adopt the highly complementary “MEOW” (coastal) and “GOODS” (open ocean) ecosystem classifications, to stimulate merging of the two and to further fine tune such a marine ecosystem classification for biodiversity change purposes.*

*The results of this activity will also be incorporated in the reports of GEO SBA Ecosystems Task ECO-09001b (Global Ecosystem Mapping) as discussed with Roger Sayre.*

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### Activities

#### **-5.3.2. Monitoring and Observation Platforms.**

*It was emphasized that (very) long sustained and comprehensive biological observations in combination with well-defined physical and chemical contextual measurements are absolutely crucial to monitor biodiversity change in the marine environment, amongst others to discriminate between natural and anthropogenic climate change as drivers of change. To this end WG 5 will strongly endorse any activity to continue and start such long term observations worldwide both in the open ocean (e.g. SAHFOS, BATS, HOTS, PAP, Station M) and coastal ocean.*

*Key requirement: Sustainable monitoring must be funded in a sustainable fashion separate from (short term) research funding.*

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## Activities

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### **-5.3.3. Examples of marine monitoring activities. (Pelagic, Benthic, in situ, remote)**

*A table summarizing building blocks for a global Marine Biodiversity Network including:*

*Program title*

*Objectives*

*Species/Parameters and/or ecosystems*

*Geographic coverage*

*Time coverage, etc.*

*WG5 will promote the addition of biological sensors on existing physical and and/or chemical monitoring devices and, vice versa, to add physical and chemical sensors on “living mobile modes of monitoring”, i.e. tagged animals.*

## Activities

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### 5.3.4.Data.

#### - 5.3.4.1 Historical, anecdotal, archaeological and fossil biological data

*One way to “reconstruct” (mostly coastal) long biological time series in retrospect, is to “dig up” hidden data of all sorts and kinds, to digitalize them if necessary and to make them accessible through well-known databases.*

*This will be a long term, on going activity for which we need regional, national and local contacts. For that reason WG5 is extending its membership and network to “cover” all costal areas world wide, i.e. representatives from all continents.*

*In collaboration with WG 1 an attempt will be made to use the SAHFOS repository representing ca. 75 years of observations to build a genetic time series to relate genetic changes with population changes and past biodiversity change.*

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### Activities

#### **-5.3.4.2 Existing data and data accessibility**

*WG 5 emphasized that all data available should be incorporated in well known freely accessible data bases such as ICES, OBIS, GBIF realizing that it is still a difficult task to make a comprehensive inventory of all present-day marine biodiversity programs and activities world wide.*

*In connection with WG 1 activities on microbial metagenomic diversity studies, a CoML-ICoMM representative will be attracted by that WG amongst others to optimally use the sequence + meta+ contextual data in the MIROBIS database for a modelling exercise relating genomic data diversity to environmental change*

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### **Activities**

#### **-5.3.4.3. Data standardization, databases and identification of key gaps**

*WG5 will pay attention to standardizing protocols related to sampling, sample processing, sample, storage and data handling within large international programs*

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### **Activities**

#### **5.3.4. Invasive species**

*Detection and monitoring of Invasive Species and Harmful Algal Blooms.*

*Monitoring network based on field stations is indispensable both for large and micro-organisms (through sequencing)*

#### **5.3.5. Modelling**

*Based on data inventories, climate change and socio-economic scenarios models need to be developed to predict impact of invasive species, harmful algal blooms, etc.*

#### **5.3.6. Capacity Building**

*WG 5 will stimulate capacity building in developing countries through IOC, POGO, SCOR to increase sustained observations in the southern hemisphere*

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### **5.4 Deliverables**

- IPPC report on marine Biodiversity at regular intervals [ **all WG's???** ]
- Outreach regarding the objectives, benefits and challenges of marine biodiversity observation [ **all WG's???** ]
- Development of a global integrated marine observation plan
- Liasons with data holders of commercial species (ICES, etc.)
- List of data providers of invasive species
- Comprehensive inventory of all past and present marine organizations and
- Comprehensive inventory of cruise summary reports with a biological component to make
- A metadata base type inventory of historical (and present) biological data and data series
- Early products using existing expertise and datasets to advance scientific understanding of biodiversity change
- One detailed marine ecosystem clasification
- To be continued

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### **5.5. Data**

- *Summary of Activity 5.3.3 Data*

### **5.6. Implementation partners**

- *Regional networks of marine stations*
- *Coastal and open ocean programs*
- *Private Foundations*
- *Commercial partners*

### **5.7. Coordination**

- *Royal NIOZ for the next three years*

### **5.8 Schedule, 5.9 Financials, 5.10 Barriers**

- *Yet to be done. Tables.*