MARINE & COASTAL DATA

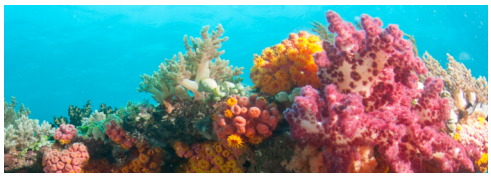
The world's oceans are extensive, difficult to survey and highly varied across the globe. In addition there are areas rich in biodiversity and many features are threatened by a variety of anthropogenic activities. Existing marine data is patchy and incomplete. For all these reasons it is therefore important that there is awareness of the available data, its potential uses and limitations. There is limited awareness of the available marine and coastal datasets and information can be difficult to access. Knowledge of the gaps within data that might affect its reliability and suitability to answer specific questions is also key. Issues include a lack of knowledge of what datasets exist and the incorrect choice of data to include within analysis.

A review was carried out of marine biodiversity datasets to list the various types, the data gaps to support the appropriate use of data. ***This is an a summary of the full manual of marine and coastal data of biodiversity importance.***

Data Types: Nine categories of data were identified during the review of 78 datasets of marine and coastal biodiversity importance

Biogenic Habitat

Habitats created by plants or animals, which grow in such a manner that they provide a unique environment and physical structure for other organisms to live. Examples of marine and coastal biogenic habitats include warm-water corals, cold-water corals, mangroves, saltmarshes, seagrass meadows and kelp beds.

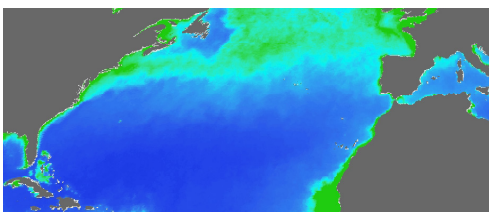


Ecological status and impact

Describes the degree to which human uses of the environment have altered the structure and functioning of plant and animal communities. A geographical area can be assigned an ecological status class e.g. high (relatively undisturbed by man), good, moderate, poor, bad.

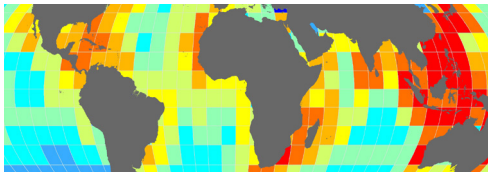
Environment descriptor

Variables that can be used to depict the environment. They include physical, environmental and biological variables and can be used to monitor environmental changes through space and time. They are also used as predictors in species distribution models. For example, mean sea surface temperature or bathymetry.



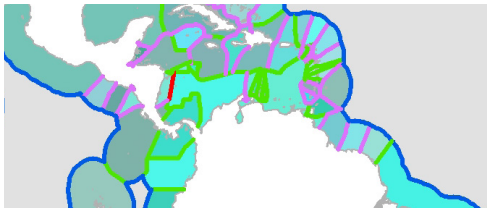
Biodiversity Metric

Biodiversity metrics are designed to numerically measure the value of biodiversity in space and time. They can be used to monitor biodiversity changes through time, or to identify areas of high biodiversity value such as sites showing high levels of species richness.



Administration

Administrative datasets are essential tools to support spatial analyses of marine and coastal biodiversity for impact assessment, research and conservation purposes. These datasets define political boundaries rather than biodiversity features.

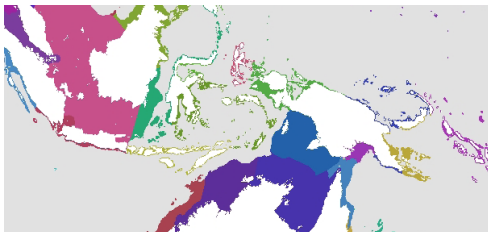


Species Distribution

The distribution of a species is understood here as the geographical spaces where the species may be found. Species distributions can be expert-derived or predicted by numerical models

Biogeographic Classification

Biogeographic classifications are used to understand how and where species are distributed, and to mark the boundaries between oceanographic regimes. They help assessing which habitats, communities and species could be subject to disproportionate impact, because of concentration of human activities, species/habitat rarity, or limited extent of distribution. Examples include Large Marine Ecoregions of the World or Global distribution of Seamouts.

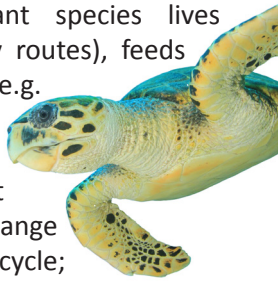


Areas of Biodiversity

Areas of biodiversity importance include a range of protected areas (e.g. World Heritage Sites) as well as the many approaches used to identify sites for conservation effort and protection (e.g. Key Biodiversity Areas, Ecologically or Biologically Significant Areas).

Species Habitat

In simple terms, a habitat is where an animal or plant species lives (including migratory routes), feeds and reproduces (e.g. breeding, spawning, nesting, and nursery sites). The habitat of a species may change throughout its life cycle; e.g. larvae and adult fish are generally found in different locations.



UNEP WCMC

Data Gaps & Solutions

Introduction

Understanding the impacts of pressures on both marine species and the people that depend on them for livelihoods requires substantial data on the species, and on the bio-geochemical and oceanographic processes. An understanding of the data gaps and of the appropriate use of data can help the planning and delivery of improved solutions for marine biodiversity.

Why are there data gaps?

Data Collection is Challenging

Collecting data in the marine environment is expensive. The environment is logistically challenging because of its large size and remoteness. Marine scientists must also rely on advanced technologies and equipment such as oceanographic research vessels, submersibles, remotely-operated vehicles and remote-sensing (i.e. satellite telemetry, aerial photography).

Scientific knowledge

Despite an estimated 2.2 million species living in the oceans, it is thought that 91% of these have not yet been described. Gaps in knowledge, such as this, hamper the understanding of marine biodiversity.

What are the data gaps?

Spatial & Temporal Data Gaps

It is estimated that 95% of the ocean remains unexplored. There is a strong bias in sampling effort and data availability towards temperate regions in the Northern hemisphere, such as the North Atlantic Ocean.

Sea surface, coastal areas and the continental shelf are more studied than the deep ocean. Areas beyond national jurisdiction are comparatively unexplored. In addition, more records are collected, on average, during the summer months.

Species Data Gaps

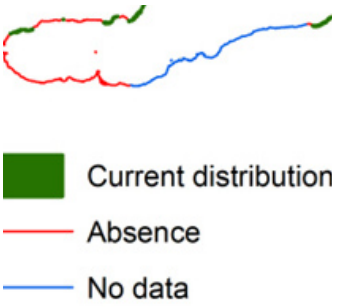
There is a bias in knowledge and data availability of particular groups. For example, nearly half of known marine biodiversity is represented by only three groups (crustaceans, molluscs, and fish), and many of these species are commercially important.

Data Solutions

Modelling techniques have been developed to gain understanding of distributions and characteristics in the marine environment and the species that inhabit it. Species Distribution Modelling (SDM) techniques have emerged as pragmatic and cost-effective solutions to “filling in” the data gaps mentioned above using predictive mapping.

Using Data

What does the ‘absence of data’ mean?



Caution should be taken in using species spatial distributions that have been estimated using data that were not obtained using comprehensive survey and sampling strategies. In this context, it is imperative to discriminate between ‘no recorded presence’ and ‘identified absence’. For example, absence may mean, among other things, no sampling has taken place at this location, habitat is not suitable for the species, or the species is elusive and therefore difficult to spot. Information on the real absence of the species or habitat in specific areas (as opposed to the absence of data) are rarely included in the datasets.

Data format matters: points and polygons

Data are most frequently distributed as point (single XY coordinate), polygon vectors (boundary shapes), or rasters (grids of pixels of varying resolution). The data provides information on the of presence of species and habitats. Figure 1 provides an example of a combined point and polygon dataset.

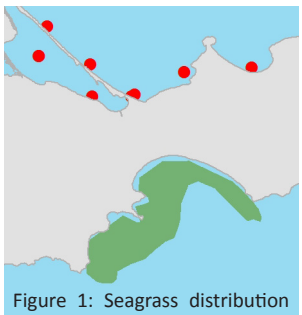


Figure 1: Seagrass distribution showing point (red dots) and polygon (green boundary) data

Point data can be useful where there has only been sparse sampling and therefore occurrence data for the individual sightings in point format is more useful than a polygon created from only a few records.

Polygon data is useful for calculating the spatial coverage (i.e. surface area) of a habitat (e.g. seagrass meadows, mangrove forests) in a particular region, assuming that the habitat is continuously present within the boundary of the polygons.

Spatial and temporal scales of datasets

Data must be at an appropriate scale (spatial and temporal) to answer a particular question, as patterns observed at one scale (e.g. global or monthly) may not be detectable at another (e.g. local, annual). Different datasets that are combined within an assessment or model must also be at compatible scales e.g. If modelling a species preferred habitat, it would be inappropriate to combine environmental data recorded in a different season from species observation data.

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