Habitat

ACRONYMS AREAS COUNTRIES MARINE TERMS

DEFINITION

Habitat means the place or type of site where an organism or population naturally occurs.

Convention on Biological Diversity (CBD) 1992[1]

NOTES ON DEFINITION

There are numerous scientific definitions of habitat[2] and two definitions which come from Multilateral Environmental Agreements (MEA). In addition, the term has been used in many environmental safeguard standards, the most high profile of which is the International Finance Corporation's (IFC) Performance Standard 6 (PS6). Generic definitions, including that of the Convention on Biological Diversity (CBD) and Convention on Migratory Species (CMS) define habitat broadly as an area providing suitable conditions for the survival of a particular species or organism. Whilst the CMS definition focuses on species, the CBD definition allows for the presence of populations or organisms to delineate habitats and also specifies the necessity for natural occurrence in the definition. CMS links the definition to the convention's context of conserving migratory species. Scientific definitions broadly define habitat as, "as the suite of resources (food, shelter) and environmental conditions (abiotic and biotic) that determine the presence, survival and reproduction of a population"[3]. The main feature of the scientific definition is that it describes the environmental characteristics in more detail and highlights that the conditions 'determine' the presence of a species.

FURTHER DEFINITIONS

Supplementary definition

Habitat means any area in the range of a (...) species which contains suitable living conditions for that species.

Convention on Migratory Species (CMS) Article 1 Interpretation, Paragraph 3 (g)

Supplementary definition with particular business relevance

A terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment.

International Finance Corporation PS6 (2012)

KEY POINTS

- There are numerous scientific definitions of habitat from Multilateral Environmental Agreements, financial standards, and Conventions. The common principle is that habitat is a suitable place where an organism naturally occurs.
- Species are dependent for their survival on habitat. Habitat loss and fragmentation is the primary cause of species loss.
- Conservation of habitats is enshrined in multiple international strategies and Conventions including the Convention on Biological Diversity; the CBD Strategic Plan for Biodiversity 2011-2020; Convention on Migratory Species;
- Measuring habitat is necessary to identify conservation priorities and facilitate better management. Mapping habitats can help with prioritisation, protected area creation and tracking of targets. There are several methods to carry out mapping of habitats.

INTRODUCTION

The habitat of an organism provides the requirements for that species to survive. The early concept of habitat arose because naturalists started to question why some species were present in one location but not in another [4]. The paradigm of habitat is now firmly embedded as one of the key concepts of nature and is therefore often the focus of conservation.

HISTORY

The history of the habitat concept goes back to work carried out in the early 20th century when a variety of naturalists examined the zoning of species and linked it to environmental conditions [4]. Habitat depends on both the abiotic (non-living) features of the environment such as the underlying geology and climatic patterns, and the biotic features such as the presence of particular species [5]. Species are only adapted to live in certain habitat types [6].

IMPORTANCE OF HABITATS IN SPECIES SURVIVAL

Species are dependent on their habitat for their survival. Habitat loss and fragmentation has been identified as one of the primary causes of species range decline, numerical abundance decline, and extinction [7]. There is also some research which indicates that habitat loss may cause the selective extinction of key species which are important for ecosystem function [8].

MULTILATERAL ENVIRONMENTAL AGREEMENT

Due to the importance of habitat in supporting species, habitat protection is one of the focuses of conservation effort and legislation globally. Habitat is defined within the Convention on Biological Diversity (CBD) and is particularly relevant to Article 8 (d). This Article relates to in-situ conservation and is concerned with the protection of natural habitats and the maintenance of viable populations of species in their natural surroundings. Habitat is central to the concept of in-situ conservation, where the

aim is to conserve natural habitats supporting the preservation of the ecological processes which underpin ecosystem function. Targets within the CBD Strategic Plan for Biodiversity 2011-2020 highlight the protection of habitat and reduction in its rate of loss as key elements. Habitat loss is the focus of the associated Aichi Target 5 which aims to at least halve the rate of habitat loss[9]. Protected area increases are part of another Aichi target, Target 11, which aims to increase the percentage of habitat protected and also particularly highlights the fact that this increase should ensure that the protected area coverage should be ecologically representative. Therefore the protected area network should encompass a representative range of habitats. The Convention on Migratory Species (CMS) also defines habitat in order to support the functions of the convention in the protection of migratory species. Migratory species are particularly interesting because they often utilise only a portion of their range at any one time - meaning they often occur in numerous different habitats - or they link the same type of habitat through time and over potentially large distances. The CMS describe migratory species as 'living threads' linking habitats in different locations over time[10].

STANDARDS

Habitat is a key element in defining or demonstrating biodiversity value in many financial standards, which often contain a specific definition of habitat. This definition is tailored to the standard and its application. For example, the International Finance Corporation Performance Standard 6 (IFC PS6) uses the concepts of natural, modified and critical habitat to structure mitigation approaches to potential impacts on biodiversity. IFC depart from the more traditional definition for habitat because projects must account for other ecological aspects, in addition to species, when deciding if they are overlapping with 'critical' or 'modified' habitat as defined by the standards.

MEASURING HABITAT: USE OF HABITAT MAPS

Measuring habitat is necessary to identify conservation priorities and facilitate better management. Mapping of habitats can be used to assist decision makers in numerous ways including, identification of priority areas; policy implementation[11]; to meet legislation stipulations[12] or international targets, such as the Aichi Targets[13]. Habitat mapping is important within spatial planning particularly in the application of ecosystem-based management and the designation of marine protected areas[14][15]. Defining an appropriate scale at which to map or categorise habitat is difficult because of the variety of species and habitat niches present in the environment. For example the range of a large predator will encompass a variety of different habitat types while the habitat of a particular parasite will often be limited to a single host species[4]. There is broad consensus on the definition of wider habitat types such as forest or grassland but the finer scale definitions are more complicated. There is no global consensus on a comprehensive list of habitat types. However, there are a number of habitat classification systems using defined hierarchies[16, 17]. IUCN has developed a habitat classification scheme featuring both terrestrial and marine habitat types divided into three hierarchical levels which are used to describe the habitat types in which species on the IUCN Red List occur[18].

METHODS IN MAPPING HABITAT

1. TERRESTRIAL MAPPING

Habitat mapping in a terrestrial environment usually involves recording features such as vegetation type across areas of land[19]. At a local scale habitat mapping can be conducted by walkover surveys[20]. However, it is not possible or practical to carry out large scale mapping with this level of effort. At regional or global scale land cover is often used as a proxy for habitat mapping[21]. Land cover is often mapped using aerial and satellite images. Land cover is the visible features of the Earth surface including the vegetation layer as well as natural (e.g. rivers) and manmade (e.g. cities and roads)

features [22, 23]. These features reflect solar radiation in different ways and therefore demonstrate unique spectral characteristics which can be mapped using satellites.

2. MARINE MAPPING

Mapping the marine environment is more challenging because water surfaces demonstrate more complex reflective properties when compared to terrestrial surfaces. Satellite sensors are therefore designed differently for use in the marine environment [22]. Only a small fraction (5-10%) of the seafloor has been surveyed, to identify bathymetry (underwater depth information), with an equivalent resolution to similar terrestrial studies [24, 25]. It is possible to measure biological characteristics in the marine environment, and some physical characteristics, such as sea surface temperature, by satellite [22, 26]. However, there still remains considerable challenges to improve marine habitat mapping [26, 27].

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Rocks in the inter-tidal zone act as habitats for marine invertebrates, Lofoten islands, Norway. Eder/Shutterstock.com

Category:

Internationally recognised definitions

Key terms: In depth

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