ID: W4236718105

TITLE: GeoHab Atlas of seafloor geomorphic features and benthic habitats?synthesis and lessons learned

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ABSTRACT:

This chapter presents a broad synthesis and overview based on the 53 case studies included in Part 2 of this book, and on questionnaires completed by the authors. The case studies covered areas of seafloor ranging from 0.2 to 500,000 km2 (average of 16,670 km2) and a broad range of geomorphic feature types. The mean depths of the study areas ranged from 1.5 to 8000 m, with about half of the studies on the shelf (depth <120 m) and half on the slope and at greater depths. Mapping resolution ranged from 0.01 to 1000 m (mean of 45 m). There is a skewed distribution of studies across the four naturalness categories with most habitats classed in the ?very good? (n=20) and ?good? (n=24) condition categories. Only eight studies classified their study area as being in a ?poor? condition and none were classified as being in ?very poor? condition. The majority of case studies (n=34) concluded that the condition was steady, eight case studies reported a declining condition, and only two case studies assessed the condition of their study area was improving. The confidence of the estimates for condition and trend were more evenly spread between high (n=15), medium (n=21), and low (n=10). Sediment grain size/composition was found to be the most useful surrogate for benthic communities in the most studies (n=13), followed by acoustic backscatter (n=11), water depth (n=10), slope (n=10), wave?current exposure (n=6), substrate type (n=6), seabed rugosity (n=6), and geomorphology/Topographic Position Index (n=6). A range of analytical methods were used to identify surrogates, with ARC GIS being by far the most popular method (27 out of 42 studies that specified a methodology). Of the many purposes for mapping benthic habitats, four stand out as being preeminent: (1) to support government spatial marine planning, management, and decision-making (n=30); (2) to support and underpin the design of marine protected areas (n=19) and fisheries reserves (n=10); (3) to conduct living and nonliving seabed resource assessments for economic and management purposes (n=16); and (4) to conduct scientific research programs aimed at generating knowledge of benthic ecosystems and seafloor geology (n=11). Out of 53 case studies habitat mapping was intended to be part of an ongoing monitoring program in 12 cases, whereas the mapping was considered to be a one-off exercise in 36 cases. However, out of the 36 one-off cases, the authors considered that their habitat map would form the baseline for monitoring future changes in 22 cases. This suggests that governments and regulators generally view habitat mapping as a useful means of measuring and monitoring change. In terms of the perceived clients and users of habitat maps, most authors considered marine conservation (n=39) and fisheries (n=21) to be the biggest users of habitat maps. This is consistent with the overwhelming majority of habitat surveys being funded by government or government-funded agencies/institutions (n=46) that are most likely responsible for implementing conservation policies, with only minor funding from private industry (n=2) or nongovernment organizations (n=3). A gap analysis (i.e., geomorphic features and habitats not included in the case studies) illustrates that whereas estuarine, shelf, and slope (canyon) habitats are well represented in the case studies, deep ocean (abyssal?hadal) environments were described in only a few case studies. Geographically, about two-thirds of the case studies were from waters around western Europe and North and South America, whilst the margins of the continents of Africa and Asia were not well represented in the case studies. Given the intense pressures facing benthic habitats and broad regional differences in ecosystems, species, and habitats, further research is needed in these geographic areas.

SOURCE: Elsevier eBooks

PDF URL: None

CITED BY COUNT: 9

PUBLICATION YEAR: 2020

TYPE: book-chapter

CONCEPTS: ['Benthic zone', 'Seafloor spreading', 'Sediment', 'Geology', 'Physical geography', 'Hydrology (agriculture)', 'Environmental science', 'Geography', 'Oceanography', 'Geomorphology', 'Geotechnical engineering']