Story Board 4: Hidden Treasure – Ireland's Deep-water Corals

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SB4

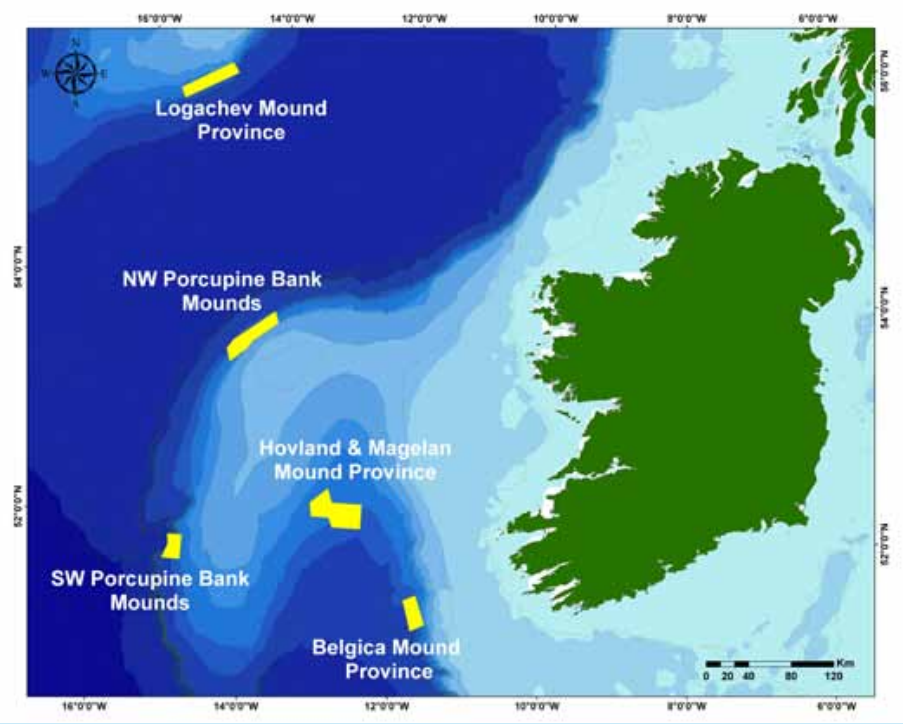

Figure SB4.1. Location of the main mound provinces in the Northeast Atlantic region.

Deep in the dark, cold waters of the Northeast Atlantic, the presence of corals has been known since the eighteenth century. However, the technologies to allow mapping of the full extent of these habitats has become available only in the last 20 years. These include multibeam and side-scan sonar as well as underwater video cameras which have revealed the spectacular shapes and colours of these underwater creatures.

Deep-water or cold-water corals are found on parts of the continental slope to the west of Ireland at water depths ranging between 600 and 1000 m and worldwide are found at depths of up to 2000 m. The main differences between these corals and their shallow water tropical counterparts are that they are able to survive in complete darkness below the light penetration depth and can tolerate water temperatures as low as 4°C. Warm-water reefs have a higher diversity of coral species in comparison to cold-water reefs (which are normally constructed with one or two main coral species), but the diversity of associated fauna is much higher among cold-water corals. The dominant reef-forming corals on the Northeast Atlantic margin are *Lophelia pertusa and Madrepora oculata*.

Corals normally grow in distinct localities (known as 'provinces') and may form small patches on the seabed,

Figure SB4.2. Photograph taken from a remotely operated vehicle (ROV) of deep-water corals at 800 m depth in the Porcupine Seabight, northeast Atlantic. The number of other creatures that can be seen in this photograph illustrates the high biodiversity of these corals. (Photo: © IFREMER).

small coral-topped mounds (25–100 m across and 5 m high) or giant carbonate mounds (1–5 km across and 50–300 m high). Live corals have been found in the Belgica, Logachev and the NW Porcupine Bank mound provinces. The Hovland and Magelan mounds are no longer active and have been completely covered with marine sediments (Fig. SB4.1).

For corals to begin to grow, a suitable hard substrate to which they can attach is needed. This can be made up of stones, shells or man-made objects such as ship-wrecks or oil industry installations. In addition, the corals need clean and fast-flowing water, and a sufficient food supply as they feed on particles (e.g. plankton) supplied by deep-sea currents in contrast to shallow water corals that get energy from symbiotic algae.

Why are Deep-water Corals Important?

Deep-water corals are associated with high biodiversity. Hence, fish are attracted to coral-populated areas because they provide enhanced feeding possibilities, a hiding place, and a nursery area (Fig. SB4.2). In recognition of their importance as habitats and their natural heritage significance, some of Ireland's deep-water coral settlements have been designated as the first marine Special Areas of Conservation (SAC).

Deep-water Corals and Climate Change

It is estimated that the carbonate mounds on which the corals are found initiated their growth *c.* 1.8 to 2 million years ago. Analyses of long sediment cores through these mounds suggest that the mound growth process was driven by changes in global climate. During warm interglacial periods, growth was driven by biological coral growth (average mound growth rate 10 cm per thousand years); during cold glacial periods biologically driven mound growth stopped, but mound elevation continued due to sediment deposition (average mound growth rate 5.8 cm per thousand years). Hence, deep-water coral carbonate mounds contain unique records of past climate change. Reconstructions of such past changes can potentially help to predict future trends.

Figure SB4.3. The fishing trawl track has badly damaged the coral in this video still from the Belgica mound province, eastern Porcupine Seabight, northeast Atlantic. © IFREMER.

Threats to Deep-water Corals

Commercial deep-sea fishing and the expanding offshore oil industry are the main threats to deep-water coral ecosystems and affect the corals' vitality through pollution, mechanical impact and increased sedimentation rates. Bottom trawling for deep-sea fish (e.g. Orange-Roughy) has been shown to destroy coral reefs completely beyond recovery (Fig. SB4.3). Oil-drilling operations are likely to increase the amount of suspended sediment that clogs coral polyps and together with oil pollution can harm corals.

Further Information

A comprehensive introduction to cold-water corals: http://www.lophelia.org/

The EU-funded Atlantic Coral Ecosystem Study: http://www.ecoserve.ie/projects/aces/

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