Biodiversity on Artificial Oyster Reefs

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Introduction:

Four artificial oyster reefs were constructed at the sand nourishment at the Oesterdam in the Eastern Scheldt. The artificial oyster reefs were placed to slow down erosion, reduce wave impact on the dike and potentially increase biodiversity. The artificial oyster reefs are intended to turn into living, adapting oyster reefs, for this reason the development of the biodiversity was investigated.

Figure 1: Location of the artificial oyster reefs in the Eastern Scheldt of the Netherlands[2]

Species abundance & richness:

The species abundance was measured using a 0.25m² quadrant several times in different sections at every reef. Species present within the quadrant were recorded on a field form.

Figure 2: Species richness per phylum on an artificial oyster reefs.

Figure 3: Average species abundance per m² for macrofauna on the artificial oyster reefs.

Most common species:

Mytulis edulis[3]

Amphipoda[4]

Littorinidae[5]

Actinaria[6]

Hemigrapsus takanoi[7]

Exotic species:

The new hard substrate attracted many hard substrate species, including exotic species. Most exotic species are adapted to hard substrate environments as many of them originate from ports, ships and aquaculture transportation.

Figure 4: Exotic versus native species richness on an artificial oyster reefs.

Figure 5: The proportion of exotic and native species in the total abundance on the artificial oyster reefs.

Battle for the reefs:

The crabs *Hemigrapsus takanoi* and *Carcinus maenas* are the perfect example to study competition between an exotic and native species at the artificial oyster reefs. Similar sized *H. takanoi* and *C. maenas* are both present on the artificial reefs, they are motile species, and share the same ecological niche.

Figure 5: proportion of *Hemigrapsus takanoi* and *Carcinus maenas* (up to 50 mm carapace width) in the crab population on the artificial reefs.

Native: *Carcinus maenas*[8]

Exotic: *Hemigrapsus takanoi*[9]

Oyster spat:

Oyster spat should settle on the reefs to eventually turn the artificial reefs into living reefs. Living oysters can maintain themselves and the sediment stabilisation when the metal cage erodes. Settlement discs were placed on the reefs to monitor the settlement of oyster (*Crassostrea gigas*) spat.

Figure 6: Oyster spat settlement per m² at the artificial oyster reefs (March 2015).

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Conclusion:

- The most common species colonizing the reefs are typical hard substrate species (molluscs, crustaceans, tunicates, anemones and macroalgae), these are rarely found in the original soft substrate.
- Species richness seems to have declined over time. Have the first colonisers since been outcompeted?
- Exotic species comprise almost half the species richness, but native species are always more. abundant.
- The exotic crab, *H. takanoi* consistently outnumbers the native *C. maenas*. Is *C. maenas* being outcompeted by the invader in this habitat?

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Photos: [2]www.google.com; [3]crystalcovestatepark.org; [4]www.marinelife.ac.nz; [5]Ecomare, foto fitis, sytske dijksen [6]http://home.scarlet.be; [7]http://www.krabben.net; [8]www.carolscronwall.com; [9]http://home.kpn.nl/faassema

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