

Alien macroinvertebrates in brackish and marine waters: the situation in Belgium and the Netherlands

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Alien species are species that are introduced outside their natural geographic area through human activity. Once these species get established, start to spread and exert an adverse effect on ecosystem structure and functioning, they are called invasive. The Marine Strategy Framework Directive requires that alien species are maintained at levels that do not adversely alter the ecosystem. Therefore, a good monitoring and assessment of alien species present in the marine environment and an analysis of their pathways and vectors of introduction is an important first step to obtain these goals. We investigated the occurrence of alien macroinvertebrates in brackish and marine waters in Belgium and the Netherlands based on own observations and literature. More than 40 alien macroinvertebrates were regularly recorded in brackish waters and the marine environment. A spectacular increase in establishment of alien macroinvertebrates was observed during the last decade as a consequence of increased globalization and changing environmental conditions. The recorded species mainly belonged to the crustaceans (more than 60%) followed by molluscs and worms. The main donor regions were North America and Asia. The most important pathways of introduction were passive transport via hull fouling or ballast water of ships and introduction via aquaculture activities or aquarium hobbyists. Large harbours and brackish polder watercourses were the main hot spots for alien species. Two small crab species (*Hemigrapsus penicillatus* and *Hemigrapsus sanguineus*) originating from Southeast Asia have recently started to colonize the Belgian and Dutch coast and are expected to compete with our native green crab (*Carcinus maenas*) for food and habitat. Based on observations of species present in neighbouring countries, but currently not present in Belgium or the Netherlands, more species are expected. Horizon scanning, the systematic examination of current or future invaders, and a follow-up of recently introduced or new species is recommended to avoid new introductions or the future spread of already established species.