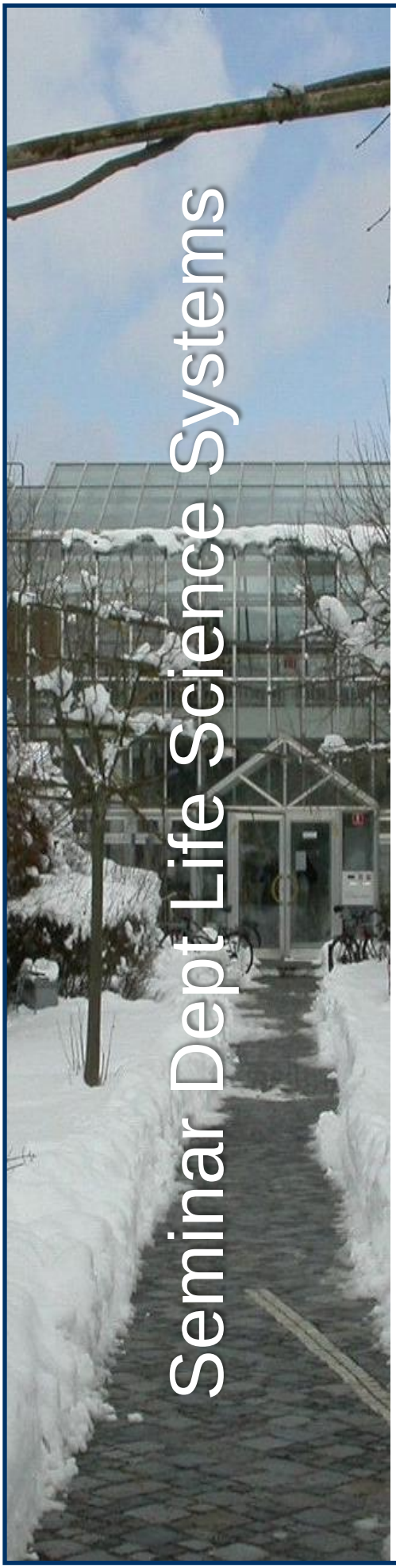

Recovery and restoration and marine ecosystems: nudging nature and lessons from freshwater

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Open marine ecosystems generally recover quickly once perturbation ceases, unless structurally important ecosystem engineers are lost such as biogenic reefs and vegetated habitats. Slow recovery can also occur when important long-lived species such as keystone predators/grazers are lost. Such natural recovery occurs primarily from remote colonisation of larvae and algal propagules, plus active migration from un-impacted populations. Some examples are given of long-term recovery following acute and chronic pollution, including interactions with climate change. In more enclosed marine ecosystems such as lagoons or enclosed inlets there is much greater scope and greater need for active restoration, with much to be learned from restoration of freshwater ponds and lakes. Parallels with and divergences from freshwater systems are briefly outlined. Both bottom-up de-stratification and top-down biofiltration were used to create healthy and stable ecosystems.

A warning is, however, given of the problems in managing brackish water systems such as docks high up estuaries and some coastal lagoons – these are too fresh for most marine species and too salty for most freshwater species. These can be highly intractable for restoration or rehabilitation. Restoration or rehabilitation should always be targeted to achieve a desired target state. This is best achieved by multiway stakeholder engagement supported where possible by historical ecology or at least good natural history. Active restoration can speed recovery of biodiversity, ecosystem processes and ultimately services to society. Getting back to the original conditions before development or major impact is usually impossible. The geomorphological template of the habitat may have been so modified that the original condition is unobtainable.

Global climate change also means that the species pool in the area may have changed. Under such circumstances the best that can be achieved is to create novel ecosystems. In highly urbanised or agricultural landscapes these may bear no resemblance to naturally occurring ecosystems. They can, however, enable urban renewal - especially in redundant waterfronts in ports in macro-tidal estuaries by providing culturally important pools of biodiversity, leading to stable ecosystems providing important ecosystem services.

Dept Life Science Systems

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