



# Kelp help - revitalizing the sugar kelp community

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## Dramatic decline of *Saccharina latissima* (*Laminaria saccharina*) in Norway



Dense sugar kelp forest



Turf algae community

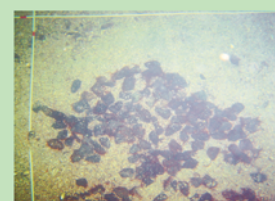
Dense forest of sugar kelp has been replaced by silty turf algae on sheltered coast of Southern Norway. This shift in community structure has resulted in loss of perennial vegetation and associated algae and animals. No indications of natural re-growth of the kelp forest have been observed on stations monitored the last 5 years. Below we present three approaches for restoration of the declining kelp forests in Norway.

## Kelp Seeded Gravel

Gravel seeded with *Saccharina* has been spread out at test localities to study aided re-growth of kelp forest. These kelp plots may function as oases for later natural dispersal and a necessary kick-starter to revitalize the kelp community with associated algae and animals. Small stones (gravel, pebbles) are seeded in aquaria and spread out at selected locations. Quickly, young *Saccharina* grows in dense patches, and hopefully, they will be able to compete with the turf alga and reproduce new generations of sugar kelp.



Small stones seeded in aquaria



Seeded stones spread out on the bottom at start of the experiment



Growth control in aquarium



10-40 cm long juveniles after 6 months

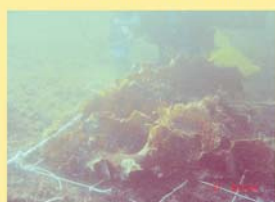


Rope culture of mature *Saccharina* ready for transplantation



## Kelp forestation

Mature *Saccharina* plants were transplanted into areas where the kelp forest has been missing for 10 years. These plots of mature sugar kelp may function as oases for re-establish the kelp forest by dispersal of spores and providing room for the juveniles. The study showed that a minimum patch-size was needed for the kelp to compete with the turf algae and to be self-reproducing. Test areas of 1x1 m were not sufficient. Too few seedlings succeeded and the filamentous algae conquered the ground again when the old transplanted kelp died of age.



Test site of 1x1 m



Hanging gardens of sugar kelp

## Artificial reefs

Artificial reefs may counteract the loss of biodiversity that has followed the shift in community structure by offering a larger variety of habitats. Increase in the habitat diversity will enhance the biological diversity and hence also the robustness of the community. The new substratum was soon colonized by *Saccharina* kelp and the years to come will show if these new oasis will improve the biodiversity and the quality of marine community in general.



Reef systems (SeaCult) deployed in Hammerfest



Reef in spring and summer covered with *Saccharina*