



Treatment may help kelp to recover

After successful experiments to remove sea urchins with quicklime, the kelp forest is returning to the test areas in Porsangerfjorden in Finnmark. Juvenile fish appear to be thriving amongst the new kelp plants, which makes us optimistic that both the kelp forests and fish populations in the fjord can recover.

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The results are preliminary, and the impact on the local flora and fauna needs to be better tested through a large-scale ecosystem experiment, which is what we are planning to do. We will treat some areas with the new method, whilst control areas will be left untouched. Meanwhile, we aim to develop a cost-efficient method of spreading the quicklime.

Much of the kelp forest in northern Norway was grazed down by sea urchins in the 1970s. Since then, the sea urchin populations have remained high and kept the sea bottom bare, stony and barren, particularly in fjords and sheltered parts of the coast. Over the past decade, kelp has re-established itself naturally in Nord-Trøndelag and the southern Helgeland up to Vega (65° N). Fishermen also report patches of recovery in Finnmark, particularly at the outer coastline. In fjords like Porsangerfjorden,

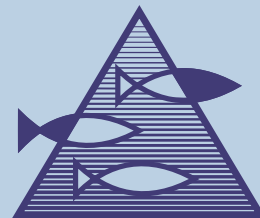
however, there are few signs of improvement. Here the sea urchins still dominates, resulting in a large low productive marine desert.

KELP FORESTS BRING LIFE

Kelp forests are high-productive and biodiverse. They are a favoured hiding place and feeding ground for many of the fjords' inhabitants, such as juvenile fish. A comparison is often drawn between kelp forests and tropical rain forests, on account of their productivity and biodiversity, as well as their importance for life in the coastal zone.

Our pilot experiments in the Porsangerfjord showed that quicklime can effectively remove sea urchins, allowing kelp plants to grow back, which in turn resulted in the return of the juvenile fish. One advantage of quicklime treatment is the rapid response. If it's used against sea





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urchins in the autumn, new kelp can grow during the winter and spring, and fauna will start to return the following summer.

SOWING KELP ON GRAVEL

Kelp may re-establish naturally to areas after treatment through the spread of spores from kelp in the surrounding area. If the nearest kelp population is far away, this natural process may take many years. In such cases, alternative methods can be used to promote regrowth of kelp.

The Institute of Marine Research's Flødevigen research station has recently tested a method in southern Norway that involves sowing sugar kelp on gravel (the "green gravel" project). The seeded gravel is then spread out on the sea bottom. The aim is to establish "oases" of kelp, to promote re-growth and further dispersion of kelp in areas with no kelp left. Sowing kelp on rope has also been successful to quickly establish underwater oases. These methods can be used in areas treated with quicklime if there is inadequate natural recruitment of kelp.

JAPANESE METHOD

The pilot treatment with quicklime were carried out on a relatively small scale in the Porsangerfjord, but the aim is to develop methods that can be used to treat large areas. During the pilot project, laboratory experiments were also carried out to investigate the lethal dose-response at different temperatures and also the

reactive time of the quicklime mixed in seawater. Data from these field and laboratory experiments have been used in the planning of a large-scale field experiment that the Institute of Marine Research intends to carry out in the Porsangerfjord. Quicklime treatment has been used for many years in Japan. However, it was previously believed that it would not work in our cold, northern coastal waters.

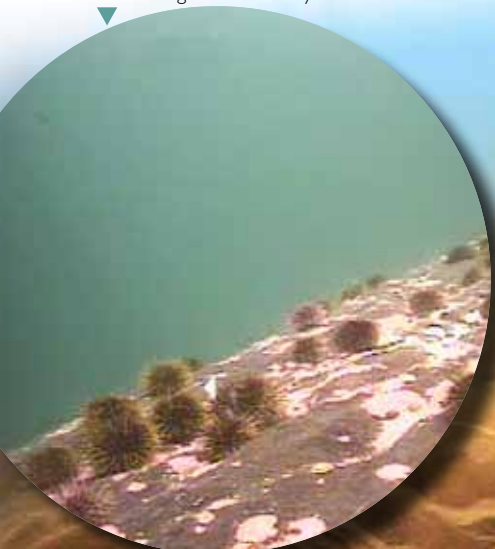
Before using quicklime on a larger scale, it is important to map and analyse any negative impacts of the treatment process. Preliminary field observations suggest that there is no impact on juvenile fish, as they swim in and out of the quicklime cloud apparently unaffected. In our upcoming experiments we will focus on how benthic animals such as bristle worms, snails and starfish react to the treatment.

EPIGRAPH

The quicklime experiments form part of the EPIGRAPH project, and are being carried out partly at The Institute of Marine Research's field station in Holmfjord and partly through field work in the fjord. Before starting the experiments, a permit to use quicklime was obtained from the Climate and Pollution Agency (formerly the SFT). If the next set of experiments is successful, it is likely that the results will be transferable to other fjords struggling with similar problems, offering new hope for overgrazed coastal areas.

Untreated areas where all of the kelp has been grazed down by sea urchins.

Newly established winged kelp in locations treated with quicklime last year.



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