



Example of the vegetation on the fjord bed. This photo was taken at Løfallstrand in Hardangerfjorden.

## New research programme focusing on coastal and fjord ecosystems

*The northern kelp forests in Porsangerfjorden have been significantly degraded by the large numbers of sea urchins grazing on the kelp plants. Meanwhile, in Hardangerfjorden, sugar kelp is becoming much scarcer and the sprat population has declined notably. In order to investigate what is happening to these two ecosystems, the Institute of Marine Research has initiated a new strategic programme focusing on coastal and fjord ecosystems.*

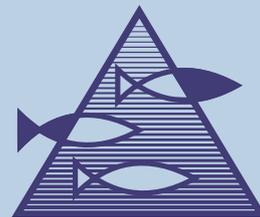
BY ARNE BJØRGE

The aim of the new research programme, which is called EPIGRAPH, is to help researchers understand the reasons for the changes taking place in Hardangerfjorden and Porsangerfjorden. Through this programme, we hope to learn more about the flora and fauna of the fjord ecosystems, discover how they function and most importantly find out how human activities affect the ecological processes. Coastal waters are heavily exploited for a number of purposes: they receive waste water from towns, villages, industrial plants and fish farms; they are used for transport; and they provide spawning and rearing grounds for important fish resources that are harvested both commercially and by anglers. The programme will play an important role in gathering knowledge that will be used in the management plans for our coastal waters.

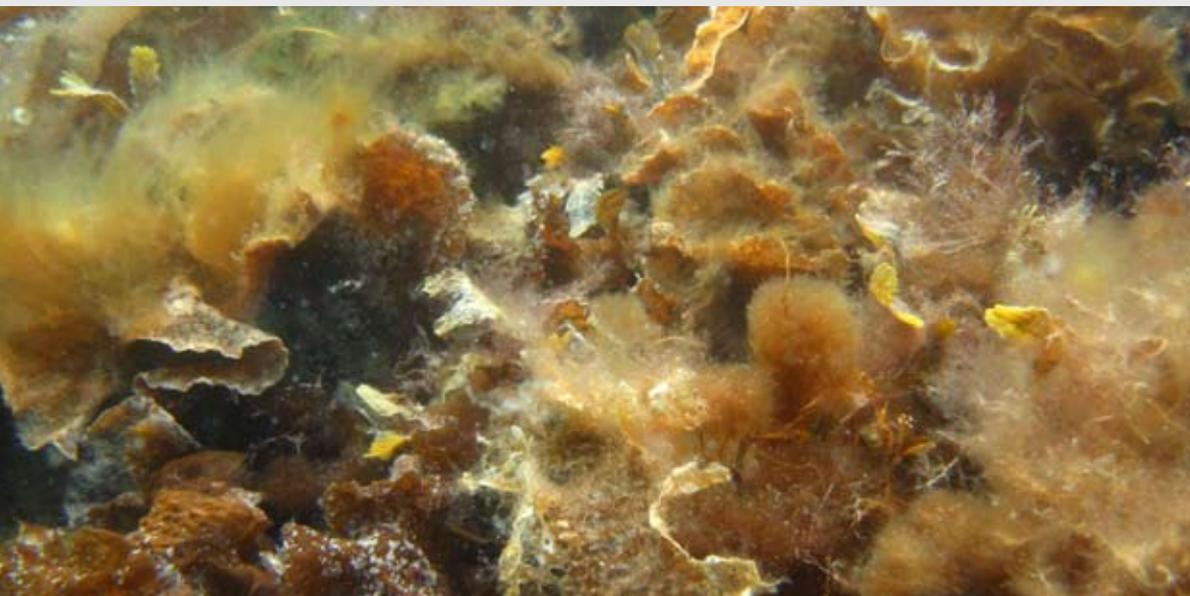
EPIGRAPH is an abbreviation of “Ecological Processes and Impacts Governing the Resilience and Alternations in the Porsangerfjord and the Hardangerfjord”, whilst an epigraph, which means “written on the outside”, is supposed to say something about the contents – just like the researchers want to do in this project.

EPIGRAPH is a collaborative project between the Institute of Marine Research, the universities of Bergen, Tromsø, Ås and St Andrews in Scotland, NIVA and Finnmark University College. Annual conferences will give the project participants a chance to draw on the findings of the research in the two separate ecosystems. These conferences will be held close to Hardangerfjorden and Porsangerfjorden, and the local authorities and local press will be invited to attend.





INSTITUTE OF MARINE RESEARCH  
HAVFORSKNINGSINSTITUTTET



Sugar kelp at Løfallstrand in Hardangerfjorden.

**INSTITUTE OF MARINE RESEARCH**

Nordnesgaten 50  
P.O. Box 1870 Nordnes  
NO-5817 Bergen – Norway  
Tel.: +47 55 23 85 00  
Fax: +47 55 23 85 31

www.imr.no

**TROMSØ DEPARTMENT**

Sykehusveien 23  
P.O. Box 6404  
NO-9294 Tromsø – Norway  
Tel.: +47 55 23 85 00  
Fax: +47 77 60 97 01

**FLØDEVIGEN RESEARCH STATION**

NO-4817 His – Norway  
Tel.: +47 55 23 85 00  
Fax: +47 37 05 90 01

**AUSTEVOLL RESEARCH STATION**

NO-5392 Storebø – Norway  
Tel.: +47 55 23 85 00  
Fax: +47 56 18 22 22

**MATRE RESEARCH STATION**

NO-5984 Matredal – Norway  
Tel.: +47 55 23 85 00  
Fax: +47 56 36 75 85

**PUBLIC RELATIONS AND COMMUNICATION**

Tel.: +47 55 23 85 38  
Fax: +47 55 23 85 55  
E-mail: informasjonen@imr.no

**CONTACTS**

Arne Bjørge  
Project manager  
Tel: +47 22 95 87 51  
E-mail: arne.bjoerge@imr.no

Porsanger  
Kjell Tormod Nilssen  
Tel: +47 77 60 97 24  
Cell: +47 900 92 829  
E-mail: kjell.tormod.nilssen@imr.no

Hardanger  
Øystein Skaala  
Tel: +47 53 47 35 23  
Cell: +47 476 27 878  
E-mail: oystein.skaala@imr.no

**RESEARCH GROUP**

Coastal zone ecosystem

## New research programme focusing on coastal and fjord ecosystems

### PORSANGERFJORDEN

The northern kelp forests in Porsangerfjorden have been significantly degraded by the large numbers of sea urchins grazing on the kelp plants. We do not know why the sea urchins suddenly became capable of degrading the kelp forest. Meanwhile, the coastal cod population has almost totally disappeared. Is this linked to the decline of the kelp forests? These phenomena are occurring along large stretches of the Norwegian coastline, but Porsangerfjorden is a good model area for studying the ecological processes, and if possible determining the reasons for the alterations. In Porsangerfjorden we are also witnessing a large-scale, natural experiment, in that the fjord is being invaded by king crab, which is a new, introduced species with a diet that includes sea urchins.

The working hypothesis of the EPIGRAPH project is that the ecosystem in Porsangerfjorden is regulated by grazing processes; in other words, it is a “top-down” ecosystem. Five subprojects will look at: how the eggs and larvae of cod and king crab are transported; the population dynamics and access to food of fish; the grazing habits of harbour seals and

grey seals; the interaction between northern kelp, sea urchins and king crab; and, last but not least, biodiversity and production in demersal communities. These subprojects will provide data for modelling the ecosystem of the fjord.

### HARDANGERFJORDEN

In Hardangerfjorden, sugar kelp is becoming much scarcer and the sprat population has declined notably. We do not know whether increasing levels of nutrient salts have been a contributing factor to these alterations. Meanwhile, fish that have escaped from fish farms and salmon lice may have had an impact on the wild salmon and sea trout.

The working hypothesis of the EPIGRAPH project is that the ecosystem in Hardangerfjorden is regulated by oceanographic conditions (for example higher levels of nutrient salts), and that it is therefore a “bottom-up” ecosystem. Eight subprojects will look at oceanography, kelp vegetation, vulnerable habitats, zooplankton, sprats, predatory fish, the genetics of sprats and the interaction between wild and escaped salmon.



**EPIGRAPH**  
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