

Project information

Project title

Habitat structure and ecosystem function of eel grass (*Zostera marina*) meadows in the high north in relation to human traditional use and exploitation

Year

2013/2014

Project leader

Hartvig Christie, NIVA

Participants

- Hartvig Christie (Norwegian Institute for Water Research, NIVA, project leader 2013)
- Nina Mari Jørgensen (Norwegian Polar Institute, project leader 2012)
- Guttorm Christensen
- Trond Ivarjord (Akvaplan-niva, APN)
- Arild Buanes (Norut)
- Torstein Pedersen (University of Tromsø, UiT)
- Frithjof Moy (Institute of Marine Research, IMR).
- Master student: Kristin Nymark Heggland, UiT

Flagship

Fjord and coast, Theme: Structure, function and change in Arctic and boreal fjord ecosystems

Funding Source

Fram Centre

Summary of Results

The goal of this project was to describe the structure and ecosystem function of the eelgrass meadows covering the inner part of Balsfjorden. The eelgrass was compared with another macrophyte (*Chorda*) system, and a social science study of the importance of the inner Balsfjord ecosystem should be done in addition to the ecological studies. The project had a reduction in funding both years that resulted in only fieldwork in 2012 and limited amounts to data analyzes in 2013.

The seagrass sampled on about 2 m depth varied in size (20-70 cm length) and density and thus biomass between the sites, but average biomass was more than 1 kg per m² while the other habitat (*Chorda*) showed longer leaves but biomass mainly lower than 0.5 kg per m². The fauna on both habitats was dominated by small crustaceans (amphipods and isopods) and mollusks (a few species of snails and small mussels), but showed large variations locally. Total density could exceed 20 000 individuals per m². In spite of large variations in density between sites, the replicates on each site reflected a pattern of a few species with preference for one of the habitats.

Fish was sampled or estimated with beach seine, nets and video transects, and juvenile cod was abundant in addition to a number of other species of pelagic and demersal fish. The fauna found on eelgrass and *Chorda* were reflected in fish stomach content, where fish belonging to the cod family mainly preyed on the crustaceans and more bottom dwelling fish preyed on mollusks. Data on stable C and N isotopes of the macrophytes, invertebrates and fish will reveal more specific results on interactions between the trophic levels in the system. At present, the stable isotopes are analyzed at a lab in Canada, and data from the social science study and historical fish landings have not been reported. Due to reduced funding the project progression have been delayed.

Highlights:

There is a highlight to present such large and dense eelgrass meadows at the high latitudes as Balsfjord.

The eelgrass and adjacent macrophyte beds house a high number of small animals like crustaceans and mollusks. The preference of many species for either eelgrass or *Chorda* indicate that protection of each habitat type imply protection of associated species and the total biodiversity, and stomach content of fish can tell which of the habitats the fish prefer.

The eelgrass meadows serve as habitat and/or feeding area for a number of fish species.

These eelgrass meadows may serve as important nursery or shelter areas for juvenile cod at high latitudes where most alternative habitats are grazed by sea urchins.

For the Management

These large seagrass meadows serve as a habitat of special interest and importance in an area with abundant fish and seabird populations. The management related to possible disturbances of this ecosystem may consider high production, high diversity, important habitat for special invertebrates and fish, particularly in a region where macrophyte communities are threatened by sea urchin grazing.

Published Results/Planned Publications

A preliminary abstract of the work done by the master student on the project, Kristin Nymark Heggland, has been submitted for Arctic frontiers 2013.

- Title: Habitat for 0-group coastal cod (*Gadus morhua*) in Balsfjorden and Porsangerfjorden. Olsen JL. Coyer JA. Stam WT. Moy FE. Christie H. Jørgensen NM. (2013). Eelgrass, *Zostera marina*, populations in northern Norwegian fjords are genetically isolated and diverse. Mar Ecol Prog Ser
- Heggland K. 2013. Relation between habitat characteristics and abundance, diet and condition of 0-group cod in two northern Norwegian fjords. Master thesis. University of Tromsø.
- Jørgensen, N.M and Bekkby, T. Historical and present distribution of *Zostera marina* in the high north (Troms County, northern Norway) – a decline over the last century. In press. Botanica marina.

Communicated Results

Jørgensen, N.M., Christie, H., Bekkby, T. Naturtyper i Balsfjorden. Foredrag forskningsdagene 2013, Midt-Troms museum.

Interdisciplinary Cooperation

The project has included a social science part on local ecological knowledge (LEK).

Budget in accordance to results

The funding in 2012 was important for initiating the project and to complete the field work. The large reduction in funding in 2013 has led to problems to fulfill the tasks and delayed initiation of analyses. The plan for completing the result presentation and publication must be reorganized. The feedback from the social science part is so far poor.

Could results from the project be subject for any commercial utilization

No

Conclusions

We have establish initial baseline data on the function and structure of eel grass meadows in the high north, and results from this study may be compared with data from other sea grass and macrophyte habitats in high north and at other latitudes.

We have in this study used new techniques of boat operated video for fish transect studies that can be compared with more traditional methods as gill nets and beach seine.