

IMPROVED WATER QUALITY BY COOPERATION

Local authorities, agricultural advisors, farmers and research scientists have collaborated to attain the target of improved water quality in the western part of lake Vansjø. The collaboration has given positive results as the water quality in the lake has improved substantially, and swimming is again safe.

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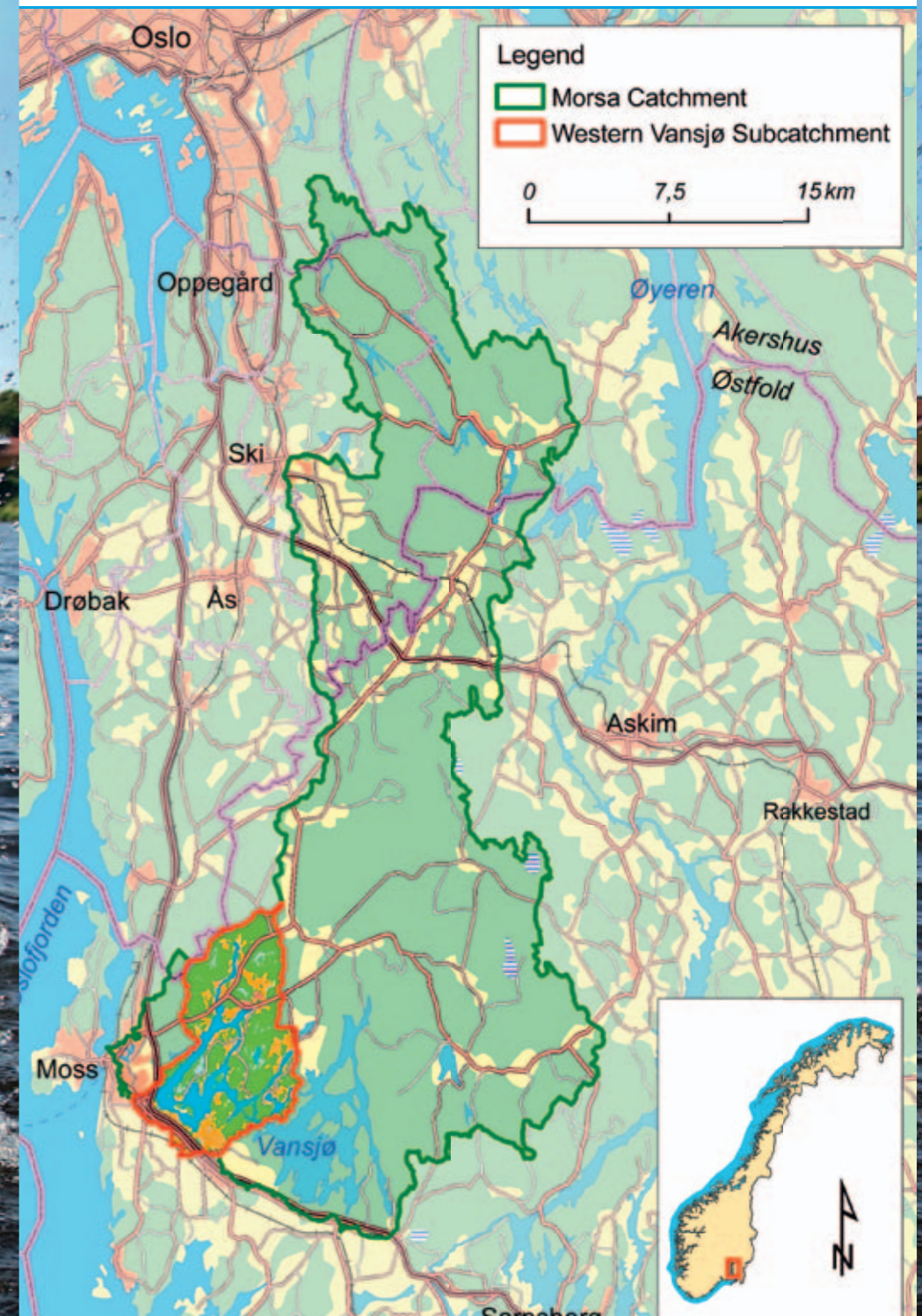
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The Norwegian pilot area, Lake Vansjø

The Vansjø (Morsa) catchment is located in South East Norway. The pilot area is the sub-catchment draining to the western part of lake Vansjø. The pilot area is 80 km² of which 16 % is agricultural land. Main productions are cereals, potatoes and vegetables. The western part of lake Vansjø has a very poor water quality due to algal blooms. The water quality of the lake is of great concern because it is an important recreation area for people living in the region. Large phosphorus loads to the lake is identified as the main reason for the eutrophication problems.





Reduced phosphorus fertilization
 Focus on reduced phosphorus fertilization started in meetings with farmers in 2005. Farmer contracts from 2008 gave further reduction in phosphorus fertilization. Average phosphorus fertilization in the catchment:
 2004: 22 kg phosphorus/ha
 2007: 11 kg phosphorus/ha
 2008: 6 kg phosphorus/ha
 2010: 5 kg phosphorus/ha

Constructed wetlands
 The farmer (and his son) as water manager. 16 small constructed wetlands have been established during the project period.



Buffer strips
 Buffer strips with permanent grass have been established along streams and the lake.

Research as basis for reduced phosphorus fertilization
 The field experiments were carried out in collaboration with the local extension service for agriculture, and it was demonstrated that the phosphorus fertilization could be reduced without losses of yield for both potatoes and vegetables.



Large phosphorus loads to the lake is identified as the main reason for the eutrophication problems, says Tyra Risnes. Since the phosphorus loads from point sources has become low, the main focus for further reduction in phosphorus loads to the lake is to reduce phosphorus losses from agricultural areas.

Milder winters and more high-intensity rainfall are expected. This will increase the risk of erosion and phosphorus losses from agricultural areas. Thus, mitigation measures to reduce phosphorus losses from agricultural areas will be even more important in the future.

A total of 40 farms lie entirely or partly within this catchment. There is a large production of potatoes and vegetables. This results in extra challenges when aiming at reduced phosphorus losses, because of a high phosphorus applica-

tion to these crops and thereby a high content of available phosphorus in soil.

Action plan

Substantial efforts have been made to improve the water quality during the last eleven years. The first years, the efforts showed to be insufficient to improve the water quality to a significant degree. Therefore, in collaboration with different stakeholders, an action plan for reduced phosphorus loads to the western part of lake Vansjø was worked out in 2006/2007, says Tyra Risnes. The farmers were involved through participation at meetings where all farmers were invited and through dialogue with selected farmers and with The Norwegian Farmer's Union.

As a result of this work, an integrated project funded by the Ministry of Food and Agricul-

ture was started in 2008 in order to carry out the action plan for improving the water quality in the lake. Further, in 2009 the work in the pilot area became a part of Aquarius, whereby transnational exchange of experiences was included. In the project, local authorities, agricultural advisors, farmers and research scientists collaborate to attain the desired water quality.

Farmer contracts to reduce phosphorus losses

The farmers are encouraged to sign a contract where they will receive a financial support for covering extra costs for committing to a set of restrictions and mitigation measures aiming at reduced phosphorus losses for a period of three years, says Tyra Risnes. Among other things, the requirements in the contracts include:

- Use of less phosphorus fertilizer than the national recommended level
- No soil cultivation during autumn
- Establishment of eight-meter wide buffer zones along open water
- Establishment of grassed waterways where there is a large risk of erosion
- Establishment of constructed wetlands where this is recommended

An agricultural advisor discussed specific challenges with each individual farmer, and the farmer was encouraged to sign the contract. An environmental plan for each farm that signed the contract was worked out by the farmer in collaboration with the agricultural extension service.

A few months after start of the project, 29 out of the 40 farmers in the catchment had signed the contract. In addition to the visit from the agricultural advisor, the basis for the high degree of participation was meetings with the farmers in the preceding years, where they were educated about the importance and effect of the mitigation measures.

The role of research

Bioforsk – Norwegian Institute for Agricultural and Environmental Research has studied the effect of some of the implemented mitigation options and the effect of other possible mitiga-

tion options on yields and phosphorus losses. In annual meetings with the stakeholders, the research tasks were discussed, ensuring that the research aimed at answering relevant questions for the farmers and local authorities. Vegetable and potato fields pose great challenges when aiming at reducing phosphorus losses. A large part of the research activity has therefore been related to possible mitigation options on these fields, e.g. the effect of reduced phosphorus fertilization on yields and quality of the products.

The research has been important for the comprehensive reduction of phosphorus fertilization in the catchment.

Bottle necks

In a meeting with farmers December 2010, the farmers pointed out that the requirement of no autumn tillage is an important bottle neck for continuing the contracts in the present form. No autumn tillage makes it impossible to grow winter wheat and rye and more use of herbicides is needed. Some farmers think it is difficult to succeed with spring ploughing on clay soils. If restrictions on autumn tillage are going to be continued, subsidies are still needed as spring cereals give less income compared to winter wheat.

Farmers growing vegetable and potatoes pointed out that reduced phosphorus fertili-

zation give challenges by lack of mineral fertilizers with a lower phosphorus concentration which are suitable for these crops. Consequently, reduced phosphorus fertilization requires more work as more operations are needed to apply the different nutrients in required amounts.

Farmers' opinions

More farmers in the pilot area agree that agriculture is one of the reasons for poor water quality and that reduced phosphorus fertilization has not reduced the grain yields. Yet, the economic benefit of reduced phosphorus fertilization is small because phosphorous fertilizer is cheap. However, farmers in the area also approve of the positive effect of their contribution to reduce the use of the world's limited mineral phosphorus resources.

The farmer contracts impose restrictions e.g. that farmers no longer can produce winter wheat, which reduces profitability for the individual farmers. Nevertheless, farmers in the area have expressed understanding for the contracts and the importance of the measures for the lake. Furthermore they have voiced willingness to take on the responsibility while stressing that all farmers must contribute, and that free-riders are not accepted.

Recommendations and learnings from the Norwegian pilot project

Finding solutions

Involve all stakeholders in discussions and brainstorming. This will ensure that the suggested solutions are possible to implement.

Education of farmers

- Research based information about the importance and effect of the mitigation measures
- Show results on demonstration sites
- Involve agricultural advisors for discussing environmental challenges with individual farmers and for working out environmental plans on farm level.

Time perspective

Realize that it probably will take time to get most of the farmers in a catchment to change their farming practices to a more environmentally friendly form.

Use of subsidies

As some of the necessary measures may not be profitable, subsidies given to the farmers that implement the measures may be necessary for comprehensive implementation of mitigation measures.



The western part of lake Vansjø has a very poor water quality due to algae blooms.

