

# Complex challenges of managing resources

*Know-how for Finland's fisheries, game and reindeer husbandry...*

**T**he Finnish Game and Fisheries Research Institute (RKTL) produces high quality scientific information on fisheries, game and reindeer for the sustainable use of natural resources, and helps maintain biodiversity through research and aquaculture. The Socioeconomic and Aquaculture Research Unit of RKTL conducts social, economic and aquaculture production research linked with fisheries, game and reindeer husbandry. It also produces the official fisheries and hunting statistics.

## Research programme on game, reindeer and aquafood

This research programme integrates and coordinates studies on production, processing, marketing and sales, as well as use of fish, game and reindeer products for human consumption. The goal of the programme is to produce scientific information and expertise that helps the national and EU administration meet the challenges of a rapidly changing food production sector, and helps the industry to develop competitive food products, meeting consumer needs and expectations. The demands of the markets and expectations of consumers are monitored throughout the programme. Changes in the industrial operational environment are analysed annually to ensure the relevance of the research targets. The central principle of the programme is that the whole value chain is viewed as an integrated process, from the producers through to the consumer.

## Less-valuable fish material for food, feed and bioenergy

In contrast to over-exploited oceanic fish stocks, Finland has a unique under-utilised resource in coastal waters: a rapidly growing biomass of cyprinid fish with no current commercial use. Intensive research efforts are targeted towards more efficient use of these cyprinid populations as well as

fish processing by-products for use in food, feed, fertilizers and energy. The research estimates potential catches and characterises future 'zero-waste' value chains. The target is to find means to produce value-added ingredients by separation whereby the remains would be directed to biogas and fertilizer production. The feasibility models for commercial application are created and evaluated with the ultimate goal of enabling business to be founded on underutilised fish biomass. Mass fishing of cyprinids will also remove substantial amounts of phosphorus from the coastal ecosystem, which is expected to improve water quality, the composition of fish species and the recreational values of the coastal area.

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## Diverse, sustainable and high-quality food production

The aquaculture production sector has grown quickly worldwide and the markets are global. One factor contributing to success in this new expanding market has been a diverse

product supply that meets demand. We have helped the Finnish fish farming industry diversify from rainbow trout oriented production to production of other species and new products. Market research and studies have been carried out on the feasibility of introducing new species (ie. European whitefish, perch, pike-perch) in food fish farming in Finland. The goal of the programme extends to improving fish feeds and feeding practices in order to reduce the environmental nutrient loads of fish farming. Furthermore, introducing new feed ingredients, in collaboration with the fish feed industry, decreases dependency on ocean industrial fish used for aquafeeds.



## European whitefish (Coregonus lavaretus) in focus

European whitefish farming is increasing rapidly in Finland. Research has been focused on growth and welfare studies, nutrition physiology and sea farming. Whitefish production is further developed through a selective breeding programme. Ongoing research is targeted at product quality, where results are expected to offer consumers and decision-makers information on the health-promoting characteristics and safety of whitefish products. Moreover, this theme produces information for the fishermen and fish farmers on the quality of whitefish as a raw material and its applicability for different purposes.



### Research programme on natural resources and society

Exploitation of fish, game and reindeer resources occurs both in primary production and as a component of recreational activities or leisure services. This research programme focuses on the economic, social and community dimensions of sustainability. The goal of the programme is to produce knowledge that helps to recognise, define and solve governance problems connected with fish, game and reindeer resources. Moreover, this knowledge promotes the development of new natural resource based livelihoods and the prediction of changes and contradictions in the use and governance of natural resources.

### A roadmap for sustainable integration of aquaculture and fisheries

RKTL is one of 10 partners in an EU-funded cooperative research project named Coexist (Interaction in European coastal waters: A roadmap to sustainable integration of aquaculture and fisheries). 10 countries and 13 research institutes are working together to create recommendations for more sustainable coastal zone use. RKTL is working on a Baltic case study involving the evaluation of alternative management options in aquaculture. These options include: continuing business as usual; more efficient site selection (fewer farms,

located more offshore); and improved nutrient cycling in aquafeeds by using a so-called 'net loading' system (trash fish removal) or re-circulating Baltic fish as feed raw material. The net loading system provides synergies with coastal fishing livelihood. Implementation of new management measures presumes changes in aquaculture permission procedures and fisheries policies. Stakeholders' perceptions and outlooks for cooperation will be studied carefully in order to achieve realistic recommendations for developing governance institutions.

### Cormorants, people and fisheries

Rapid growth of the great cormorant population along the Finnish coasts has raised hot debate and local resistance. The main problems are connected with the landscape and, in particular, fisheries. Fisheries related conflict stems from the bird's fish predation, which is considered as a threat to fishing and fish farming. One half of commercial coastal fishers in Finland consider the cormorant as a hindrance to their livelihood, the harm being manifested in a reduction of fish catch, and damage both to fishing gear and to the fish. This project studies the complexity of interactions that have emerged along with the cormorant invasion of the Finnish archipelago and coastal areas, with the aim of reaching a better understanding of these human-wildlife contradictions. The main thematic entities are twofold: the local activities and the people's perceptions of cormorants; and the institutional framework which affects the confrontation and options for conflict mitigation. The complex and diverse nature of the human-wildlife conflicts requires a multidisciplinary approach that combines social and natural sciences.

### Wolf, moose and man

The interconnection of moose, wolf and man constitutes an emerging problem in Finnish environmental and resource management, both from scientific and governance perspectives. This research focuses on three broad problem fields: What kinds of problems do the co-

presence of moose, wolf and man produce in particular socioecological environments? What institutional arrangements are already in place for controlling and directing the ways in which these species utilise the services afforded by the socioecological settings? How should the institutional arrangements and governance structures be re-adjusted in the face of an ecosystem approach and ecosystem services?

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The research is multidisciplinary, multi-scalar and experimental and utilises quantitative and qualitative methods together with the methods of action research. The research enables improved understanding of the nature of socioecological systems and the significance of ecosystem services in sustainable use of local and regional natural resources.



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