



# SEA CHANGE

AS POLITICAL DEBATE OVER THE  
OVEREXPLOITATION OF FISH STOCKS  
RAGES ON, UBC'S FISHERIES CENTRE  
IS TARGETING THE RESPONSIBLE  
MANAGEMENT OF AQUATIC ECOSYSTEMS  
FROM MULTIPLE PERSPECTIVES



The spectacular collapse of Canada's Atlantic cod fishery in 1992 shone a public spotlight on a long-simmering academic debate: were political decisions about fisheries management policies encouraging the overexploitation of fish stocks? More than a simple conservation issue, the demise of Canada's most lucrative fishery also generated significant public fallout. Thousands of jobs were lost, local economies were decimated—and more than 15 years later, cod populations show no sign of recovery.

Today, the plight of the world's fish stocks is well known but remains poorly understood. The dearth of scientific information—and the grave environmental, economic and social consequences of overfishing—has prompted a worldwide effort to seek solutions. At the heart of UBC's contribution is the Fisheries Centre, an interdisciplinary research hub promoting the study and responsible management of aquatic ecosystems.

"From ecological studies to investigating how the fish arrives on the table, no single discipline can solve the problem of fisheries," says Rashid Sumaila, newly appointed Director of the Fisheries Centre and its Fisheries Economics Research Unit. "Although there is a mix of basic and applied research within the Fisheries Centre, much of our work involves working with fishing communities, informing the public and advising policy makers, such as the Federal government or the UN."

Sumaila's own research integrates economics with other disciplines to help manage and sustain fisheries. He is known for his thoughtful analysis of government subsidies to fisheries, which he characterizes as "good, bad or ugly" depending on their effectiveness in reducing pressure on overfished stocks. His research also examines how the "profit now, pay later" approach to many fisheries may affect future generations, helping to inform elaborate ecosystem models that consider biological and economic parameters over time.

These models of complex interactions of species and ecosystems provide researchers with invaluable insights into current problems—and future solutions. Associate Professor Villy Christensen has been using modeling since 1990 to demonstrate how human exploitation impacts marine ecosystems, and is passionate about its efficacy. "You can see how things were, how they are, and how they might be, all informed by a scientific model."

Sumaila concurs. "Modeling is a nice way of bringing together most of our work. You can now do policy analysis using these models. If you want to maximize the dollars from an ecosystem, what will that system look like in the future? If you want to maintain a certain number of jobs in the fishery, what will the system look like? If you sacrifice the ecosystem for jobs for a few years, you may then see a downhill trend."



### Underwater world

The Sea Around Us Project, a key Fisheries Centre research cluster led by renowned researcher Daniel Pauly, is investigating the impact of fisheries on the world's marine ecosystems – and this work is becoming increasingly critical given the rapid depletion of global fish stocks. Project member Villy Christensen and the team members use geographic information systems (GIS) data to create and analyze complex maps of fisheries catches, aquatic habitats, fish biomasses, commercial species distributions, fishing vessel prices, Marine Protected Areas, and even fishing access agreements between nations. The result is a powerful overview of human interactions with aquatic ecosystems on a local, national and global scale.

“This [visual] information enabled us to show that the over-reporting of fish catches has masked a global decline in landings,” says Christensen, “[and] this has fueled false optimism about future catch increases and the ability to meet UN and other food security targets.”

The Sea Around Us databases also provide a powerful engine for Ecopath, a modeling software developed by Christensen and Carl Walters that has become the de facto standard for ecosystem approaches to fisheries management, with more than 6,000 users in 150 countries. Christensen and an interdisciplinary team of UBC researchers and Masters of Digital Media program students have now integrated this powerful model with a high-resolution gaming engine to create a scientifically accurate virtual seascape where the virtual fish populations respond to changes in real time. Working in partnership with the B.C. Ministry of the Environment, a newly proposed Environmental Decision Support Facility will enable provincial resource managers to immediately visualize the potential impacts of decisions that affect both aquatic and terrestrial environments.

As Christensen explains, “We want politicians, resource managers, and for that matter, the public to be able to explore alternate scenarios. What if we increased fishing effort? What if we closed

this area to fishing? What does the best available science say will happen?”

### Plentiful fish, productive waters

While visualization offers a powerful management tool, it is no substitute for directly engaging the communities that depend on fisheries. This on-the-ground philosophy informs the work of Project Seahorse, another key Fisheries Centre research cluster headed by Amanda Vincent, who holds the Canada Research Chair in Marine Conservation. Using the emotional power of seahorses as a focal point, Project Seahorse (PS) engages all level of stakeholders – from fishing communities to international regulatory bodies – to build sustainable biological, economic and social capital. This approach has been particularly successful in the Philippines, where PS has partnered with some of the world's poorest communities to enable the designation of 33 Marine Protected Areas (MPAs).

“MPAs are a tool for building social capital,” Vincent explains. “They require a local management council, planning and

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Above > Rashid Sumaila, UBC Below > Kaldor

interactions with local authorities. In a community with few resources and little organization or power or hope, establishing an MPA empowers them to also deal with other problems of resource use, education, and law and order. Moreover, MPAs have led to measurably more fish in their waters.”

Vincent’s team leads an array of projects all over the world. In Hong Kong, PS has translated its trade research into a broad collaborative effort for sustainable use of marine species in traditional Chinese medicine, involving industry and government as well as academia. At the international level, PS has been instrumental in engaging CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, in establishing export controls on marine fishes of commercial value, using seahorses to set precedent.

#### Future of fish

Other Fisheries Centre research groups are actively involved in sustaining vital North American fisheries and their ecosystems. The Marine Mammal Research Unit, headed

by Andrew Trites, is examining the interactions between fisheries, humans, and marine mammals, with field research conducted at the Port Moody open water facility and the Pacific Ocean showing that marine mammals are indicators of ecosystem change.

The Aboriginal Fisheries Research Unit, led by David Close, combines traditional ecological knowledge with modern science to address questions benefiting Aboriginal resource management and protecting Aboriginal fisheries and foods in perpetuity.

The Fisheries Ecosystems Restoration Research group, led by Tony Pitcher, focuses on modeling and evaluation in support of policy goals that reconcile the preservation of biodiversity and services with sustainable and responsible fisheries, including “Rapfish,” an interdisciplinary rapid appraisal method for evaluating the status of fisheries.

The Quantitative Modeling Group, involving Carl Walters, Steve Martell, Murdoch McAllister and Villy Christensen, develops mathematical models to help

fisheries biologists and resource managers adapt in the face of the extreme uncertainty that characterizes many marine ecosystems.

This kind of interdisciplinary research promotes fisheries management that bases policy decisions on sound science, and requires participation from stakeholders at all levels. Will this prevent the Atlantic cod catastrophe from being repeated? Rashid Sumaila believes it is a fundamental question of value.

“We need to value the fish we eat today as our fish, and the fish our children and grandchildren will eat in the future as their fish,” he says. “At the moment, we value those future generations’ fish as if they were ours, and that can be problematic.” ■■■

*The Fisheries Centre attracts national and international funding from major donors, research councils and granting agencies, and is one of 16 research units in UBC’s College for Interdisciplinary Studies (CFIS), supporting collaborative, interdisciplinary research and learning in sustainability, social policy and human health. See [www.cfis.ubc.ca](http://www.cfis.ubc.ca).*