# Computer Graphics for Fisheries Co-Management

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Inadequate communication between the stakeholders in fisheries is one of the main constraints to progress in improving management. Fishers and managers rarely grasp the full implications of what scientists understand. Employed scientists and managers rarely appreciate the real-life situation of fishers or respect their deep knowledge of fish stocks. And scientists and fishers often do not acknowledge the difficulties of compromise and allocation with which managers must work.

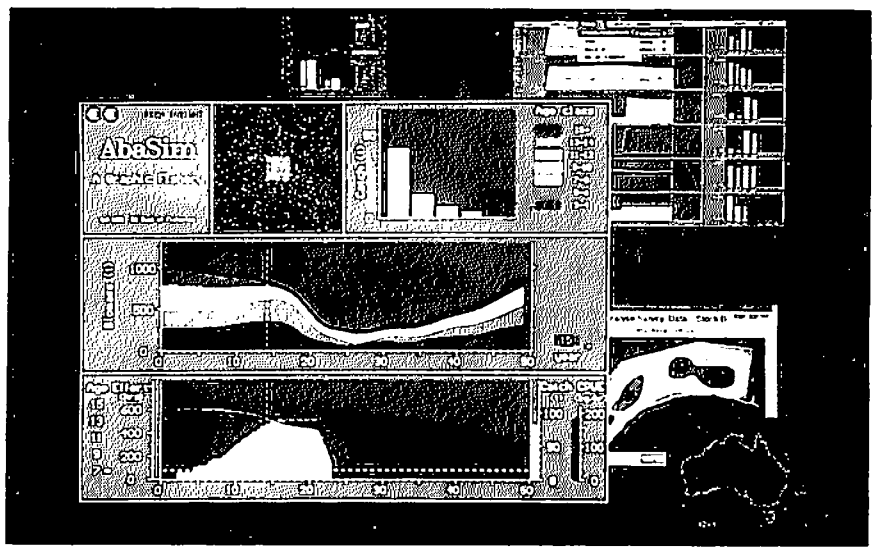
Computer graphics models of fisheries can have a significant impact in improving fisheries management by helping break down this communication gap.

The way that a user interacts with a computer is called an "interface". An effective user interface can make data and models that were previously only understood by scientists accessible to the others involved in a fishery - fishers, managers and the public. The technology also enables scientists to transfer their understanding to others, thereby ensuring that research results, and the money and time spent gaining them, are used effectively and not wasted, as is often the case.

The final report of the First World Fisheries Congress held in early May 1992 concluded that: "Interactive procedures for fishery management decision making need to be used. Interactions among scientists, fishery managers, and clients can be facilitated with the use of software interfaces to build consensus in decision making ... from setting priorities for assessment research, to evaluating risks of alternative management schemes and developing criteria for success."

An important aspect of an effective interface is the way that the user can easily alter and control what happens to images on the screen. A dynamic model of a fishery can be made into a "game" in which the user acts in the role of a manager, investigating the effects of alternative management strategies. By "playing" with a model in this way, the user gains insights into the behavior of a fishery system in the same way that the operator of a flight simulator learns how to fly an airplane.

Such a model offers benefits to the scientist by making sensitivity analysis much easier and quicker to perform than was previously possible. Rather than running numerous complex computer programs and then comparing desks full of figures and diagrams, the analyst can easily adjust a parameter value or management control and immediately see its effects on the models and the resulting recommendation for management.



The technology has already been used successfully in SHARKSIM, an interactive graphics model of Australia's southern shark fishery. Commissioned as "an agent for change", it was used in public meetings to convince industry of the need for urgent and significant changes in management of the fishery. It did so by communicating in public meetings, scientists' understanding of the stock and the likely consequences of alternative management actions. Whilst industry disputed the underlying models, it highly praised the use of the interface to communicate scientific understanding. SHARKSIM significantly increased the level of understanding of issues. It brought together fishers, managers and scientists in collaborative information exchange and consideration of future action in the fishery. The joint involvement continues to grow as each group gains increased respect for the knowledge, skills and points of view of the others.

Interactive graphics computer models of fisheries can also be effective training tools. ABASIM is a computer-based educational "game" based on real data. It simulates what happens to a population of abalone when it is fished by divers. The user can change the size limit and adjust the fishing pressure. The effects on the population and catches are immediately made apparent through colored dynamic graphics easily understood by nonspecialists.

SHARKSIM and ABASIM were developed by FISH INSIGHT, a section of the South Australian Department of Fisheries in Adelaide that specializes in the development of computer-based models using techniques of simulation, visualization and interactive game design. Over the past two years, it has developed a generic user interface that offers more access to models, greater insight into complex dynamics and the ability to communicate to nonspecialists.

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