Economic profit the key to sustainable fisheries

Exploiting a renewable resource for maximum economic profit is the antithesis of sustainable management, right? Not so, according to Australian economists. In a world first, researchers from the Crawford School of Economics and Government at the Australian National University have shown that if fisheries are managed for maximum economic return, rather than sustainable yield, fishers could actually make more money and better conserve dwindling fish stocks.

The finding, published in *Science*[1] in December 2007, challenges 35 years of thinking – based on theoretical research conducted in 1973[2] – that to maintain fisheries productivity and prevent the extinction of commercial species, we must focus on sustainable catch limits.

'But it's not just the amount of fish you catch that's important,' says lead author of the research, Professor Quentin Grafton. 'It's also how much return you get, because it costs money to fish.'

Professor Grafton and his colleagues, Dr Tom Kompas, also of the Crawford School, and Dr Ray Hilborn of the University of Washington, explain that bigger profits are made when fish numbers are allowed to rise beyond the levels traditionally considered to be sustainable. This is because it costs less to find and catch fish present in larger numbers than in less populous schools – a phenomenon known as the 'stock effect'.

'Our research has found that as stocks get smaller, the costs of fishing increase at an increasing rate, rather than in proportion to the decline in stock,' Dr Kompas says.

'This effect hasn't been accounted for in past research, partly because the programming power to model it wasn't available, and partly because fish stocks were once relatively plentiful and the effect was not apparent.'

The researchers incorporated the stock effect into revenue and stock biomass models in four fisheries – the Western and Central Pacific big eye tuna and yellowfin tuna fisheries, the Australian northern prawn fishery, and the Australian orange roughy fishery. In every case, fish stock size was greater when the aim was to maximise economic returns, rather than sustained yield.

'This is the opposite of the long-held general perception that, in theory, maximising economic profit can lead to stock depletion or even extinction,' Professor Grafton says.

'When you do the economics correctly, you end up with higher net returns from fishing, and the potential for increased resilience of fish stocks compared to those managed for maximum sustained yield.'

Profits will not come without pain, however, at least initially. With many of Australia's fisheries overfished, catches will need to be reduced across the board to allow fish stocks to recover to the levels that will sustain 'maximum economic yield' (MEY). How long fishing effort needs to be reduced will depend on the species and the initial stock status.

A haul of orange roughy, a very popular food-fish particularly vulnerable to overfishing due to the species's longevity. It also has late sexual maturity and a habit of congregating in huge schools to feed and spawn. Mark Lewis, CSIRO

'For species like the northern tiger prawn, a few years is sufficient, but slow-growing, overfished species like the orange roughy will require a reduced harvest for considerably longer,' Dr Kompas says.

The Australian Government and the Australian Fisheries Management Authority (AFMA) have been working to incorporate the research principles into fisheries law and management policy. In September 2007 the government announced its Harvest Strategy Policy,[3] which articulates the level of risk it is willing to accept in utilising Commonwealth fisheries resources. It also set an MEY target for the fisheries. AFMA is taking a number of approaches to implement this target.

'Fishers are only going to accept income cuts if the government is willing to allocate them secure and long-term fishing rights,' says AFMA Executive Manager, Dr Nick Rayns.

'To achieve this, total allowable catches (TAC) and individual transferable quotas are the preferred forms of management, as they provide strong asset values if the TAC is set correctly.'

In 2006 and 2007 the government also implemented a $150 million fishing concession buy-back scheme to enable a significant number of fishers to leave the industry.[4]

Australia's MEY research and management is increasingly attracting interest from overseas, particularly New Zealand, Canada and the United States. With close to 25% of the world's fisheries overfished or subject to overfishing, and 50% at their biological maximum sustainable limit,[5] this work offers a timely solution to a difficult problem.

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