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Stable catch: warning for future fishery collapse?

Analysis of the dynamics of world fisheries suggests that a stable level of catch over several years masks the risk of sudden collapse. This puts in question the common assumption that considers the stability of catch as a goal for fisheries sustainability.

Serial depletions of marine fish stocks because of over-exploitation are endangering the future of marine fisheries. In order to understand the causes of such depletions, the scientists from the French Research Institute for Development (IRD) analysed the dynamics of world fisheries collapses over the past 50 years.

The results of their study, that included 115 main series of the FAO world fisheries catch database collected from 1950 to 2000, show that nearly one of four world fisheries collapsed during this period with no apparent sign of improvement in the decline trend. The collapse of a fishery has been defined as a sustained period of very low catch values after a period of high catch values. The analyses of the dynamics of collapses put in question the effectiveness of overall fisheries management.

Common assumption considers that the stability of catch is the main goal for fisheries sustainability. Yet, the analysis of collapse dynamics showed that 21 percent of collapses were so called “plateau-collapses” characterised by a sudden fall after a relatively long and stable persistence of catches. In other words, the stability of the catches during the decade preceding the sudden collapse was only an apparent stability that actually masked a progressive decline of fish stocks. These results highlight the controversy of using the catch trend as the main indicator of sustainability.

Going further, a simple mathematical model related the plateau-collapses to two interacting factors. The first one is the increasing exploitation, mainly related to fishery efficiency constantly improved by modernisation and sophistication of fishing equipment. The second factor is related to critical thresholds in population levels beyond which the fish stock renewal capacity is severely reduced.

The scientists thus suggest that preventing global collapse of many more fisheries will depend not only on the efficiency of restoring depleting stocks, but also on quantifying effective fishing efforts and determining threshold effects at low level stocks.

Source: C. Mullon, P. Fréon & P. Cury, 2005– The dynamics of collapse in world fisheries, Fish and Fisheries, vol.6, pp. 111-120.
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