

THE SITUATION IN WORLD FISHERIES

Andy Thorpe, David Whitmarsh and Pierre Failler

CEMARE, University of Portsmouth, UK

Keywords: Aquaculture, artisanal fishing, coastal fisheries, co-management, Exclusive Economic Zone (EEZ), fishing effort, fishmeal, food security, Illegal, Unreported and Unregulated fishing (IUU), individual transferable quotas (ITQs), inland fisheries, Marine Stewardship Council, food-web, open access, overfishing, recreational fishing, territorial use rights (TURFs), total allowable catch (TAC), trophic level, UNCLOS III, World Summit on Sustainable Development (WSSD).

Contents

1. Introduction
2. Recent Trends in Fisheries Production
 - 2.1. The Global Position
 - 2.2. The Regional Perspective
 - 2.2.1. Asia
 - 2.2.2. Africa
 - 2.2.3. Europe
 - 2.2.4. Latin America and the Caribbean.
 - 2.2.5. North America
 - 2.2.6. Oceania
 3. Reasons for Production Growth
 - 3.1. The Technological Revolution
 - 3.2. Government and Donor Support.
 - 3.3. The Property Rights Regime
 - 3.4. The Attraction of Fishing
 - 3.5. Changing Consumer Tastes
 - 3.6. The Growing Demand for Fishmeal
 4. The Sustainability of World Fisheries
 - 4.1. International and Regional Responses
 - 4.2. National Responses
 - 4.3. Fisheries and Climate Change
 5. Conclusion

Glossary
Bibliography
Biographical Sketches

Summary

Fisheries (marine and inland capture) and aquaculture are important contributors to food security, livelihoods and employment, and export earnings and economic growth across the globe. However, it is clear that the industry is also facing a number of important challenges: most of the major commercial fish stocks are presently (or are close to being) overfished, the rapid expansion of aquaculture has seen a concomitant growth in the demand for—and consequently price of—fishmeal, the growing international trade

in fish and fish products is likely to have major implications for food security and livelihoods across the developing world, while regulatory initiatives—at both the national and international level—need to be further refined if resource sustainability and eco-system protection objectives are to be met.

This article provides a broad overview of the current situation in world fisheries. Although the global picture remains one of rising fisheries production, reported marine and inland catches have largely stagnated since the late 1980s, with aquaculture becoming increasingly important—particularly in the Asian region where it currently generates revenues ascending to US\$27.9 billion. Reasons for this production growth are varied, but include: innovation and technological developments within the sector, government and/or donor support to the industry, a growing demand for fish and fish products (especially fishmeal), and the returns available to participants in an industry that was, historically, characterized by open access or common pool property regimes. The consequent ‘race for fish’ that developed triggered concerns about the industry’s sustainability—and has seen responses formulated at the national, regional and international level with a view to avoiding a crisis in world fisheries. Such initiatives are likely to be complicated, however, by the impact of climate change on the level and regional distribution of fish populations.

1. Introduction

At the beginning of the twenty-first century, global production from capture fisheries and aquaculture annually provides about 155 million tonnes of fish (capture and aquaculture)—equivalent to a per capita supply of around 16.2 kg (live weight equivalent). Recent production increases have come almost exclusively from aquaculture, however, for increasing fishing pressure over the last half century or so has left many major fish stocks depleted or in decline. Furthermore, as the biomass of large, high trophic level fish (such as cod, tuna and groupers, which are at the top of the marine food chain) has been depleted, fishing activity has been re-focused to target lower trophic level fish and invertebrates (such as small pelagics, shrimp, crab and squid). The consequence is not just a reduction in abundance of target species, but also a simplification of marine food webs—as middle and higher level trophic fish are removed shortened food-webs become more vulnerable to environmental disruption.

This contribution seeks to provide an overview of the situation in world fisheries. We commence by identifying how marine fisheries, inland fisheries and aquaculture production have evolved over the last half century—and their present regional status. Section 3 highlights the factors which have affected this development, while the subsequent section details current responses (national and international) to the dilemma of unsustainable harvesting rates and discusses the impact climate change is having on global fisheries. A concluding section considers future supply and demand trends and discusses the likely implications of such trends for global food security in the developing world.

2. Recent Trends in Fisheries Production

2.1. The Global Position

The first comprehensive estimate of global fisheries production, produced by FAO in 1945, suggested that the total marine harvest was probably in the region of 17.7 million tonnes, with the majority (circa 95%) being landed by commercial fleets.

These fleets moreover concentrated their activities almost exclusively in the North Atlantic (46% of marine landings) and North Pacific (47%) regions and so, while experts recognized that some European stocks were already over-fished, there was a prevailing mood of optimism in the immediate post-war period about the potential for fisheries expansion.

Under-exploited stocks off Central America, Peru and Chile, in the Caribbean, off West Africa and off Australia, New Zealand, the South Pacific Islands and the East Indies in particular, were viewed as offering considerable possibilities for fisheries expansion.

Fifty years on, perceptions had changed. No longer was the talk of fisheries potential and abundance, but of over-exploited stocks and excess fishing capacity. Increased investment in fishing activity, firstly by developed nations—often in the guise of distant water fleets—and latterly by developing nations, saw impressive fleet and employment growth over the period (see Table 1).

	1970	1980	1990	2000	2002	Percentage Increase 1970-2002
Africa	1,360	1,436	1,917	2,585	2,615	92.3
North America	409	533	767	751	762	86.3
South America	518	516	769	784	770	48.6
Asia	10,125	13,285	23,654	30,770	32,821	224.2
Europe	665	619	654	864	746	12.2
Oceania	45	191	74	86	81	80
Total	13,122	16,580	27,835	35,840	37,795	188

* Figures include full, part-time and occasional fishers, and fish farmers (European data includes figures for the ex-USSR).

Source: FAO (The State of World Fisheries and Aquaculture, 1998 and 2004, FAO:Rome).

Table 1. Fisher's employment ('000s), by continent, 1970-2002.

Although FAO warn of data shortcomings vis-à-vis employment within the sector, it is undeniable that the number of fishers—whether full or part-time or occasional—has climbed dramatically in the developing countries. In Asia, for example, the growth in aquacultural activities and increased marine and inland capture sees the fisheries sector now employ over 32 million people (87% of the global total).

Meanwhile, although the numbers employed have decreased in the fully developed, largely industrial fisheries of Europe and North America, this decline has been more than matched by the growing popularity of recreational fishing in these regions. There are sharp regional differences in labour productivity, however. In 1995, for example, 301 000 Japanese fishers produced 6.7 million tonnes of fish—while nearly 6 million Indian fishers produced around 5 million tonnes of fish.

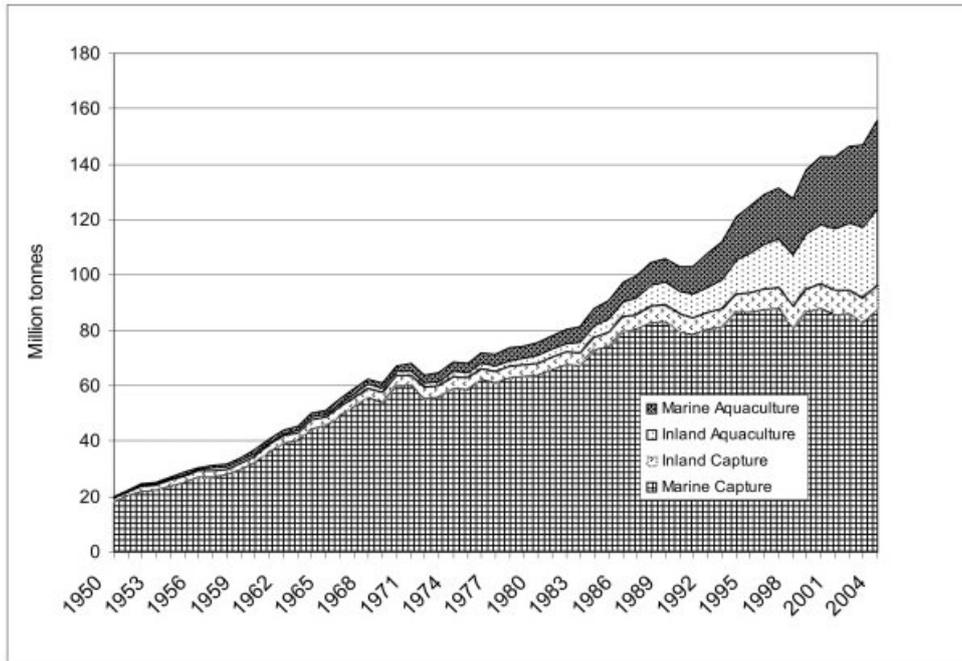


Figure 1. World production (million tonnes) from capture fisheries and aquaculture

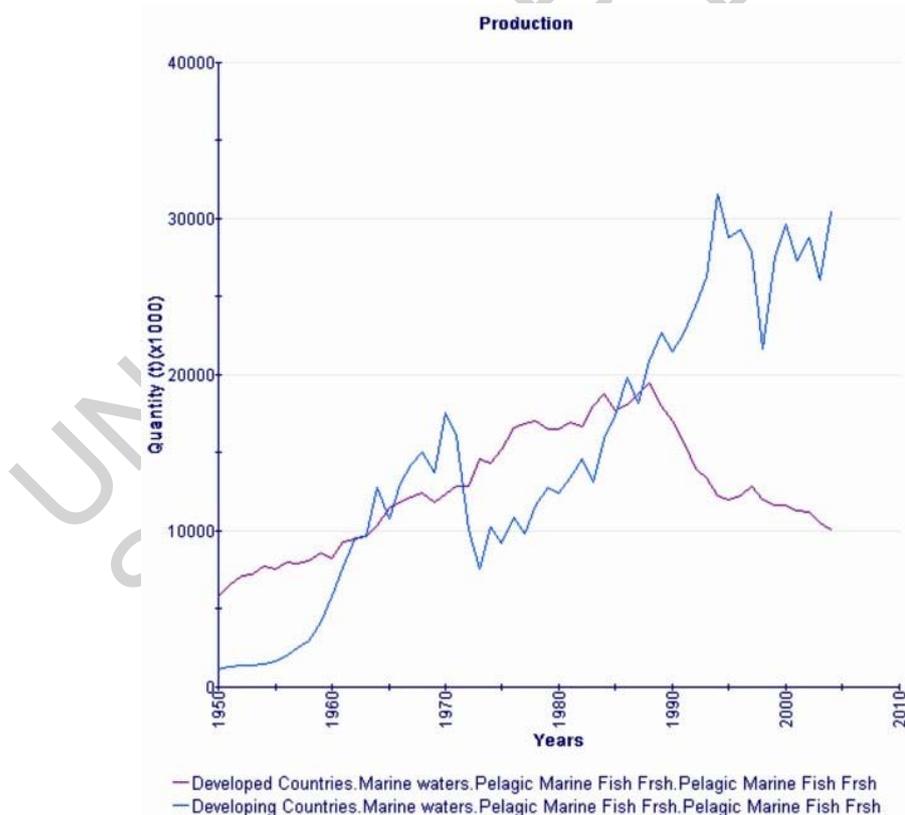


Figure 2. Pelagic production (1950-2002).

This global increase in employment has been accompanied by increased fleet investment. Data, available on the global level since 1970, suggests the global fleet of

decked vessels rose from 595 099 (with a capacity of 13.4 million tonnes) in 1970 to 1.26 million vessels (capacity 28 million tonnes) by 1995. In addition, estimates suggest a further 2.8 million undecked vessels are presently deployed in fishing activities, with the major proportion of both decked and undecked vessels (83 to 85%) being located in Asian waters.

This investment in terms of both money and time, in turn has fed through into substantial production increases in both marine capture fisheries, and latterly aquacultural (marine and inland) output (Figure 1).

In the case of marine capture fisheries, catches rose sharply from the 1950s through to the late 1980s—since when production has stabilized. Over the same period, aggregate pelagic landings (Figure 2) have increased from 8.1 to just over 40 million tonnes (47% of marine catch), albeit with rather large oscillations due to climate-induced variations in natural productivity and the effects of boom/bust fishing strategies.

The exponential growth in developing countries'—principally Peruvian—take from the late 1950s was stymied by the anchoveta collapse in the early 1970s, although by the end of the century such countries accounted for over two-thirds of the global pelagic catch (a major proportion of which is destined for the reduction industry).

While around 200 pelagic species are commercially fished, seven species (*anchoveta*, *Atlantic herring*, the *Japanese* and *South American pilchard*, chub mackerel, *capelin* and the *Chilean jack mackerel*) account for the bulk of the landings and of these six (in italics above) are presently considered to be fully exploited or worse (overexploited, depleted or recovering).

The remainder of the marine catch is comprised of demersal fish (15% in 2004) —discussed below, molluscs (8%) and crustaceans (7%)—which are discussed more fully in the relevant regional reviews that follow, unidentified species (14%), miscellaneous coastal fish (7%) and sharks, rays and diadromous species (2%).

As Figure 3 shows, aggregate landings of demersal fish have risen to a current peak of around 22 million tonnes, with developing countries now accounting for half the reported catch.

In contrast, the rather more dramatic increases in developed country catches during the 1950s and 1960s triggered the introduction of fishing restrictions in Icelandic waters in the early 1970s and then the collapse of ground fish stocks off eastern Canada in the early 1980s. Since then, landings by developed country fleets have fallen by around 30%.

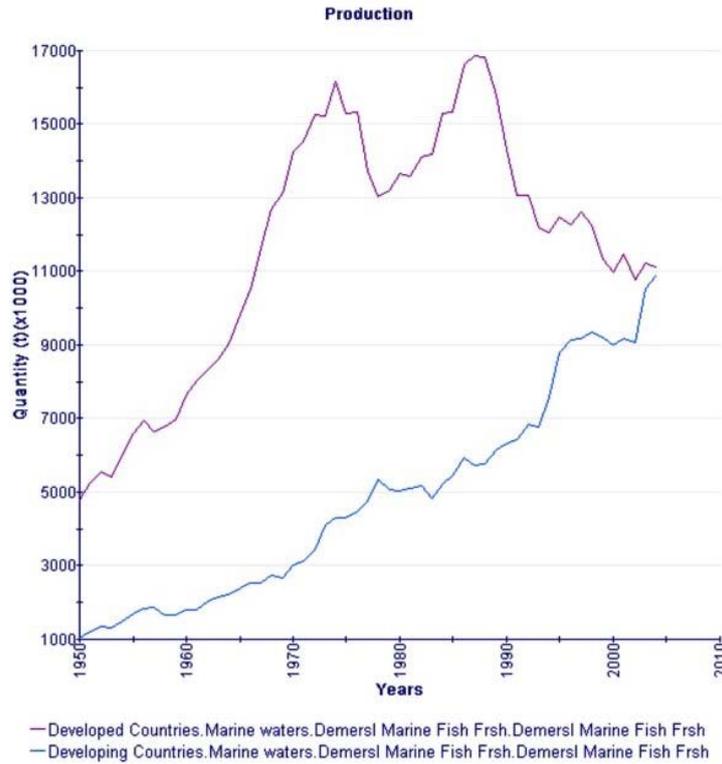


Figure 3. Demersal landings (1950-2002).

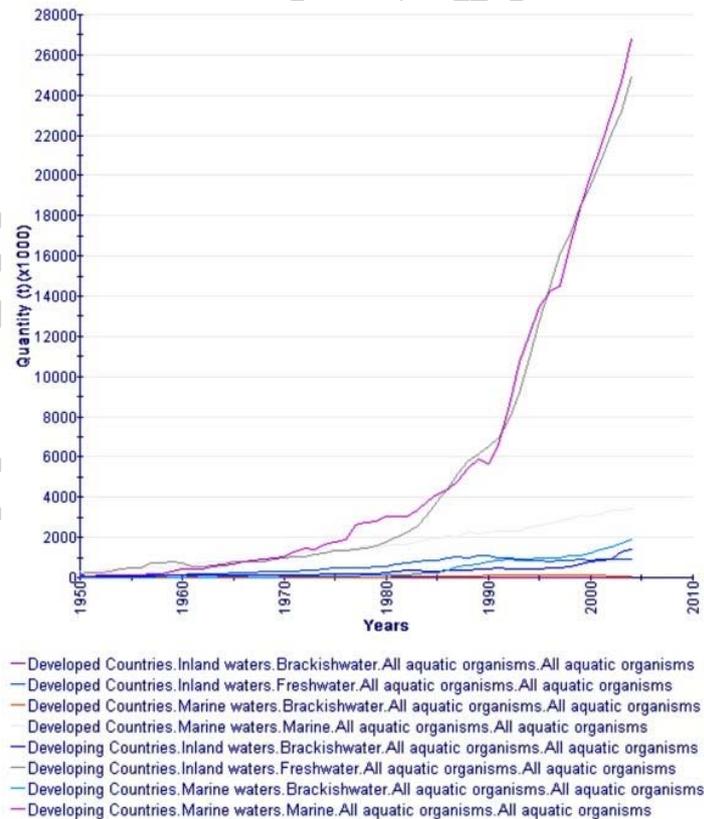


Figure 4. Aquacultural production (1950-2002)

Nevertheless, the most dramatic growth over the last half century has been seen in the fields of marine and inland aquaculture. An industry producing 638 600 tonnes in 1950 has evolved into a 59.4 million tonne operation generating US\$70.3 billion by 2004. While output in the developing world has leapt twelve-fold to 4.4 million tonnes, this increase (as Figure 4 shows) has been completely outshone by the two hundred-fold increase in production across the developing world, most notably in Asia. Individual regional trends in aquacultural activity—and the evolution of marine and inland fisheries—are discussed in more detail in the regional reviews that follow.

To conclude this section, however, we wish to draw attention to the fact that this expansion of fishing effort, fishing employment and fish production has not been without cost. The most recent stock status research (Figure 5) suggests that over three-quarters of the main commercial stocks are presently fully-overexploited (or worse). It seems clear then that prospects for future fisheries growth are limited.

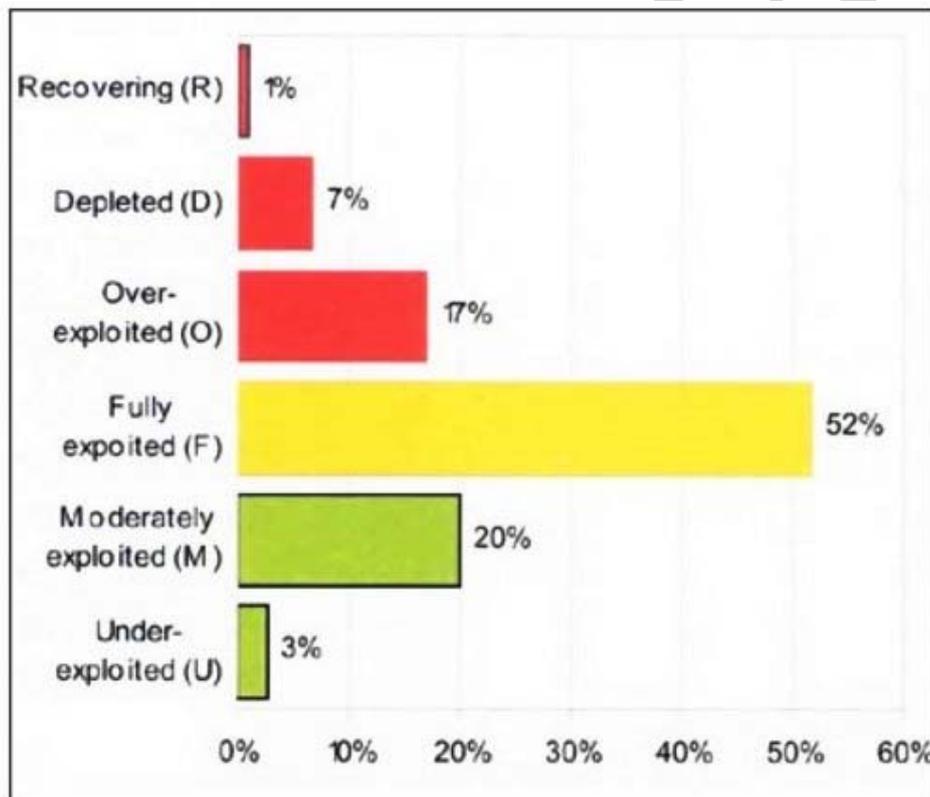


Figure 5. State of world stocks (2004)

-
-
-

TO ACCESS ALL THE 27 PAGES OF THIS CHAPTER,
Visit: <http://www.eolss.net/Eolss-sampleAllChapter.aspx>

Bibliography

Cox A. and Schmidt C-C. (2002). Subsidies in the OECD Fisheries Sector: A Review of Recent Analysis and Future Directions. www.oecd.org/dataoecd/43/40/2507604.pdf, [Provides a good detailed synopsis of the type and magnitude of fisheries subsidies in OECD countries].

ECOST. N/d. Ecosystems, Societies, Consilience, Precautionary Principle: Development of an Assessment Method of the Societal Cost for Best Fisheries Practices and Efficient Public Policies, <http://osiris.ird.sn/ecostproject/doku.php>[An example of ongoing work which attempts to mesh ecological, economic and social approaches so as to give a more complete understanding of, and response to, the unfolding crisis in world fisheries].

FAO (2004). State of World Fisheries and Aquaculture 2004. 153 pp. FAO, Rome [Most recent review of regional trends in global capture fisheries and aquaculture].

FAO (1995). Code of Conduct for Responsible Fisheries, 41 pp. Rome: FAO http://www.fao.org/figis/servlet/static?dom=org&xml=CCRF_prog.xml, [The Code sets out principles and international standards of behaviour for responsible fisheries practices].

Kurien J. (2005). Responsible Fish Trade and Food Security. FAO Fisheries Technical Paper No.456, 99pp. Rome: FAO [A detailed review of both the positive and negative impacts of the international fish trade on food security in low-income food-deficit countries].

New M.B. and Wijkstrom, U. (2002). Use of Fishmeal and Fish Oil in Aquafeeds: Further Thoughts on the Fish-Meal Trap. FAO Fisheries Circular 975, 68 pp Rome:FAO [A good overview of the evolution of, and future prospects for, the fishmeal industry].

Pauly D., Christensen V., Dalsgaard J., Froese R. and Torres Jr, F.C. (1998). 'Fishing down Marine Food Webs'. *Science*, 279:860-3 [Short article dealing with the dangers of fishing out higher trophic level species]

Roessig J.M., Woodley C.M., Cech Jr J.J. and Hansen L.J. (2004). Effects of Global Climate Change on Marine and Estuarine Fishes and fisheries. *Reviews in Fish Biology and Fisheries*, 14:251-75 [Useful article summarizing current research findings regarding the impact of climate change on fisheries].

Thorpe A, Ibarra A.A. and Reid C. (2000). 'The New Economic Model and Fisheries Development in Latin America'. *World Development*, 28(9):1689-1702 [Shows how changes in economic policy have directly impacted upon fisheries development in the Latin American region]

World Resources Institute (2004). Fishing for Answers: Making Sense of the Global Fish Crisis. World Resources Institute: Washington D.C. [A report that examines how consumption demand is affecting both the ecosystem and the structure of the global fishing industry].

Biographical Sketches

Andy Thorpe is a Reader in Development Economics in the Department of Economics at the University of Portsmouth, UK. He is fluent in Spanish, having been visiting Professor in Agricultural Economics at the *Posgrado en Economía y Planificación del Desarrollo* (POSCAE) at the National State University of Honduras in the early 1990s. This period proved to be a springboard for his early research interests - three books being published [in Spanish] on the political economy of Central American agriculture. Since his return to the UK he has worked on the political economy of fisheries development across the developing world, often in conjunction with CEMARE. He has published widely in internationally renowned journals such as *World Development*, *Food Policy*, *Marine Resource Economics*, *The Journal of Latin American Studies*, *European Review of Latin American and Caribbean Studies*, *the Journal of International Development*, *Kyklos*, *Natural Resources Forum*, *Agriculture and Human Values*, *the African Development Review* and *Defence and Peace Economics*. He was awarded a Doctorate by the Institute of Latin American Studies in 1999 and has undertaken research for the European Union, the Food and Agriculture Organisation and a number of British development-based NGOs.

David Whitmarsh is Professor of Marine Resource Management in the Department of Economics, University of Portsmouth. He teaches on a range of undergraduate and postgraduate courses within the Department, and supervises doctoral students attached to the CEMARE research group. His specialist

expertise is in the economics of the marine environment, and over the past 30 years he has undertaken both theoretical and applied research in this area. Academic journals he has published in include *Land Economics*, *Journal of Economic Education*, *Project Appraisal*, *Marine Policy*, *Marine Pollution Bulletin*, *Marine Resource Economics*, *Environmental Conservation* and *European Environment*. He has worked on research projects and participated in meetings and conferences sponsored by a number of international agencies, notably the European Commission (EC), the Organisation for Economic Cooperation and Development (OECD) and the United Nations Food and Agriculture Organisation (FAO). Other professional activities have involved advisory work for the UK Department of Trade and Industry (DTI), HM Treasury, the UK Environment Agency and the UK House of Commons Agriculture Committee.

Pierre Failler is a Senior Research Fellow at the Centre for the Economics and Management of Aquatic Resources (CEMARE), University of Portsmouth. He currently manages both the EU ECOST and POORFISH projects. Recent publications include: (with M. Diop and S. M'Bareck) (2006) *Les effets de la libéralisation du commerce. Le cas du secteur des pêches de la République de Mauritanie*. Genève: PNUE; (with C.Floros) (2006), "Forecasting Monthly Fisheries Prices: Model Comparison Using Data From Cornwall (UK)", *European Journal of Scientific Research*.