Institution: University of Hull

Unit of Assessment: C17: Geography, Environmental Studies and Archaeology

Title of case study: Producing European policies for the conservation and enhancement of freshwater fisheries

1. Summary of the impact

Researchers at the Hull International Fisheries Institute (HIFI) in the School of Biological, Biomedical and Environmental Sciences, have shaped policies that govern the regulation, conservation and enhancement of freshwater fisheries for national and trans-national governments and their agencies and institutions.

The reach of this research is international as it underpins fisheries policies and guidelines across Europe. Its significance is considerable because these policies regulate the sustainable use of freshwater fisheries; it protects them from alien and genetically-modified fishes; and they prohibit genetically-modified fish in Europe. Our research also shapes European legislation on controlling fish-eating birds. As a result this research has produced significant and broad impact.

2. Underpinning research

Until the mid 1980s research on inland fisheries mainly focused on the ecology of individual species and populations and largely failed to explore the sustainability of, and wider societal issues surrounding, inland fisheries resources. To address this oversight the University of Hull International Fisheries Institute (HIFI, established in 1989) coordinated a series of biennial conferences through the 1990s to broaden the scope of freshwater fisheries research. Over time the group's research has focused on explaining the drivers of ecosystem functioning relating to fish and fisheries, and on interrogating the impact of anthropogenic activities on the provision of ecosystem services (Cowx et al. 2010). In parallel, HIFI undertook world-leading, fundamental research into the conservation and enhancement of freshwater fisheries (Cooke and Cowx 2004; Beard et al. 2011), and the Institute has produced over 140 peer-reviewed publications and 10 edited books on these themes. HIFI staff are Cowx (Director of HIFI and Professor of Applied Fisheries Science, from 1989), Harvey (Post Doctoral Researcher then Lecturer in Fisheries Science, from 1995), Noble (Researcher, from 2003) and Nunn (Post Doctoral Researcher, from 2005).

This case study outlines two examples of how HIFI's research impacted upon European Union policies and regulations:

1) HIFI was commissioned to undertake a European Union funded research project IMPASSE to support the drafting of regulation 708/2007 of the European Parliament and Council that addresses the use, movement and containment of alien and locally-absent species in aquaculture. The research was undertaken by HIFI staff: Cowx (overall project coordination and management framework), Nunn (risk assessment), Noble and Harvey (species interactions) in collaboration with eleven other institutions across Europe [1].

The research reviewed the scale and impact of alien species' introductions across the globe; it also identified the particular, significant impacts of species' introductions due to aquaculture practices. The project developed risk assessment protocols for the introduction of alien aquatic species in Europe, plus contingency plans to mitigate impacts if invasive species escape to the wild (Gozlan et al. 2010). It also produced a management framework for regulating introductions of alien species in aquaculture, and it determined that 'closed facilities' were the best guarantor against species escape (Cowx et al. 2010).

This research was extended when the European Food Safety Authority commissioned HIFI to produce guidance documents for the Environmental Risks posed by genetically modified fish. The report was produced by Cowx and Nunn (plus sub-authors from other HEIs). It included a risk assessment of the environmental threat and criteria of GM fish, plus methodologies to assess, and criteria to quantify, their environmental impact. It also outlined how European policy should conceptualise and quantify the threats from genetically modified fish [4] Note: due to sensitivity of topic, the contract regulating this research allowed no academic articles until after the final decision on regulating the use of GM animals is made by the European Commission.

2) The European Parliament's Commission on Fisheries appointed Cowx to produce a report for cormorant management in relation to inland fisheries for the EU area (Aug 2012-Feb 2013). HIFI expertise in this field was established by an earlier Department for Environment, Food and Rural Affairs (DEFRA) funded project that identified the huge scale and intensity of cormorants' impact on UK fish stocks and recommended measures to mitigate their effect (Cowx 2003; Feltham, Cowx et al. 1999).

The 2013 report to the European Parliament was commissioned as an independent opinion on the earlier Kindermann Report [8] that recommended a pan-European cormorant management plan based on large-scale culling. The Cowx report outlined a long term strategy for addressing the competing interests of these protected birds and the fisheries they degrade. It argued that large scale culling is impractical and socially unacceptable. Instead, it recommended strategic local management of cormorant populations via deterrents (noise and nets), artificial habitat creation, oiling of eggs and localized culling. The report also included an impact statement on the effects of cormorants on European inland fisheries.

3. References to the research

Beard, D.T., Arlinghaus, R., Cooke, S.J., McIntyre, P.B., De Silva, S., Bartley, D. and Cowx, I.G. (2011) Ecosystem approach to inland fisheries: research needs and implementation strategies, *Biology Letters,* 7, 4, 481-483.

Cooke S.J. & Cowx, I.G. (2004) Considering recreational fisheries impacts in the global fish crises, *Bioscience,* 54, 857-859.

Cowx, I.G. (2003) *Interactions between Birds and Fish: Implications for Management*. Oxford: Fishing News Books, Blackwell Science, 374 pp.

Cowx, I.G., Arlinghaus, R. and Cooke, S.J. (2010) Harmonising recreational fisheries and conservation objectives for aquatic biodiversity in inland waters, *Journal of Fish Biology,* 76, 2194-2215.

Feltham, M.J., Cowx, I.G., Davies, J.M., Harvey, J.P., Wilson, B.R., Britton, J.R. and Holden, T. (1999) *Case studies of the impact of fish-eating birds on inland fisheries in England and Wales,* Report to MAFF/DoE, 144 pp.

Gozlan, R.E., Britton, J.R., Cowx, I.G. and Copp, G.H. (2010) Current knowledge on non-native freshwater fish introductions, *Journal of Fish Biology,* 76, 751–786.

Relevant grants and contracts:

Impact of fish eating birds on fish populations, Defra/MAFF/DoE, £159,000; April 1995-December 1997 (Cowx, Harvey, Nunn and Noble).

Impact of alien species in aquaculture (IMPASSE), EU FP6, €548,000, December 2006-December 2008 (Cowx, Harvey, Noble, Nunn).

Defining environmental risk assessment criteria for genetically modified fishes to be placed on the EU market (GMfishes), European Food Safety Agency, €148,000, June 2009-May 2010 (Cowx, Nunn).

Between Fisheries And Bird Conservation: The Cormorant Conflict, European Parliament Directorate General For Internal Policies Policy Department B Fisheries, August 2012-February 2013 (Cowx).

4. Details of the impact

HIFI's impact derives from its reputation for high-quality, debate-setting research that can be applied to develop policy frameworks, protocols, regulations and guidance documents for freshwater fisheries and associated aquatic environments. This record has attracted commissions from governments and national and trans-national organisations working across national, European and global frameworks. This gives HIFI's impact international reach and significance.

1) HIFI's research on alien invasive fishes and their presence (and threatened spread) in the European Union has shaped European Regulations on alien fish species. As noted earlier, HIFI's reputation for research on fish stock enhancement strategies led to the award of the EU-funded IMPASSE project to research the use, movement and risks of alien fish species in Europe. This project was also intended to support the drafting of European Council Regulation 708/2007 that regulated the use of alien fish species in aquaculture.

IMPASSE developed risk assessment protocols for alien fish species and produced guidance on

how to regulate the movements of alien fish and contingency measures in case of problems [1]. It also recommended the use of 'closed facilities' to reduce risk of escape to acceptable levels. The IMPASSE report provided evidence to help revise the regulation adopted by the Council of the European Union on 2 June 2010; the revision passed into European law on 4 November 2010 [2]. The associated outcomes have economic implications for the growth of aquaculture in Europe; they also protect European ecosystems from invasive species.

HIFI's role in establishing legislation on alien species meant that when the EU needed a policy on genetically modified fishes, HIFI were approached and therefore also shaped European Policy on the use, the presence, and the potential threats of these controversial animals.

HIFI were commissioned by the European Food Safety Authority (and its subsidiary Panel on Genetically Modified Organisms) to produce guidance documents for the Environmental Risk Assessment of genetically modified fishes (as both food and feed), for any related environmental safety issues, and for connected animal health and welfare matters. The report was published on 27 May 2010 [3] and it included:

- Criteria to assess the impact of genetically modified fishes in the EU area
- Guidelines to formulate methodologies, which can assess the impact of these fishes

This HIFI report therefore outlined how European policy should conceptualise and quantify the threats from genetically modified fish. Notably, it recommended that genetically modified fishes should be avoided throughout aquaculture developments across Europe.

This document was used directly as the basis of EU guidance documents published in January 2012 by the 'Panel on Genetically Modified Organisms' of the European Food Safety Authority [4].

This 'scientific opinion' was endorsed on 18 April 2012 by the same European Food Safety Authority 'Panel on Genetically Modified Organisms'. After a consultation period with stakeholders from 21 June to 31 August 2012, a technical report was released [5] and these protocols were accepted. The European Food Safety Authority published the final 'scientific opinion', which will steer these regulations into European law [6].

Beneficiaries include the freshwater fisheries sector, that now has regulations to protect their stocks and preserve consumer confidence. European ecosystems now protected from GM-fishes and invasive species also benefit. Related research by HIFI continues in other world regions – including a 2011 study commissioned by the UN Food and Agriculture Organisation to assess the impacts of alien aquatic species in Central Asia and the Caucasus and to prepare guidelines for managing species introductions and stocking [7].

2) HIFI's second example originates from its reputation established by DEFRA-funded research to assess the impact of cormorants on UK fish stocks (Feltham, Cowx et al. 1999). As previously noted, the European Parliament's Committee on Fisheries subsequently commissioned Cowx to produce a global impact statement on the effects of cormorants on fisheries in Europe. This report was published in January 2013 [8].

Cowx was approached to offer an opinion on the European Parliament's 2008 decision (based on the Kindermann report) to adopt a cormorant management strategy of extensive culling. The need for cormorant management is based on the high level of stock depredation suffered by recreational and commercial fisheries due to the expanding cormorant populations on European inland waters (currently 250,000+ breeding pairs). The European Parliament considered the economic impacts of these losses to be unacceptable given the economic importance of recreational fisheries and the aquaculture sector. But rather than large-scale culling, Cowx's 2013 HIFI report recommended more locally-variegated management strategies for cormorant control including deterrents, egg-oiling and limited, localized culls.

Cowx presented the report and recommendations to the European Parliament on 21 March 2013 [9]. The parliament adopted the report [10] to replace the 2008 policy of large scale culling with Cowx's recommendations, that address cormorant populations more appropriately. This approach will also be more economically feasible and less problematic for public opinion. HIFI research therefore impacted upon EU policy directly. These strategies have also impacted upon national

angling organizations, like the Angling Trust in England and Wales, who also adopted this approach.

The beneficiaries are the fisheries managers, who can now defend their stocks against cormorants. This is significant because the European freshwater fisheries sector is worth over €6 billion per annum and employs over 50,000 people. Fisheries help to sustain healthy environments and ecosystems and are a sizeable recreational sector. Bird and nature conservation movements have also welcomed this revised legislation. This research thus delivered impact of substantial significance and considerable international reach.

Further recognition of the excellence of this research impact is highlighted by the following awards:

- 2008 American Fisheries Society Award to Cowx: 'for outstanding contribution to international inland fisheries management'. This is the first time this award has been made outside of North America in the 110 year history of the American Fisheries Society.
- 2012 Honorary Doctor of Science to Cowx: 'for contributions to inland fisheries', Michigan State University, USA; Cowx also delivers the Rachael Carson Memorial Lecture, Michigan State.
- 2012 International Fisheries Science Prize to Cowx: in honour of 'life time contribution to fisheries science and conservation' (awarded every four years by the World Council of Fisheries Societies).

These awards demonstrate the quality and esteem of HIFI research and its international recognition. Further, this international profile is demonstrated by HIFI's current projects, which include assessing the rehabilitation of fisheries of the Shatt-el-Arab, Iraq, for the UN Food and Agriculture Organisation. Other applied research in the REF period include a Code of Practice for Recreational Fisheries (for the European Inland Fisheries Advisory Commission, UN FAO), and a fisheries management plan for Kafue Flats, Zambia (for the European Union). These projects likewise demonstrate the significance and reach of research that shapes fisheries legislation, regulations and governance across an international range of contexts.

5. Sources to corroborate the impact

[1] Cowx, I. G., Angelopoulos, N., Nunn, A. D., Britton, J. R. and Copp, G. H. (2009) *Guidelines for environmentally-sound practices for introductions and translocations in aquaculture,* Report to The Council of the European Union, 64 pp.
[2] Council of the European Union Interinstitutional File: 2009/0153 (COD): http://register.consilium.europa.eu/pdf/en/10/st15/st15633-re01.en10.pdf.
[3] Cowx, I. G., Bolland, J. D., Nunn, A. D., Kerins, G., Stein, J., Blackburn, J., Hart, A., Henry, C., Britton, J. R. and Copp, G. H. (2010) *Defining environmental risk assessment criteria for genetically-modified fishes to be placed on the EU market,* Report to the European Food Safety Authority, 264 pp. http://www.efsa.europa.eu/en/efsajournal/doc/69e.pdf.
[4] EFSA Panels on GMO and AHAW (2012) Scientific Opinion on the Guidance on the risk assessment of food and feed from genetically modified animals and on animal health and welfare aspects, *EFSA Journal 2012,* 10, 1:2501, 43 pp. doi:10.2903/j.efsa.2012.2501.
[5] EFSA Outcome of the public consultation on the draft Scientific Opinion of the Scientific Panel on Genetically Modified Organisms providing guidance on the environmental risk assessment of genetically modified animals (2013) http://www.efsa.europa.eu/en/efsajournal/doc/428e.pdf
[6] EFSA GMO Panel (2013) Guidance on the environmental risk assessment of genetically modified animals, *EFSA Journal 2013*, 11,5: 3200, 190 pp. doi:10.2903/j.efsa.2013.3200.
[7] Cowx, I.G., Nunn, A.D., Noble, R. and van Anrooy, R. (2012) Non-native fish species in Central Asia and the Caucasus: environmentally sound practices for introductions and translocations http://ftp.fao.org/FI/DOCUMENT/sec/TAC/2012/7e.pdf.
[8] Cowx, I.G. (2013) *Between Fisheries and Bird Conservation: the Cormorant Conflict,* www.europarl.europa.eu/document/activities/cont/201303/20130308ATT62622/20130308ATT62622EN.pdf European Parliament's Committee on Fisheries.
[9] See: http://www.europarl.europa.eu/committees/en/pech/publications.html and 'Presentation by Cowx', 21 March 2013.
[10] European Parliament Commission on Fisheries, Minutes of Meeting of 20 and 21 March 2013, http://www.europarl.europa.eu/committees/en/pech/minutes.html#menuzone (meeting 21-03-13).