

Inland Fisheries and Aquaculture¹

Devin Bartley and John Jorgensen

Marine and Inland Fisheries Service
Fisheries and Aquaculture Department, Rome, Italy
Devin.Bartley@fao.org, John.Jorgensen@fao.org

At the forthcoming Global Conference on Aquaculture 2010, several of the expert panels are dealing with the many interactions of inland fisheries and aquaculture. Increased exposure of issues related to inland fisheries will benefit the sector as the role that inland fisheries play in livelihoods of people in many parts of the world is under-appreciated and under-valued. In many parts of the world, inland fisheries provide high quality protein, essential nutrients and minerals that are often difficult to obtain from other sources of food; inland fisheries provide economic opportunity and a “safety net” that allows for continued food production when other sectors may fail. In developed and some developing countries, inland fisheries have become utilized for recreation rather than for food production.

Inland fisheries are extremely diverse and harvest a tremendous amount of biodiversity. Freshwater ecosystems represent about 2-3 percent of the marine area – yet contain ~40 percent of known fish species. Some of this biodiversity is threatened or rare and inland fish species have been identified as the most threatened group of vertebrates used by humans. Aquaculture can be a component of species’ recovery programme if integrated into a broader management framework; aquaculture could also exacerbate problems with endangered species by inappropriate use of resources, introduction of alien invasive species, or by facilitating the spread of pathogens.

Contribution of inland fisheries

Readers of FAN will know that aquaculture is the fastest growing food production sector. With over 40 percent of “fish” consumption coming from aquaculture globally (and this percentage is expected to increase), aquaculture is seen as viable means to provide quality protein to a growing human population. However, less well-known is the contribution that inland fisheries makes to fish production. This is because of (a) the varied and diffuse nature of many inland fisheries operating in remote areas, (b) a lack of awareness and policies on inland fisheries in national agendas, (c) poorly defined market chains or infrastructure dealing with catch from inland waters, (d) the fact that much production is consumed or traded locally and does not enter formal economy, and (e) the high cost of collecting dispersed information. Although countries report ~10.2 million tonnes produced by inland capture fisheries, this is surely an underestimate.

Since FAO started collecting fisheries statistics in 1950, inland fisheries has contributed between 5 and 10 percent to annual fish production globally. Inland fisheries, thus, appear to contribute a relatively small proportion of the world’s total fish production compared to marine fisheries and aquaculture (Figure 1 page 14). However, hidden behind the aggregated figures, there are many countries where inland fisheries are very important. Figure 2 (page 14) shows the percentage contribution of inland fisheries, marine fisheries and aquaculture in six developing countries that are all major fish producers, and which all have access to abundant water resources.

Inland fisheries provide food and employment in rural areas where few other options are available. The Big Numbers Project (BNP)² reported that over 60 million people in developing countries are involved in aspects of small-scale inland fisheries. A large share of the marine catches are reduced to fishmeal and oil used to raise farmed fish. Tacon and Metian (2009) showed that 23.8 million tonnes or 29 percent of total marine capture fisheries landings in 2006 were used as feed. Regarding contribution to rural nutrition, a large part of aquaculture and marine production may be sold on major markets and even exported while inland fisheries generally produce low value product that are consumed in the fishing households or are sold locally. Thailand is a good example. It is a nation with a very high consumption of fish with an average consumption of 31 kg/person/year almost double the global average of 16 kg/person/year (Lymer *et al.*, 2008b). It is also a major exporter of fish products. Lymer *et al.* (2008b) found that Thailand produced a total of 3.91 million tonnes from capture fisheries in 2004, the same year aquaculture production was 1.26 million tonnes (FAO FishStat+, 2010).

If the amounts of fish that is converted to fishmeal and oil, and the share of the fish which is exported is deducted from the totals, inland fisheries provides 36 percent of the fish consumed domestically in Thailand; Lymer *et al.* (2008b) believe that this is probably still an underestimate of the contribution by inland fisheries.

Artisanal inland fisheries can also provide income as well as food. In rural markets, fish can readily be converted into cash or bartered and, importantly, the cash can be obtained for as long as the fishing season lasts, at times all year round. In the Zambezi floodplain for instance,

data suggest that the contribution of inland fisheries to household cash income is higher than cattle-rearing and sometimes crop production (Turpie *et al.*, 1999) (Table 2).

Inland fisheries and aquaculture

There are strong links between inland fisheries and aquaculture and the interaction of these sectors is being actively addressed by FAO. The use of inland fishery resources in capture-based aquaculture and the use of hatcheries in support of culture-based fisheries are two technical areas of interaction. Capture fisheries for Chinese carps in many reservoirs and small lakes in Asia is supported by hatchery production of these species; similar examples exist in Mexico. Initial production of *Pangasius catfish* in S.E. Asia relied heavily on wild caught juveniles. Although the use of wild seed has largely been replaced by hatchery-produced seed, issues arise concerning (1) capture of wild seed may have impacts at sub-species levels and (2) management measures should be seen within an ecosystem framework, where protection of critical habitats, such as spawning areas, needs to be included as a management priority along with the sustainable capture of seeds. Rice paddies contain a tremendous amount of aquatic animal diversity that is used as food and medicine to rural areas. Recommendations to enhance this production involve self-recruiting species and aquaculture, as well as water and land management.



C. PONGSRI, FAO

Inland fisheries in Myanmar leasable fishing "Inn"

FAO is creating guidelines for the eco-labelling of fisheries and fish products from inland capture fisheries that follow closely those developed and approved from marine capture fisheries. However, a significant difference between marine and inland capture fisheries that will need to be addressed in the guideline is the important role that aquaculture plays in some inland fisheries. How eco-labelling can be obtained for a fishery that relies on a farmed product will be a key consideration.

Table 1. Total fish production in Thailand from marine fisheries, inland fisheries and aquaculture, and the use of the products. a: data from FAO FishStat+, b: calculated from Thai fisheries export (FishStat+) – Marine export (Lymer *et al.*, 2008b), all other data from Lymer *et al.* (2008a) and calculation based on these data.

	Production (tonnes)				Contribution (%)		
	Marine	Inland	Aquaculture	Total	Marine	Inland	Aquaculture
Production	2850545	1060320	1259983 ^a	5170848	55	21	24
Fishmeal	771723	0	0	771723	100	0	0
Export	796344	0	640131 ^b	1436475	55	0	45
Discards	26360	0	0	26359.69	100	0	0
Food	1282478	1060320	619852	2962650	43	36	21

Table 2. Contribution of fishery to households' cash income (US\$/household/year) in different parts of the Zambezi basin, compared to other activities [percentage of total household income]

	Barotse flood-plain	Caprivi-Chobe wetlands	Lower Shire wetlands	Zambezi Delta
Cattle	120	422	31	0
Crops	91	219	298	121
Fish	180	324	56	100
	43%	28%	13%	39%
Wild animals	6	49	1	0.4
Wild plants	24	121	48	29
Wild foods	0	11	7	4
Clay	2	0	8	0.1

Source: Turpie *et al.* (1999)

Moving forward

The Foresight Study⁴ examined drivers that influence inland fisheries in order to “clarify some of the issues regarding the status of inland fishery in order to define their role in food security. It also addresses the information needed for the formulation of management policies, assesses the human impacts of changing resource availability and determines the impacts of other uses of water and landscape impacting on the fisheries”. An objective of an ecosystem approach is to understand these drivers and include information necessary for wise decision making that considers relevant stakeholders as well as the fishery resources. Thus, it is in the mutual interest of both the aquaculture and fishery sectors to understand one another. Aquaculture may provide an alternative to inland capture fisheries in some areas, but may be economically unviable in other areas when inland fisheries are more cost-effective. Certainly, the use of inland fishery resources for aquaculture should not adversely impact local communities that rely on those resources for their livelihood. It is with this objective in mind that FAN will include inland fishery topics in its upcoming issues; FAN looks forward to these future contributions.

¹FAN will regularly feature relevant articles on aquaculture-related inland fisheries articles as an important sector of aquaculture and to support efforts to promote and implement ecosystem approaches to fisheries (EAF) and aquaculture (EAA).

²Rescaling the contribution of capture fisheries, An overview with focus on developing country case studies. A report of the Big Numbers Project, FAO and World Fish Center Sponsored by PROFISH – World Bank

³FAO unpublished material, “Use of wild fish/fishery resources for aquaculture production” output of the project “Towards sustainable aquaculture: selected issues and guidelines” implemented by FAO and funded by the Government of Japan.

⁴Foresight Programme. Food and Farming Futures Project of the UK – draft 2009.

Figure 1. Inland fisheries contribution to the world’s total fish production compared to marine fisheries and aquaculture (Source: FishStat+ 2010)

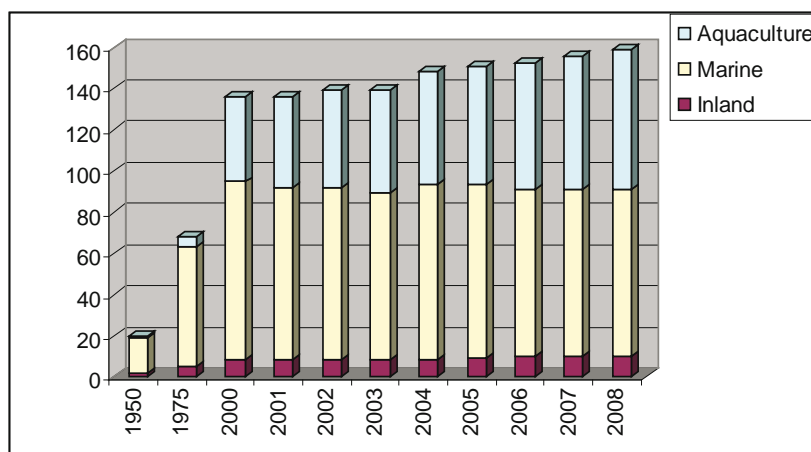
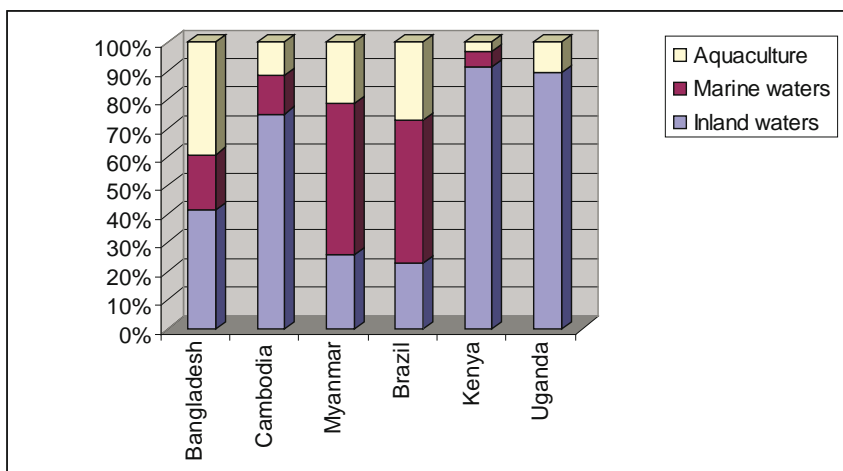


Figure 2. Percentage contribution of inland fisheries, marine fisheries and aquaculture in six developing countries that are all major fish producers, and which all have access to abundant water resources. (Source: FishStat+ 2010)



References

- FAO FishStat+ 2010. FishStat Plus - Universal software for fishery statistical time series.FAO, Rome. http://intranet.fao.org/searchframe.jsp?search_string=Fish%2BStat%2B&search_type=webg.
- Lymer, D., Funge-Smith, S., Clausen, J. & Weimin, M. 2008a. *Status and potential of fisheries and aquaculture in Asia and the Pacific 2008*. FAO Regional Office for Asia and the Pacific (Bangkok). RAP 2008:15, 110pp.
- Lymer, D., Funge-Smith, S., Khemakorn, P., Naruepon, S. & Ubolratana, S. 2008b. A review and synthesis of capture fisheries data in Thailand – Large versus small-scale fisheries. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand. RAP Publication 2008:17, 51p.
- Tacon, A.G. J., & Metian, M. 2009. Fishing for Feed or Fishing for Food: Increasing Global Competition for Small Pelagic Forage Fish. *Ambio* Vol. 38:294-302.
- Turpie, J., Smith, B., Emerton, L. & Barnes B. 1999. Economic value of the Zambezi Basin Wetlands. Cape Town: IUCN Regional Office in Southern Africa, 346 p. ■