

# Better-practice approaches for **culture-based fisheries** development in Asia

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# The marketing context – understanding demand for fish

Studies that are to be undertaken and considered prior to popularising culture-based fisheries practices

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Poor understanding of the demand for aquatic products has frequently undermined attempts to promote culture-based fish production. Therefore a marketing ‘situation analysis’ should be one of the first tasks undertaken prior to promoting and/or extending such an activity. Fingerling supply characteristics, essential for culture-based fisheries, must also be evaluated. Some of the main aims of such a study are to:

- Provide a basis for species selection, production and harvesting strategy;
- Predict future demand based on historic trends in demand and supply for target species and their substitutes (products with similar marketing, preparation and consumption qualities);
- Find out if there is a potential for cost-effective value addition through appropriate post-harvest processing steps;
- Understand who benefits (and loses) from existing market systems and how this might change as a result of the new activity;
- Assess how sustainable the activity is, i.e. in terms of profitability where the intention is to sell surplus production; and

- Assess where institutional and other support to marketing channels/ infrastructure (e.g. cold chain facilities) may be required to improve access to target groups.

A situation analysis is a commonsense approach to gathering information required to formulate marketing goals and strategy. It commences with the ‘big picture’ of macro-environmental influences, moving down through descriptions of the total market, competition, intermediaries/ consumers and, finally, product trends and distribution channels.

Key findings of a 12-month marketing situation analysis, conducted in the dry-zone of Sri Lanka, are presented in the following sections. The purpose was to assess the potential of stocking enhancements for increasing aquatic production from small, non-perennial reservoirs (tanks), with emphasis on identifying benefits for the poor. These reservoirs are the main focus of settlement in rain-fed areas of the country’s low-land dry-zone.

After reviewing secondary information (i.e. national and regional production and commodity price statistics) interviews were conducted with:

- Fishers around perennial and seasonal reservoirs over 12 months;
- Wholesalers and retailers at different levels of network in and around major irrigation systems in the north-west province;
- Retailers in urban areas (Kandy and Colombo) to establish an overview of fresh inland fish and substitutes (processed fish, marine fish, livestock, vegetables); and
- Consumers, using ranking and scoring exercises, to establish consumption patterns and preferences in dry-zone villages.

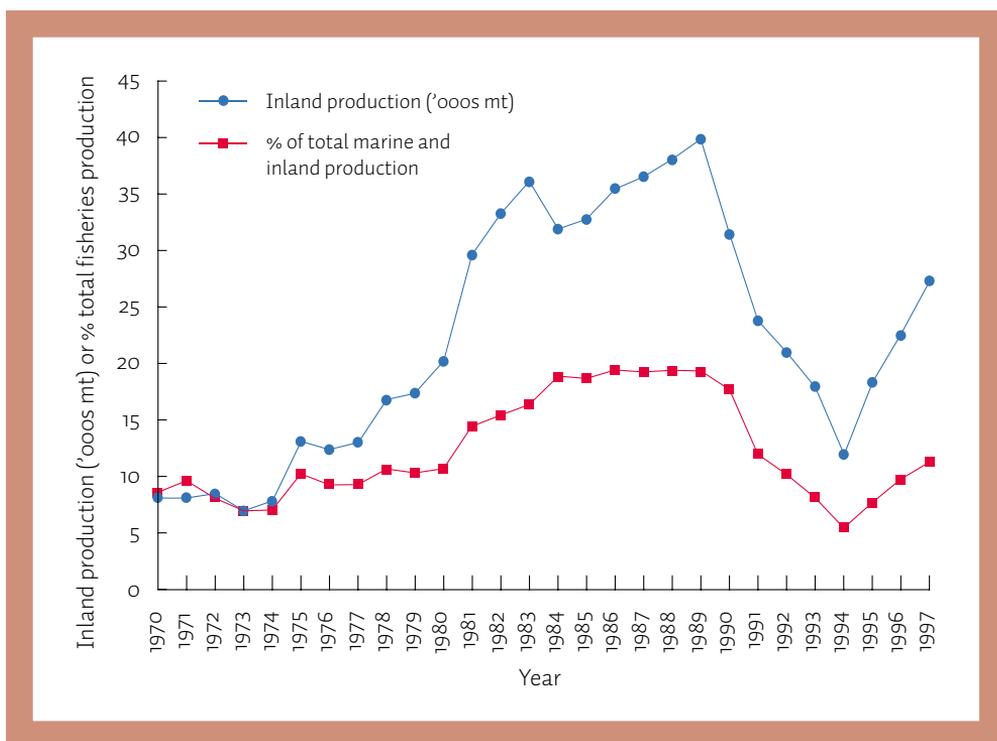
As you read through the following case study, try to compare the findings with what you know about marketing conditions in your own country. Think about the underlying reasons for those differences and, where methods are presented, think about how you might adapt them to your own circumstances.

## Evaluating secondary data

Secondary data are pre-existing data (usually quantitative) collected by others and re-used to pursue a research interest distinct from the original work. Primary data are collected directly by the researcher. Commencing a market survey with a review of secondary data will: (1) reduce the chance of duplicating existing work; and (2) offer the ability to view current markets in a context of longer-term change if time-series data sets are available. Further, the use of progressively disaggregated secondary data can be used to target suitable areas and groups for development activities.

The following example highlights the need for a critical assessment of secondary production data which is a basis for national policy on inland fisheries management (including stocking). Official production statistics (Figure 48) indicate an exponential rise in Sri Lanka's inland fishery yields corresponding with the development of a fishery for exotic tilapias that were first introduced in the 1950s. The same figures then suggest a dramatic crash and rebound which is commonly attributed to withdrawal of state support to the inland fisheries sector between 1989 and 1994. In fact, both the trend and 'cause' are suspect for the following reasons: firstly, no official fisheries inspection capacity existed during the withdrawal; and secondly, a temporary surge in production is more likely to result from the kind of de-regulation observed here. Moreover, since there has been negligible resumption of stocking, and the effectiveness of previous stocking in large perennial reservoirs remains unproven, the rebound is most likely due to increased fishing effort on self-recruiting stocks and/or simply re-establishment of monitoring capacity.

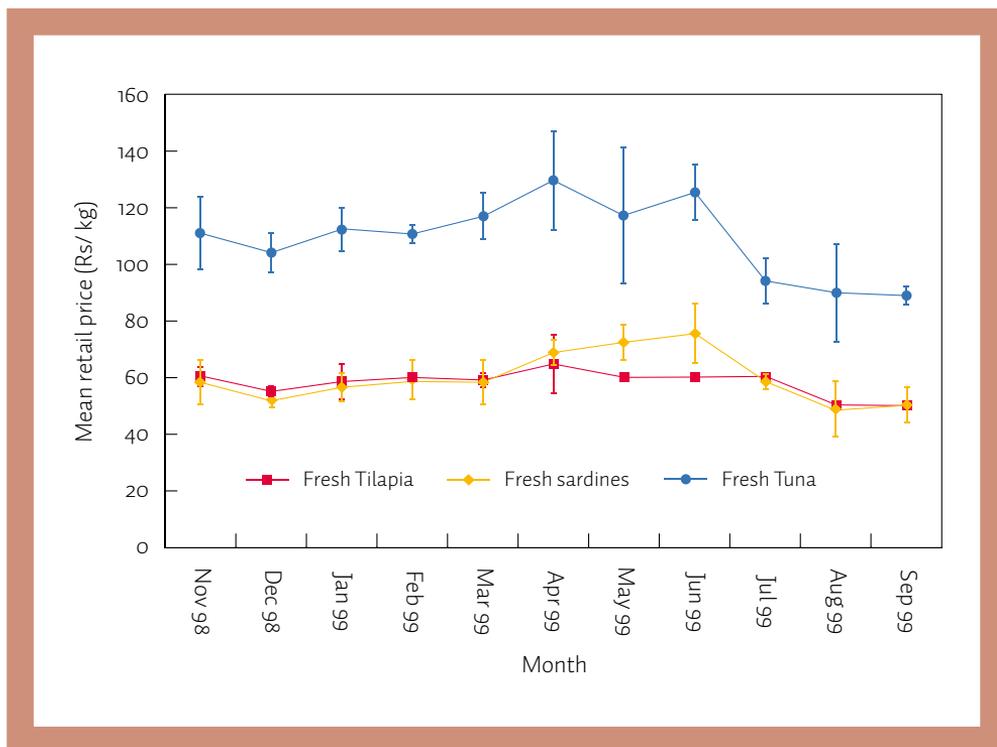
Where there are limited resources for collection and validation of production statistics, as is frequently the case in developing countries, commodity price records may be a useful alternative. These data are easier to collect and are often readily available from governmental/research institutions. It is also a useful means for assessing competition from substitutes; both perfect (e.g. other types and forms of fish) and imperfect (e.g. other types of meat and in Sri Lanka, even certain vegetables). This is a critical point, as the seasonal supply and pricing of these goods, especially perfect substitutes, will ultimately determine the ceiling and floor prices of the new produce.



**Figure 48.** Inland fish production in Sri Lanka 1970–1997 (Source: NARA Fisheries Year Book 1998)

An additional problem associated with official production statistics is that they invariably focus on commercial landings and under-report subsistence production. In developing countries such ‘invisible’ production, destined mainly for local consumption in rural areas, can be considerable. Moreover, smaller (often seasonal) water bodies, which provide much of this production, also have greatest potential for culture-based fisheries under common property regimes. Therefore, it is important to understand the existing contribution of these fisheries to livelihoods if attempts to modify them are not to be counter-productive. By integrating supply and demand factors, an analysis of commodity price levels is probably the simplest means to evaluate the contribution of subsistence production toward total demand for fresh water fish.

Figure 49 shows a useful way to summarise large volumes of price data with standard deviation bars indicating the degree of weekly variation around monthly means. In terms of marine fish consumed by the poor, sardines and other low cost species, such as herring and anchovies, are the main substitutes for tilapias; and are similarly priced. Tuna, one of the highest cost marine species, is also shown for comparison. Price fluctuations are greatest for fresh marine varieties due to adverse weather conditions, seasonal species migrations, lack of cold storage and other factors related to processing capacity. Most marine fish is transported on ice from a limited number of plants around major landing sites and markets; this lack of capacity is far less critical to the inland sector due to the close proximity of production and consumer bases.



**Figure 49.** Mean monthly retail prices and standard deviations in weekly prices, for fresh marine and inland fish varieties, Colombo 1998–99. (Source: ARTI fish price index 1988–99. In: Murray 2000.) (For reference, agricultural labourers typically earned between Rs 150–200/day during the same period.)

By contrast, despite fears of over-exploitation, supply and demand for tilapia, appear remarkably well-matched both seasonally and historically. Figure 48 shows a fluctuation in retail price of only 17% over the year. Longer-term stability was confirmed by correcting prices for inflation, a compound rate of 103% between 1992 and 1998. Tilapia prices maintained close parity with inflation (even during the withdrawal of state support), while the erratic rise and fall of sardine prices underscores the relative instability of the marine market.

Such differences are reinforced by a demand segmentation that is a consequence of geographic accessibility and income

disparities. Coastal and better-off urban communities (including those on main roads) prefer marine fish. Whereas, in rural inland areas of Sri Lanka’s dry-zone, demand is predominantly for cheaper, locally available freshwater fish, mainly tilapia, supplemented with dried marine varieties.

Two important constraints to culture-based fisheries in Sri Lanka emerge from this analysis: (1) there is a lack of established demand for inland fish in more lucrative urban markets; and (2) cultured-based species must compete with relatively low cost tilapias from capture fisheries in rural areas.

## Seed and fingerling supply

A sustainable supply of suitable fingerling varieties, available when required at a particular size is a requisite for culture-based fisheries (as noted earlier in this manual). A market analysis should evaluate existing markets with particular emphasis on private sector incentives to produce and supply such seed. The fate of state fingerling production facilities during the withdrawal of state support in Sri Lanka (Figure 48) also provides a useful lesson in this respect. Most of these hatcheries were long-leased to the private sector operators, who, switched almost entirely from food fish to more lucrative ornamental fish production. This demonstrates that under current market conditions, culture-based fisheries in Sri Lanka cannot be expected to rely on the private sector for their fingerling supply. This is a major constraint to development. Alternatives must be considered, such as resuming support from the public sector and/or non-government organisations and developing community-based production systems, though these options too must be evaluated critically in terms of their sustainability.

## Value addition

An analysis of marketing margins (considering production, wholesale and retail costs) indicates that drying fish represents salvage rather than a value addition strategy. Fresh fish commands the highest margins, which are shared equitably at different levels of the

market chain, because of its competitive local structure (next section). Deficits for fresh fish are made up with cheap, imported and dried marine varieties.

## Marketing networks for inland fish

Next, it is appropriate to consider briefly the commercial networks into which surplus production from village reservoirs in Sri Lanka might be marketed (Figure 52). This useful first step in primary data collection is based on interviews with network participants and consumers, and direct observations at different market levels. The market is based on two distinct production sources: artisanal fisheries in perennial reservoirs, supplying numerous adjacent villages settled around smaller village reservoirs (Figure 50); and produce from the more numerous smaller reservoirs. Supply of the latter produce is much less predictable, being constrained by the multi-purpose use of the reservoir and availability of water. In small reservoirs, most fish is produced seasonally and consumed locally. The following points are some of the main production characteristics of these two sources:

### Production in seasonal village reservoirs

- The productivity of small seasonal reservoirs (<10 ha) depends on linkages with the watershed as a whole so fish availability varies within and between seasons (this is prior to the commencement of culture-based fishery practices).

- Natural repopulation of seasonal reservoirs is through the movement of fish, including tilapia and snakehead, from perennial refuges lower down the watershed.
- Harvest occurs mainly in the dry season for subsistence purposes with any trading limited to a few casual participants. Traders are deterred by erratic availability and negative consumer perceptions associated with muddy/soapy off-flavours attributed to smaller darker tilapia from seasonal reservoirs.
- Long-standing cultural taboos, such as the access to the water bodies, associated with these subsistence fisheries are also much more persistent than in the recently established commercial sector. This limits participation to younger and mainly poorer males. Women receive only indirect benefit and are often critical of male participation.
- Fish are marketed mainly through a short chain of wholesalers and mobile retailers that service rural areas. Vendors using bicycles predominate over shorter distances (Figures 50 and 51) and sell smaller quantities (typically 10–20 kg/day) than those using motorbikes covering a greater range and selling larger quantities (typically 30–50 kg/day).
- In the dry season, when fish are most abundant, larger wholesalers truck tilapias to urban centres and the coast.

The conventional marketing networks for marine fish and higher value inland fish overlap marginally with that of tilapia sold by poorer traders in rural areas. Fish are generally sold whole and fresher fish are the most marketable. Common carp, which are the only exotic carp established in the fishery, are sold at prices similar to large tilapias, but often after processing into portions, increasing risk of spoilage (Figure 51). Higher value, niche freshwater species include the snakehead (*Channa striata*) and several eel species.

## Production in perennial reservoirs

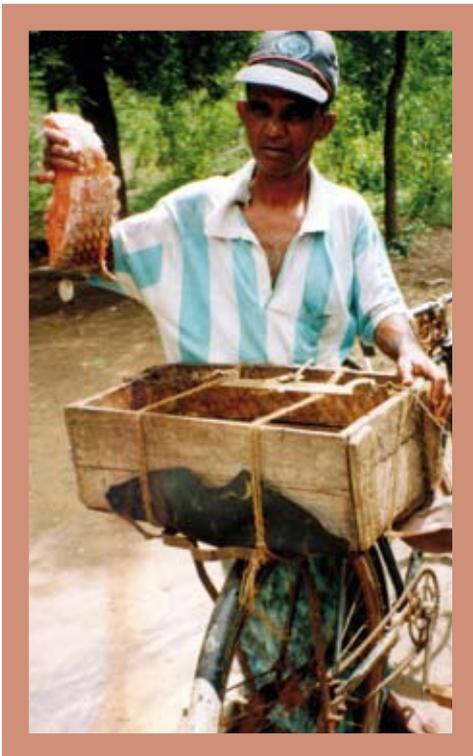
- Naturally recruited tilapias constitute between 75–90% of the harvest of fish gill-netted using canoes throughout the year (Figure 50). In recent years, entrant numbers have been increasing: mostly fisher–farmers living around the large reservoirs.
- This unregulated (relatively) fishery is resulting in a declining average size of individual fish and a loss of indigenous species from the catch.
- Production peaks during the two dry seasons when water levels are low (March–April and July–September) and during spill events (November–January).

## Consumer preferences

Unfortunately, consumers themselves tend to be given least consideration in many marketing studies of this kind. In the following exercise, 220 consumers in four villages were asked to rank which fresh fish or meat varieties they most preferred to eat (Figure 52). Mean ranks for the whole sample are shown in Table 14. Statistical analysis indicated that large tilapia, snakehead and wild game were significantly more popular than all other items. These locally sourced foods were all associated with freshness and quality—so much so



**Figure 50.** Bicycle vendors purchase tilapia from a landing site on a major reservoir at first light –note: wire mesh keep cage (right) and single outside carp (centre) (Source: Murray 2004).



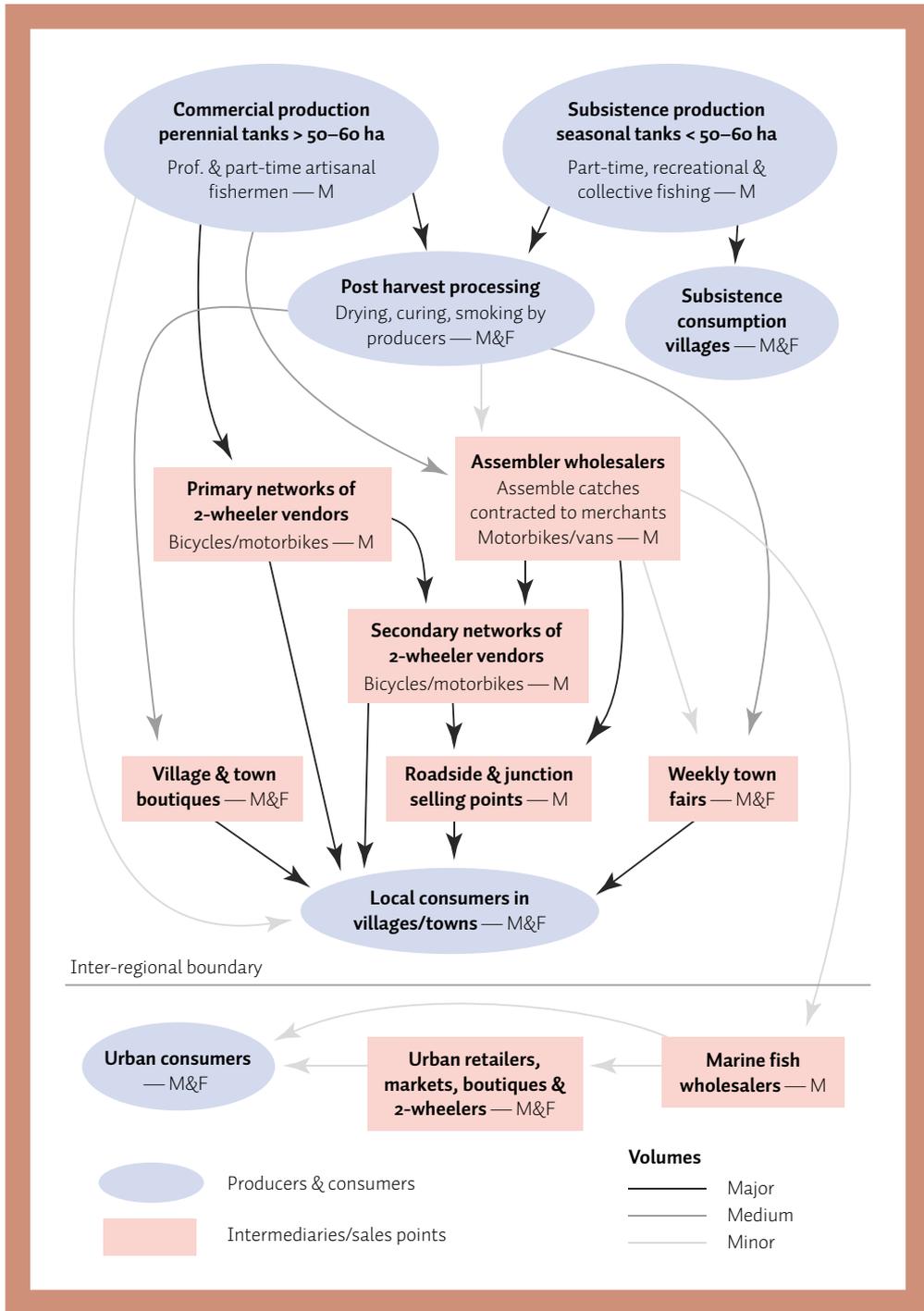
**Figure 51.** Large carps must be portioned for sale, increasing spoilage risk (Source: Murray 2004).

that many consumers associated use of ice for fish preservation as an indicator of inferior quality. A more detailed breakdown of results by different social criteria indicated that the poor prefer smaller, low cost tilapias, while wealthier individuals and those over 40 years old prefer costlier marine varieties.

Given that exotic carps are the main focus for culture-based fisheries, the intermediate ranking of common carp is of particular interest. Most respondents preferred common carp to marine fish, but felt that it was inferior to inland varieties of a comparable size e.g. larger tilapias and snakehead. Women and people over 40 years preferred them due to their relatively fleshy nature and ease of preparation. In other words, the current popularity of common carp appears to be part of an unfulfilled niche for larger sized fresh fish in general.

**Table 14.** Mean preference ranks for different types of fish and meat in four Sri Lankan dry-zone villages (n = 220) (Source: Murray, in preparation).

Fresh fish/meat varieties	Mean Rank
Large tilapia (>150 g)*	1
Snakehead*	2.5
Wild game*	2.5
Chicken	4.5
Common carp	4.5
Large marine fish (>150 g)	6.5
Small tilapia (<150 g)	6.5
Eggs and dairy products	8.5
Common labeo ( <i>Labeo dussumieri</i> )	8.5
Small marine fish (<150 g)	10
Small indigenous species (SIS)	11
Beef and mutton	12



**Figure 52.** Principal marketing chains for inland fish in North-west Province, Sri Lanka: M = Male, F = Female, indicating likely participation (Source: Murray et al. 2000).



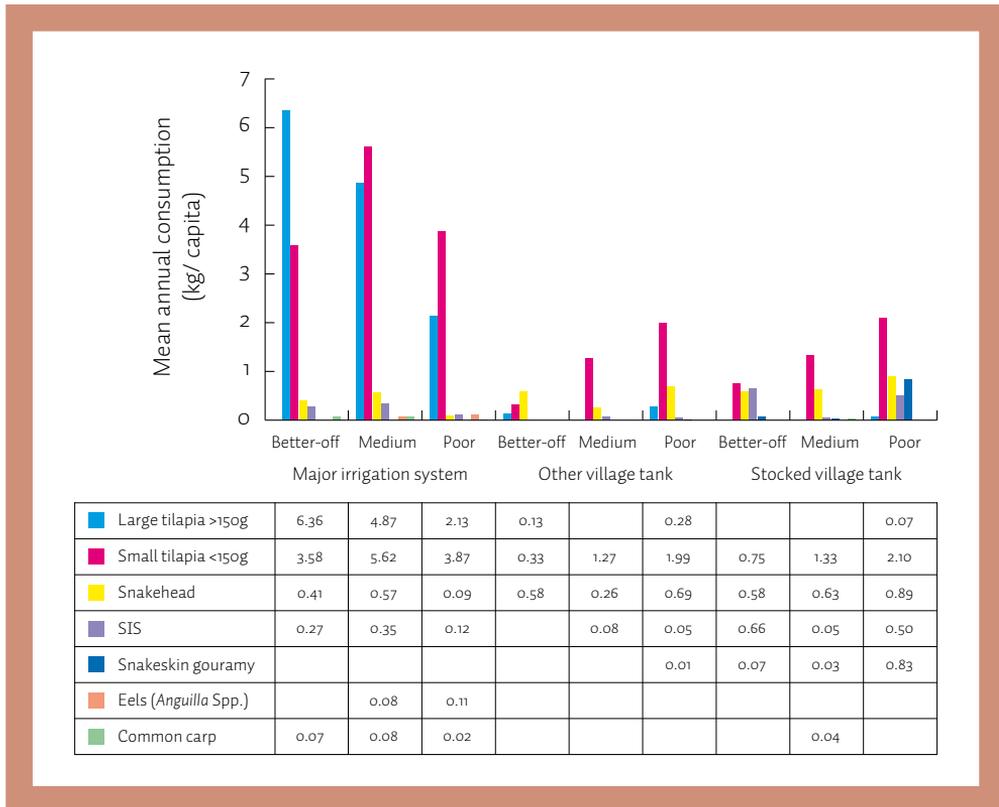
**Figure 53.** Ranking inland fish varieties using picture cards.

## The vulnerability context

Prior to implementing any major development strategy, it is important to research the role of existing markets in local livelihoods, and assess who is likely to benefit or lose from change; the so-called vulnerability context. Such an analysis can also clarify the roles and relationships between different stakeholder groups in relation to shared use of fish and water resources. This is a key factor in the design of sustainable culture-based fisheries strategies.

Figures 54 and 55 show inland fish consumption patterns in three dry-zone villages where stocking experiments (using wild-sourced tilapia and snakehead) were conducted in small seasonal reservoirs. Results are extrapolated from a 7-day recall of household consumption over 13 months, with interviews conducted on a fortnightly basis.

Figure 55 shows that compared to comparable rice-growing countries in South-east Asia (e.g. Laos and Cambodia), even poor households in Sri Lanka appear to be far more reliant on purchasing fish (from perennial reservoirs) than harvesting aquatic animals from rice fields and water bodies. However, this finding

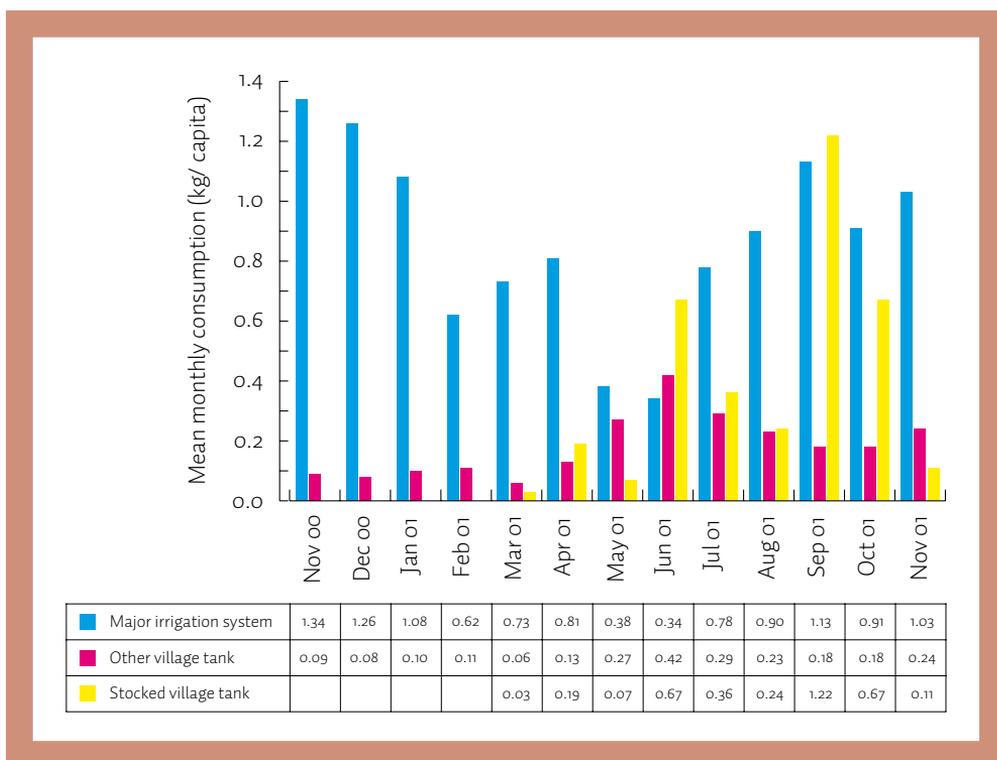


**Figure 54.** Mean annual *per capita* consumption of inland fish varieties by production source in three low-caste villages participating in stocking trials, Dec 2000–Nov 2001.

still masks the seasonal importance of subsistence production from village reservoirs to the livelihoods of the poorest groups. Figure 49 shows how these villagers substitute commercial fish for their own catches between May and November, thereby making considerable indirect financial savings. Moreover, the seasonal livelihood calendar presented earlier in this manual (Figure 6) clearly shows that on-farm/off-farm employment opportunities are lowest during this dry-season period when many families struggle to maintain their basic food security. Both figures also reflect how consumption of smaller (low cost) tilapias from both production sources is one coping

strategy for the poor (even being substituted for vegetables which are more costly in the dry season).

Furthermore, the poachers, frequently held accountable for the failure of community-based stocking initiatives, are most likely to come from this group. Yet analysis of the situation in Sri Lanka indicates that such activity is tolerated at low levels, and even informally reciprocated between villages. Careful thought and much imagination therefore needs to be given to how the interests of poor subsistence fishers and consumers can be improved, or at least maintained, where culture-based fisheries are implemented.



**Figure 55.** Mean monthly *per capita* consumption of inland fish by production source in three low-caste villages post-stocking, Nov 2000–Nov 2001.

The market network for inland fish has proved very well adapted to the needs of numerous small-scale producer and traders. This is remarkable given that it has occurred with negligible institutional support. The poor are effectively excluded from newly liberalised cash crop markets in other agricultural sectors. Given this vulnerability context, the existing market mechanism must be considered first and foremost as a livelihood ‘safety net’ for the poor. Other benefits include:

- Equitable returns to different levels of the marketing network largely because of market space, i.e. the nature of the supply, multi-point landing and marketing of fish at tanks and their marketing mainly to dispersed rural population
- Good local demand, allows marketing chains to remain unsophisticated and accessible by the poor working on a short-term basis. This makes trading a robust livelihood option with low entry costs that don’t require sophisticated support.
- Seasonal employment as fishers and traders for landless, share-croppers and agricultural labourers.
- Smaller, lower valued species marketed to the poorer and most remote communities. This reduces costs and opens opportunities to poorer traders limited to the use of bicycles.

- Opportunities for low caste, poor women in the production and marketing of small dried fish. The large market for dried fish, although not an option for ‘adding value’, does make salvage an option. This is important for reducing risk to producers and traders.

Culture-based fisheries must therefore be adapted to add value to the existing system, while being inclusive of those who are currently most reliant on it. For example, efforts to commoditise output through bulk production for export markets are likely to be detrimental in this instance. On the other hand, culture-based fishery systems must be able to compete locally at prices comparable to the existing tilapia fishery if they are to be sustainable. Lack of private sector incentives to produce food-fish fingerlings is also a major constraint.

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