

Working Paper No. 10
(July 1998)

Fisheries Marketing, Demand and Credit in Raichur District, Karnataka, India

**Aquaculture in
Small-scale
Farmer-managed
Irrigation Systems
Funded by DFID
Aquaculture Research
Programme**

**Institute of
Aquaculture
University of Stirling
Scotland, UK**

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in Raichur District, Karnataka, India**

**Aquaculture in Small-Scale Farmer-Managed Irrigation Systems
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Institute of Aquaculture, University of Stirling, Scotland, UK.

List of Working Papers

Project Summary Report

1. Raichur District: Site for a Study of Aquaculture Development in the Semi-arid Tropics
2. Methods for Participatory Information Gathering and Analysis
3. Socio-economic Analysis of Villages in Relation to Aquaculture Potential in Raichur District, Karnataka, India
4. Investigation of Gender Issues in Relation to Aquaculture Potential in Raichur District, Karnataka, India
5. On-farm Resources for Small-scale Farmer-managed Aquaculture in Raichur District, Karnataka, India
6. Inland Fisheries Resources and the Current Status of Aquaculture in Raichur District and Karnataka State, India
7. An Investigation of Aquaculture Potential in Small-scale Farmer-managed Irrigation Systems of Raichur District, Karnataka, India
8. Indigenous Freshwater Fish Resources of Karnataka State and their Potential for Aquaculture
9. Institutional Linkages of Relevance to Small-scale Aquaculture Development in Karnataka State, India
10. Fisheries Marketing, Demand and Credit in Raichur District, Karnataka, India

Project background

The arid and semi-arid tropics are areas in urgent need of development. As a home to a large proportion of the world's poor these regions face a future of scarcity of food and insufficient water for consumption and irrigation of crops. It has been predicted that India and Sri Lanka will face a fresh-water crisis in the near future, and as much water is currently wasted due to inadequate management and conservation practices there is a need for more integrated approaches to water management. The majority of India's surface water bodies are used primarily for irrigation. Although large-scale irrigation systems cover more surface area and supply a greater area of farmland, more farmers are dependent on small-scale systems for their daily livelihood. Irrigation systems are often very inefficient water distribution systems, and studies suggest that the efficiency of water use could be improved. The integration of aquaculture (which can be non-consumptive in terms of water use) has the potential to increase food production and improve the efficiency of the use of small-scale irrigation water resource.

These Working Papers are the first stage of the research project 'Small-scale farmer-managed aquaculture in engineered water systems' (DFID project R7064). The project aims to investigate the potential for integration of aquaculture into small-scale farmer-managed irrigation systems in arid and semi-arid regions of India and Sri Lanka. Intended beneficiaries include the rural poor, which in India belong to the Scheduled Castes (SCs)¹ and Scheduled Tribes (STs)². This part of the project focuses on Karnataka State on the south west of the Indian peninsula.

During the research, the economic and technical feasibility and the social acceptability of the production of fish in such systems of arid and semi-arid regions of Karnataka were investigated. Field research took place from 6 April to 21 May 1998 and included a 'Rapid Rural Appraisal' of four villages in Raichur District, Karnataka, and semi-structured interviews with representatives from the Government Department of Fisheries, marketing organisations, academics and other relevant institutional sectors within the state.

All fieldwork was undertaken in collaboration with the NGO Samuha, an organisation undertaking wide-ranging activities in the arid and semi-arid areas of Karnataka State. Samuha has extensive experience within participatory development and its initiatives range across health, disabilities, women's development, HIV/AIDS, education, animal husbandry, drinking water and sanitation, irrigation and watershed development (Pradeep, 1994). The majority of the work of Samuha is carried out in the districts of Koppal and Raichur with a smaller project in Bangalore. The activities of Samuha are supported by a number of bodies: ActionAid; OXFAM; the Swiss Development Cooperation; the Government of Karnataka and the Government of India as well as individual donors.

The results and analysis are presented in the ten Working Papers listed above. For an overview of the content of each of the Working Papers, see the Summary Report. This series of working papers have been produced principally as a resource for a stakeholder workshop to be held in Coimbatore, 19th - 20th November 1998. Conclusions and the research agenda are therefore preliminary.

¹ SCs: lower castes identified by the Indian government as a means of classifying castes for the allocation of benefits.

² STs: all tribals. SCs and STs together constitute the 'socially and educationally backward classes of citizens'. The terms form the basis for policies of protection and positive discrimination.

Glossary

DFID	Department for International Development (formerly ODA).
KCIFF	Karnataka Co-operative Inland Fisheries Federation
PRA	Participatory Rural Appraisal
RRA	Rapid Rural Appraisal
Rs	Indian unit of currency. At current exchange rate: £0.016
SC	Scheduled Caste
ST	Scheduled Tribe
Taluk	administrative sub-region in a district
1ha	2.4 acres

Summary

1. The long-term sustainability of aquaculture development will depend in part on the flexibility of the marketing structure. In rural areas the channels through which produce is sold often become linked with sources of inputs such as fingerlings, fertilisers and credit. An understanding of the market is therefore essential for the assessment of the feasibility of aquaculture development.
2. As part of the DFID funded project 'aquaculture in small-scale farmer-managed irrigation systems', the marketing chain was investigated and demand and consumption patterns of four villages within the district were studied. Participatory techniques such as semi-structured interviews, focus group discussions and ranking and scoring was used as well as key informant interviews.
3. Fish is eaten less frequently than other types of meat (on average 3-4 times per year compared to 1-4 times per month for chicken, sheep and goats) in all villages. In individual villages no consensus was found with regards to the importance of different characteristics of fish (such as size or number of bones). Suggested reasons for the low consumption of and lack of discrimination between different types of fish are the poor availability of fish in villages in combination with a cultural perception whereby local people associate the effects of fish consumption with the debilitating effects of hot weather.
4. Retail fish prices were found to vary principally with size, species, seasonal demand and availability. Supply is greatest from March to June when available water is reduced to a minimum and lowest during the monsoon from July to November. Because fish are eaten less in the summer months demand is highest from November to February (when much fish is consumed during Muslim festivals). Specimens below 1kg typically fetch 65-75% of the prices of larger specimens, and only those above 1kg are selected for wholesale. Consumers distinguish between two groups of fish: carps and carnivorous species. The latter group have fewer bones and a different texture and flavour. Air breathers such as murrels fetch the highest price followed by catfish and major carps. Indigenous species fetch slightly less than the major carps. Trash fish (below 50g) are sold for the lowest price regardless of species.
5. As an impoverished semi-arid region Raichur District is devoid of good infrastructure and organised markets. In rural towns fish marketing typically consist of several street vendors selling small quantities of their own catch. To reduce the potential for exploitation of these subsistence fishermen the Department of Fisheries encourages them to form registered co-operatives, to which they license water bodies. This policy has met with varying degrees of success. Several examples of small 'fully integrated' co-operatives are operating successfully.
6. Most of the capture fisheries production (and almost all the farmed fish production) in Raichur is exported out of the district for auction in four major fish consuming centres in Hyderabad, Madras, Bombay and Calcutta. A few powerful merchants, who take advantage of rail links in Raichur and Hospet, control the bulk of this wholesale trade. These centres also contain the only ice production facilities in the district (and the only organised markets). In West Raichur, one family monopolise the wholesale trade, exporting nearly one third of the districts entire production last year. Such merchants can set the future price of fish by extending credit to subsistence fishermen, making them very vulnerable to exploitation.
7. Although the demand for fish amongst villagers is reportedly high, retail options are limited by the lack of produce. Market infrastructure (including the lack of a cold chain) is potentially a major constraint to the development of large-scale aquaculture in the district.

Fisheries Marketing, Demand and Credit in Raichur District

Working Paper 10

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1 Introduction

A developed marketing system stimulating demand is important if aquaculture is to increase beyond a marginal activity. The long-term sustainability of aquaculture development will depend in part on the flexibility of the marketing structure and their ability to respond to changes. In rural areas complex relationships sometimes develop which link the channels through which produce is sold with sources of inputs such as fingerlings, fertilisers and credit. An understanding of the market is therefore an essential part of an assessment of the feasibility of aquaculture development. As part of the economic feasibility assessment of Raichur District, the marketing chain was investigated and demand and consumption patterns of four villages within the district were established.

2 Methodology

A combination of market visits and key informant interviews were used to investigate the existing marketing of aquatic products in the study area. Demand and consumption patterns in four villages (see Box 1 and Figure 1) within the district were investigated using a combination of Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) tools such as semi-structured interviews, activity charts and ranking and scoring of key parameters. In each of the villages the seasonal availability of fish and meats was established. Furthermore fish and meat were ranked and scored according to preference as a food. Ranking and scoring exercises on fish and meat preferences were analysed using Friedman's two-way analysis of variance to assess the level of consensus between consumers (see Appendix 2 for results of analysis and Working Paper 2 for discussion of statistical analysis of ranks and scores). The marketing decisions of subsistence fishermen were also investigated using semi-structured interviews.

Box 1: Research villages in Raichur District.

Village name	Taluk ³
Jumlapur & Ainapur	Kushtagi
Chikkawankalakunta	Yelbarga
Pai Doddi	Lingsugur
Mallapur	Deodurg

3 Marketing and credit

Small-scale fish production is supported by a variety of marketing systems. These range from vendors (who buy fish directly from fishermen and sell it on the streets of local villages), to sophisticated networks involving middlemen, processing and the transportation of fish to distant markets. Fish is bought and sold at each stage of the process increasing the eventual price paid by the consumer. Each vendor in the process takes some risk to earn his income. Processing either maintains or increases the value of fish, allowing storage or further transport, and it may result in conversion to a more marketable form. In these small-scale systems this is principally salting, smoking, or drying.

³ Taluk: administrative sub-region in a district.

The perishability of fresh fish and the need for a quick sale make vendors (culturists and fishermen) vulnerable to price manipulation and exploitation by middlemen who wish to avoid competition. Debt bondage is common with credit from purchasers tying producers to poor terms of trade. However, alternative forms of credit are rarely available to small-scale producers or fishermen. Furthermore the links of patronage and kinship, their historical link with the caste system, and the flexibility underlying informal systems are not easily reproduced in formal systems. The presence of informal systems already channeling funds into aquaculture can be useful indicators of the commercial viability of aquaculture activities (Stevenson & Pollnac, 1982).

Government intervention in the markets are in principle be driven by a desire to increase the quantity and quality of fish available, and to set minimum standards of public health. To achieve these aims, credit or subsidies are provided. In Karnataka, the KCIFF (the Karnataka Co-operative Inland Fisheries Federation) undertakes such intervention. They give bicycles and fish transport boxes to fishermen's co-operatives, purchase fish at fixed prices directly from culturists⁴ or co-operatives, and transport them through their own cold chain for sale in Mangalore and Bangalore. By virtue of a chain of recently established cold counters, they also have the only frozen storage capacity (2mt) specifically for freshwater fish in the State (Table 1). Impoverished areas such as semi-arid regions are typically devoid of good infrastructure and organised markets. Table 1 shows a list of the current fish markets in Karnataka, and Figure 2 is a map showing all formal regulated markets (subject to local market ordinances and licensing) in Karnataka State.

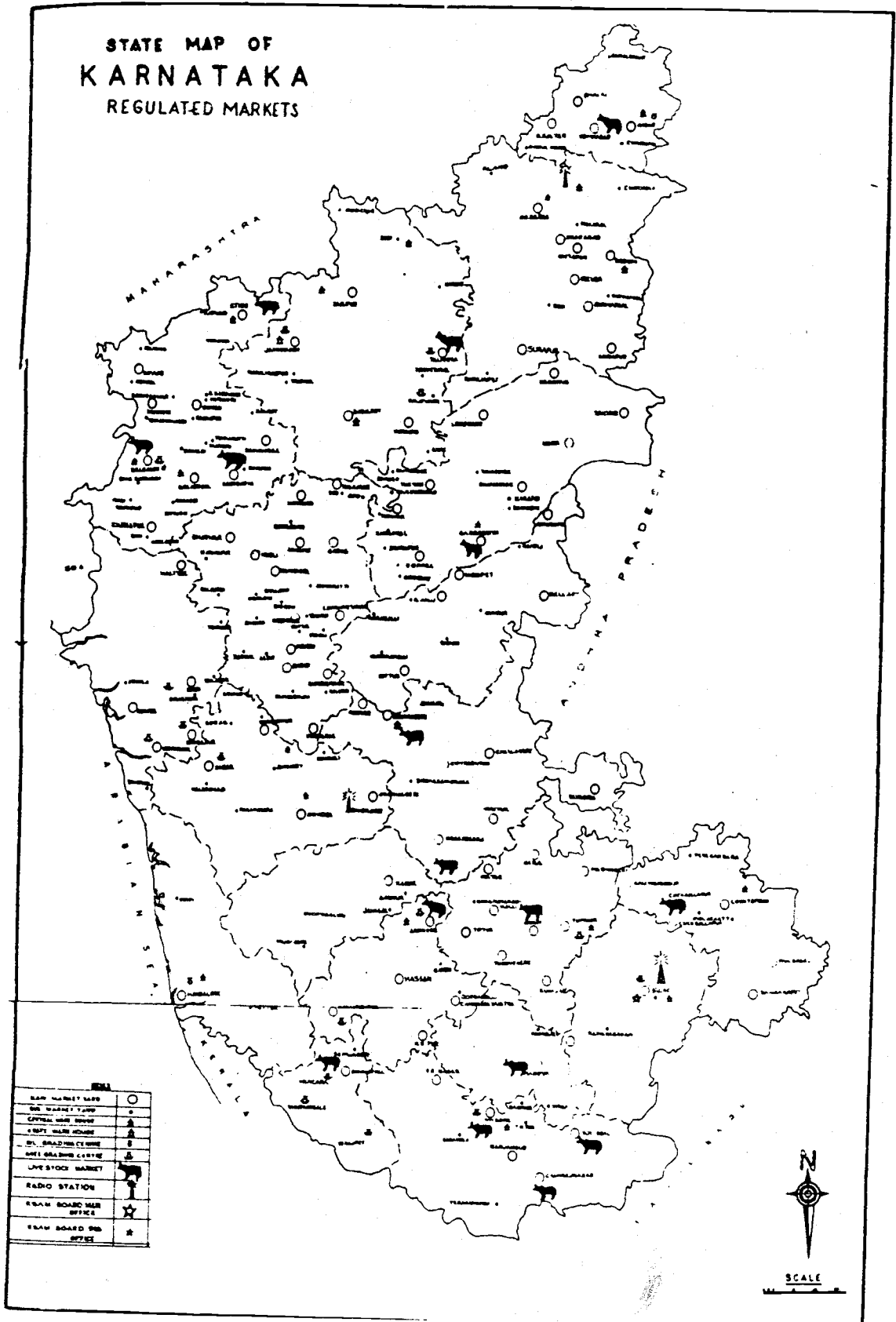
Table 1: Fish markets in Karnataka State, 1997.

District	Fish markets (1997)	Ice plants (no)	Capacity (mt)	Cold storage (no)	Capacity (mt)
Banglore	9	9	71.5	4	52
Belgaum	3	7	90	1	10
Bellary	3	4	27		
Bidar	0	2	40	5	24.5
Bijapur	6	6	36		
Chickmagalur	3				
Chitradurga	6	9	118		22
Dakinsha Kannada	59				
Dharwad	5			2	
Gulbarga	1				44
Hassan	3				
Kodagu	8			2	
Kolar	9				12
Mandya	3				
Mysore	4	6	36.4	2	
Raichur	2	1	10	1	20
Shimoga	5				
Tumkur	3				
Uttara Kannada	25				
Total	157	43	418.9	16	164.5

Source: Department of Fisheries (DoF) Statistical Bulletin of Fisheries (1996-97).

⁴ The Indian Department of Fisheries (DoF) use the following terms 'seed production' and 'rearing production' to describe the production of fry and fingerlings respectively. Farmers subsequently on-growing to harvest are known as 'culturists'.

Figure 2: Map showing distribution of regulated markets within Karnataka State.



4 Fish consumption patterns and demand

The total production in Raichur in 1996 was 3,578mt. In common with others arid inland districts very little marine fish is imported from the coast, and much of the cultured produce and products from reliable perennial sources is exported for countrywide auction in urban areas. Even if Raichur's production was consumed within the district, it would only represent an annual mean fish per capita consumption of 1.5kg. In comparison, in Bangladesh (where 80% of animal protein comes from fish), per capita consumption among lower income groups is 4.4kg, and average per capita consumption in Asia is 23.3kg and 7.8kg in Africa (O'Riordan, 1996).

4.1 Demand and consumption patterns in project villages

Table 2 shows the different types of meat eaten in the project area, and Table 3 the important characteristics of fish as identified by consumers (male and female) within each village.

Table 2: Different types of meat consumed in the villages.

Meat
Chicken
Fish
Goat and sheep
Wild animals (rabbit, deer, lizards, wild birds, crabs)

Source: village group discussions.

Table 3: Criteria guiding the selection of fish as identified by consumers in the four project villages.

Parameter	Jumlapur	Chikkawankalakunta	Pai Doddi	Mallapur
Availability	*	*		
Cost	*	*	*	
Meat content			*	
Number of bones	*	*	*	*
Quality	*	*		
Size	*	*	*	*
Species				*
Taste			*	*

Source: village group discussions.

The majority of higher caste Hindus are vegetarians, but meat (including fish) is normally eaten by individuals belonging to the Scheduled Castes⁵ (SCs) or Scheduled Tribes⁶ (STs) as well as Muslims (Charsley, 1996). No Hindus eat beef and very few eat pork, which is why these two types of meat are not included in Table 1.

Box 2 shows the frequency of consumption of different types of meat in the villages investigated. In general chicken is consumed most frequently, and wild animals and fish least frequently. Figures 3 to 6 show the frequency of consumption of different types of meat in the four villages.

⁵ SCs: lower castes identified by the Indian government as a means of classifying castes for the allocation of benefits.

⁶ STs: all tribals. SCs and STs together constitute the 'socially and educationally backward classes of citizens'. The terms form the basis for policies of protection and positive discrimination.

Box 2: Significant results of Friedman's two-way analysis of variance carried out on meat consumption ranking or scoring from the research villages. >: eaten significantly more often than.

Jumlapur & Ainapur:

Chicken > fish (P<0.05)

Chikkawankalakunta:

Chicken > wild animals > fish

Chicken > goat / sheep (P<0.001)

Pai Doddi:

Goat and sheep > fish (P<0.01)

Mallapur:

Goat and sheep > wild animals (P<0.01)

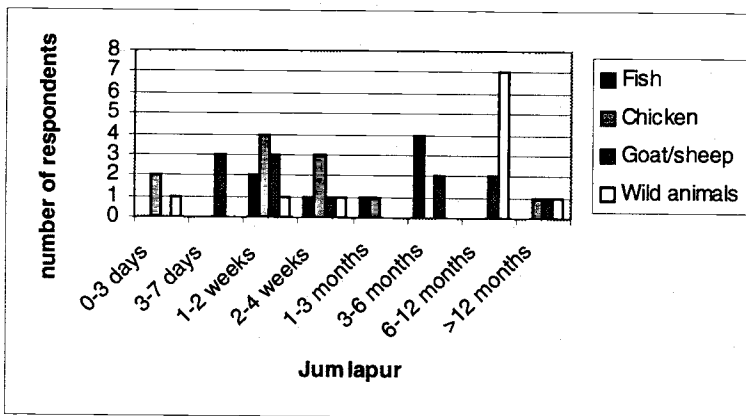


Figure 3: Time interval between the consumption of different types of meat in Jumlapur as established from semi-structured interviews and ranking and scoring exercises in the village.

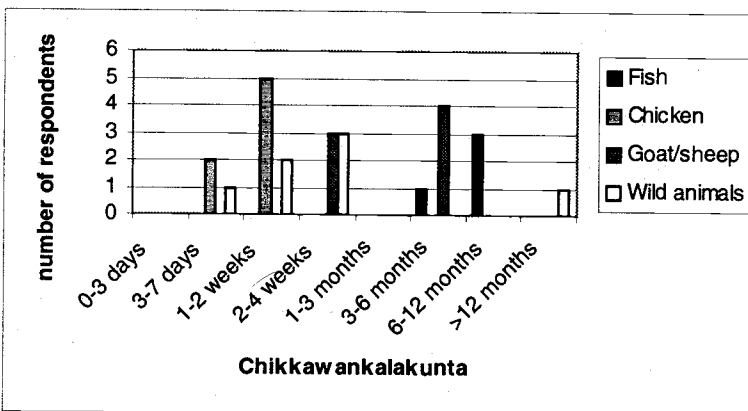


Figure 4: Time interval between the consumption of different types of meat in Chikkawankalakunta as established from semi-structured interviews and ranking and scoring exercises in the village.

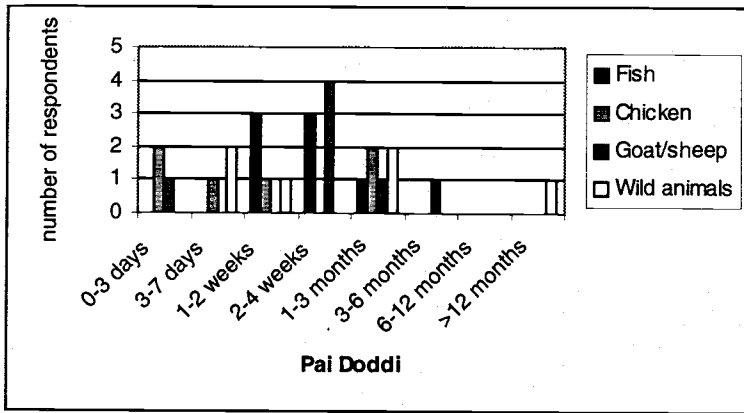


Figure 5: Time interval between the consumption of different types of meat in Pai Doddi as established from semi-structured interviews and ranking and scoring exercises in the village.

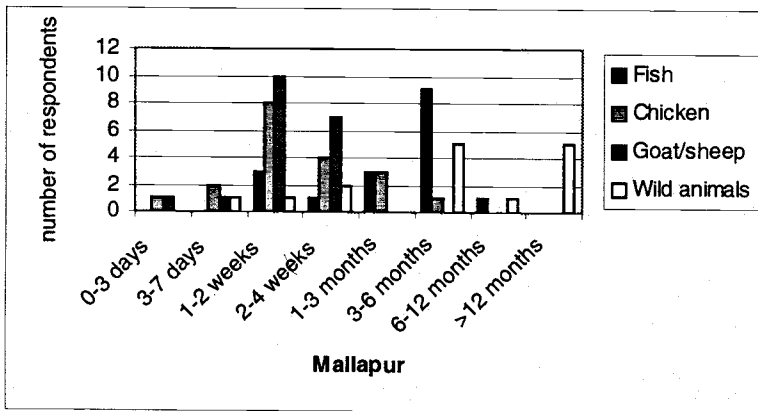


Figure 6: Time interval between consumption of different types of meat in Mallapur as established from semi-structured interviews and ranking and scoring exercises in the village.

As can be seen there is a great spread within each village, but generally chicken is eaten more than once every three months. Wild animals are eaten most frequently in Chikkawankalakunta and Pai Doddi, and least frequently in Jumlapur and Mallapur. Many of the different types of meat are eaten once a week and most families eat meat more than once a month.

No consensus was found regarding the importance of different characteristics in fish⁷. This may reflect the low availability of fish within villages, such that villagers will consume whatever is available. Only in Chikkawankalakunta was size significantly more important than other criteria. These included bones, cost, quality, meat content and species (see Table 3). Fish is generally eaten in curry or fried, and taste may be more important in the latter case. In group meetings villagers identified the following reasons for the low level of fish consumption in villages:

Availability: Within most of the villages fish is rarely available, and is usually purchased from nearby markets or, more rarely, from 'head-carriers' visiting the village on bicycles (e.g. in

⁷ Significant results of Friedman's two-way analysis of fish preference ranking and scoring exercises in the research villages show that in Pai Doddi and Mallapur villages size is significantly more important than the number of bones ($p < .05$).

Mallapur), whereas other meat sources are available within the village or market. Some of the villagers (usually the poorer or landless) supplement their diet by catching their own fish when available. This is most common in the village of Pai Doddi, situated near the Krishna River. In Jumlapur locals fish the perennial Khillaritti tank (situated at the mouth of the watershed). Similarly some (illegal) fishing take place in Chikkawankalakunta in a small seasonal tank. In all villages locals stressed they would like to eat more fish if it was available.

As can be seen from Figures 2 to 5, the frequency of fish consumption was greatest in Jumlapur and Pai Doddi and least in Mallapur. This is probably a reflection of accessibility to local markets and fisheries resources.

“Fish is heat”: When asked why they did not eat more fish, villagers commonly responded that ‘fish is heat’. Local people associate the effects of fish consumption with the effects of hot weather. Villagers said eating fish makes one vulnerable to depression, tiredness, aching of limbs, causes boils in the mouth, makes one thirsty and should not be consumed by sick people. A ‘hot’ and ‘cold’ classification extends to a whole range of foods (see Box 3.). Fish is considered one of the hottest foods only surpassed by papaya (which contains powerful enzymes and is often used to cure meat). Goat and sheep meat was considered cold to neutral. Which particular properties of fish are responsible for them being a ‘hot’ food is unclear. However, this perception means that fish is consumed less during the hottest period of the year from February to June, when most fish is available at the lowest cost. Only in the town of Hubli with its large marine fish market was this perception significantly different. Here consumers distinguished different marine species as being alternatively hot and cool. With the exception of silver carp all freshwater fish were still considered ‘hot’.

Box 3: Examples of ‘hot’ and ‘cold’ foods.

‘Hot’ foods

papaya
beef
coffee
goats milk
aubergine
egg
butter

fish
chicken
buttermilk
coconut meat
chapati
ghee

‘Cold’ foods

oranges, grapes
mutton
tea
cows milk
onion
rice
okra

goats meat
lamb
curd
coconut milk
roti
lemon

Cost and substitutes: Box 4 shows the range of meat and fish prices found at local markets. Although pig was available (and ubiquitous in towns) its consumption was largely confined to certain lower castes as it is considered unclean and a taboo food source. Pigs were observed in villages but villagers were reluctant to discuss their consumption. Hindus consider cows holy animals and beef was rarely available though apparently it is eaten by certain lower castes.

Box 4: Market prices of meat and fish.

Chicken: Rs 65-70 per kg
Pig: Rs 100-120 per kg
Freshwater fish: Rs 20-45 per kg

Mutton/goat: Rs 75-84 per kg,
Beef: Rs 32-80 per kg

Most consumers living near markets still consume significantly more meat than fish. This was despite the fact that fish offer excellent value, being typically less than half the price of other meats. Fish is also readily available at markets and is an excellent source of nutrition. When

villagers explained their preference for other meats over fish, the negative heat qualities of fish were invariably cited.

Villagers slaughter larger animals communally (often as part of the many religious festivals) and share meat amongst kin or social groups on a reciprocal basis. Most families (even landless) own chickens, which they slaughter when needed. Mutton and goat is most often purchased from local markets when it could be afforded.

4.2 Fish prices

Fish prices vary principally with size, species, seasonal demand and availability, as well as the number of middlemen involved in the marketing chain. All merchants interviewed agreed that the demand for fish had increased substantially over the last two decades.

In Raichur District only fish from capture fisheries were available. Produce from fish farms was usually harvested in several batches and sold to wholesalers for export out of the district. Fish vendors identified the following major determinants of price within the district.

Seasonality: Production from rivers, tanks and reservoirs peaks from March to June, when waters have receded to a minimum, and the fish are easier to catch. Production is then curtailed with the onset of the monsoon. Seasonal tanks are restocked in July, the Tungabhadra Dam season finishes in mid-June and limited production within the district is then only available from river fisheries. Production begins to rise again in November and December. Because of consumer attitudes (see section 4.1), demand is least when supply is greatest and therefore prices are lowest from March to May and highest from November to February. Muslim festivals with corresponding higher demands in January and February lead to increased prices during this period.

Prices also vary on much smaller time scales. Normal market days are on Tuesdays, Wednesdays and Fridays. Mondays, Thursdays and Saturdays are Hindu prayer days, when minimal sales take place. Most towns have their main market on Sundays, when many customers gather and an extra margin is normally included on the price of fish.

Because of the perishable nature of fish local catches are sold early in the morning. This means that prices fall as the day progresses. Most of the small-scale fisherman interviewed were finely tuned to the market and were able to sell in the cooler early hours.

Size: This is one of the key determinants of price. Specimens below 1kg cost 65-75% the price of larger specimens. For wholesale purposes, only fish above 1kg are selected.

Species: Although preferences varied, some general patterns were observed. Although poor people eat what they can, fish are generally classified into two food types: carps and carnivorous species (including catfish, murrels and *Wallago attu*) (see Working Paper 8 for a description of indigenous fish species). Of the carnivorous group, murrels and *Wallago attu* fetch the premium prices along with live air-breathers (the most expensive fish). Catfish and major carp prices are similar with indigenous carps being slightly less expensive (these are also less likely to reach as large sizes as the major carps). As well as differing in flavour and texture, the carnivorous species have much fewer bones than the carps and are therefore preferred by many consumers. Catla tended to be the most popular carp species and *Wallagu attu* and the murrels the most popular carnivorous species. Fish below 50g were designated trash fish (used for chicken feed etc.) and sold for Rs 10-20 per kg regardless of species. Table 4 shows the range of prices charged for different species at markets across the district.

Table 4: Retail price ranges (Rs per kg) of common species for sale in Raichur markets. For details on the fish species mentioned, see Working Paper 8.

Carps	< 1kg	> 1kg	Carnivorous species	
Catla	25-30	25-40	<i>Wallago attu</i>	35-40
Mrigal	25-30	25-35		40
Rohu	25-30	25-35	<i>Mystus sp</i>	25 – 30
Silver carp	25-30	25-35	<i>Pangasius pangasius</i>	25
Common carp	25-30	25-35	<i>Ompak bimaculatus</i>	25-30
<i>Labeo Pobail</i>	20			
<i>Labeo calabasu</i>	25		Air-breathers	
<i>Labeo fimbriatus</i>	25		<i>Channidae sp.</i>	35-40
Other			<i>Mastambelicus armatus</i>	35-40
<i>O. mossambicus</i>	10-15			
Trash fish	10-20			

Source: retail merchants from Raichur markets.

4.3 Retail markets

At the lowest level markets consisted of several street vendors (normally subsistence fishermen or their wives) selling their own catch, with typical volumes ranging from 5-40kg per day. These vendors would often travel 30-40km to sell at the side of larger vegetable and grain markets. Trading would normally be complete before 10AM. At Tintinni Bridge near Pai Doddi village in Lingsugur taluk, marketing was carried out by female members of a tribe who migrate for work during the rainy season. Such markets are widely distributed throughout the district, and usually consist of small groups of subsistence fishermen and vendors (or their wives). Women head carriers typically take fish into the villages.



Figure 7: Female ‘head carrier’ and customer, Tintinni bridge, Raichur.

Co-operative retailing

By pooling resources and demarcating effort co-operative fisheries organisations aim to achieve the following economic benefits for members:

- Reduction of marketing costs
- Increased efficiency of marketing, including:
 - Initiation of product processing to increase the range of marketable product.
 - Improvement of management leading to the development of new markets.
 - Achievement of a more even production (fitting supply to demand).
- Increased bargaining power for obtaining supplies and selling products.

The producer usually receives an agreed price for the fish and in return obtains a share of the profits. A democratic process determines the policy of the co-operative. Membership and voting rights generally correlate with the relative amount of trading done through the co-operative, rather than the amount of money lent to the co-operative (Shaw, 1986).

Disadvantages of co-operative organisations lie largely with planning and decision-making. Because joint decisions have to be made, members often have to compromise, and this may result in slower decision-making processes in co-operatives than in individually run businesses.

Co-operative retailing in Raichur district

Encouraged by the Department of Fisheries many capture fisheries are licensed to co-operative groups of artisanal fishermen. Most members are of SC and ST background, landless and among the poorest sections of society. The following levels of organization were found:

1. **Access co-operatives:** co-operation here largely ends with obtaining a license and stocking spawn for which members pay a contribution. Fishermen operate individually or in small groups and market their produce independently. The Tungabhadra Dam co-operative is an example of an access co-operative.
2. **Access and materials co-operatives:** these carry out further group activities, sourcing discount fishing materials, setting up savings groups and lobbying Government institutions. An example is the Komplis Fishermen's Co-operative on the River Krishna.
3. **Fully integrated co-operatives:** these undertake all activities from rearing through to distribution and marketing as a group. Members often work for a daily wage (in catch or cash), receive materials from the co-operative and receive a regular dividend on the co-operative's sales. Examples included the Manchellapur Co-operative in Raichur taluk, the Munginath Co-operative Society in Gajandragarth Bijapur, and the Hulli Kerri Co-operative in Koppal.

Fishermen in the first two groups are typically contracted to wholesale or retail merchants, often with sub-contractors collecting fish from groups of 10-20 fishermen. Fishermen are frequently given loans (Rs 1,000 to 15,000) at the end of the season for materials. This effectively creates a debt-bondage in many cases, and the subtle exploitation of fishermen, many of whom feel that the relationship is beneficial as they are guaranteed a market and flexible credit even though they receive low prices for their produce. In Raichur, one co-operative received as little as Rs 6 per kg from a local merchant with a wholesale monopoly in the area.

In the third group, jobs are demarcated to different members. Women often sell fish as 'head carriers' by foot or bike, typically within a 20km radius (normally selling 10-15kg each per day). Men sell fish at local retail markets. After community consumption and local sales any surplus produce is sold to wholesalers. Where water bodies are perennial, co-operatives only harvest

larger fish, throwing small ones back into the water. This give them more control over their output. Co-operatives with seasonal water bodies take more advantage of wholesalers, especially towards the end of the season.

In Gajendragarth (30km from Kushtagi) the local (Munginath) co-operative has the unusual advantage of having complete control of the local fish market. By arrangement with the local Panchayat, to whom they pay an annual sales tax, they can impose a levy of Rs 0.40 per kg on any non-co-operative vendors selling fish in the town.



Figure 8: Mavinakerrie fishermen's 'integrated' co-operative society, Raichur.

4.4 Wholesale markets

Wholesale markets are located exclusively in cities where they can take advantage of good rail links (most roads are single track and in poor repair). In Raichur they are found in Raichur and Koppal cities, and similarly in the principal cities of Gadag and Hublis in Dharwad and Hospet in Bellary (Raichur and Hospet are by far the largest wholesale markets serving Raichur District). Markets in these cities are the only organised markets⁸ in the area and have integrated wholesale and retail functions. All of these cities possess ice plants except Koppal (which receives ice from Hospet 30km away). Inland fish is sent for auction by rail to four major fish-consuming centres, Hyderabad (Andhra Pradesh), Madras (Tamil Nadu), Bombay and Calcutta. Subsidiary markets are in Pune and Solapur in Maharashtra. Solapur and Bajayawada in Andhra Pradesh are important staging posts where fish can be re-iced for further transit. Only larger loads of 2 tons or more are sent by lorry. Preferences are for catla in Calcutta, and murels in Bombay and

⁸ Organised fish markets: regulated by state ordinances, these markets have a permanent infrastructure usually with access to a supply of ice, cold storage and good communication networks

Hyderabad. It typically takes three days from capture to auction. All the wholesalers interviewed were Muslims, many of whom originated from Andhra Pradesh.

The bulk of the fisheries production in the region is exported through these centres and controlled by a few powerful merchants. In West Raichur, the 'Pashir brothers' have a wholesale monopoly and alone exported nearly one third of the entire district's 1997 production. In Raichur even the retail market is monopolised by these wholesalers. The potential for generating extra income through processing is lost as only icing takes place before export (see Appendix 3 for individual descriptions of these markets).

Fish farms in the irrigated belt are clustered and produce relatively large volumes of fish. Several harvests usually take place, normally in July and August when prices are high. As fish farmers have control over their production and produce in bulk they can command good prices and many of the farmers interviewed sold their produce to wholesale merchants in Bellary. None of this produce makes its way to markets in Raichur.

5 Credit and fisheries

The bulk of artisanal fishermen sell fish either directly to wholesale merchants or indirectly through a small subcontractor chain. Credit is extended down this line to the fishermen to buy 'future' supplies of fish. This also sets the future price to the fishermen regardless of the effects of demand in external markets. Selling fish outside this system in an organised way is very difficult for fishermen and their options are further reduced by the highly perishable nature of the product. Therefore most prefer to deal with wholesalers. In Koppal where this wholesale monopoly does not exist the retail market functions more equitably. Here a local co-operative is able to effectively market its own produce at an organised sub-market.

6 Dried fish marketing

Dried seafish vendors (all Muslims) were present at most of the large weekly markets (shandys) held in local market towns throughout the district. Approximately 13 fish species were found for sale including bombay duck, anchovy and prawn. Fish is often sold along with vegetables, and was commonly perceived more as an accompaniment to, than as the major part of, meals. Custom is mostly from poorer people who cannot afford to buy fresh fish regularly. Dried fish is usually purchased in small portions from 50-100g and small roadside vendors would typically sell 0.5 to 1kg per day. Peak season for sales and best price is from March to June, when prices range from Rs 80-100 per kg. Low season is from June to February when prices drop to Rs 30-60 per kg. Because of their hygroscopic nature and increased perishability during the rainy season, stocks can not be held for long during this time. Dried fish originating from Goa and Uttar Kannada are distributed through Ganeshpeth fish market in Hublis.

Though some reservoir fishermen were observed preparing dried trash fish, there is currently no organised market for this product, which fetches half the price of marine dry fish. Much of it is exported to Andhra Pradesh where it is used as feed in the poultry industry.

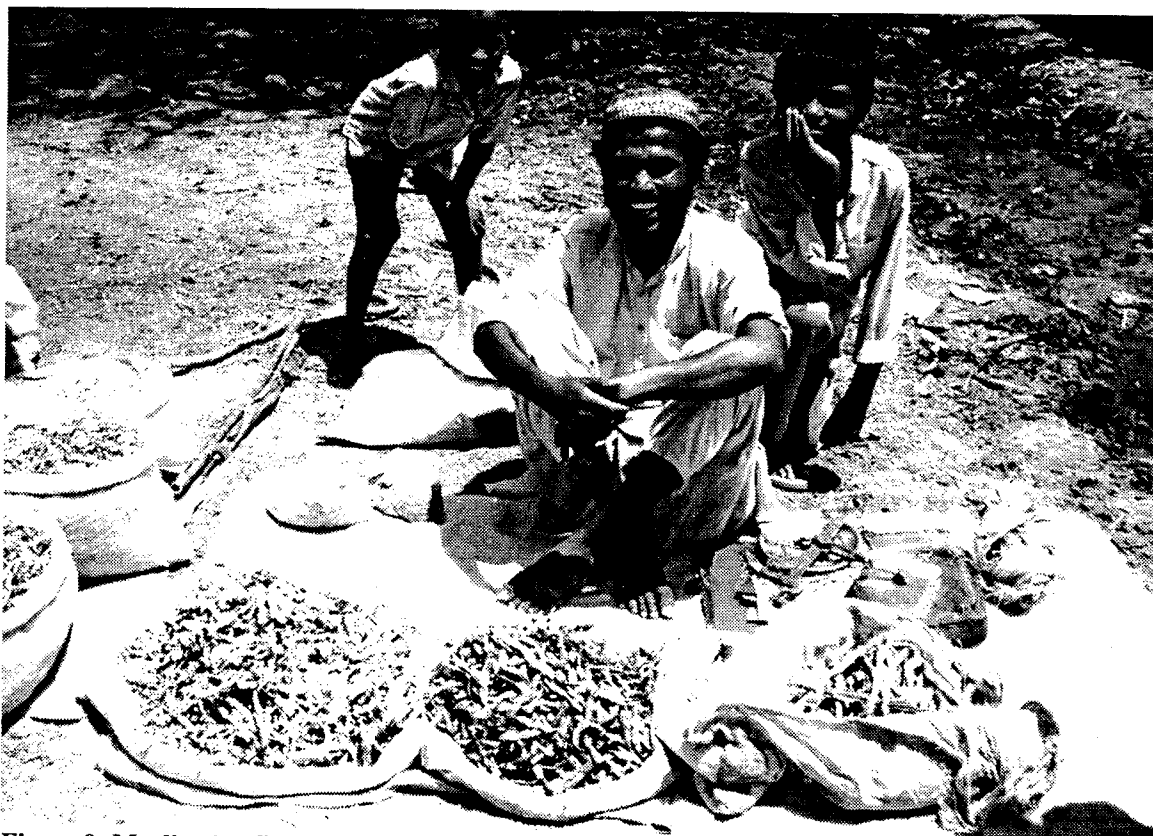


Figure 9: Muslim dry fish vendor, Sindhnur market, Raichur District.

7 Conclusion

Although the demand for fish is high amongst ST and SC groups in the study villages, the consumption frequency of this protein source was lower than that of other types of meat because of the lower availability of fish. A poor retail marketing infrastructure, lacking good communications, storage and processing facilities means that fish is available only from very local sources.

This indicates that a 'conventional' approach to fish culture – producing large indigenous and exotic carps – would have little impact on local producers/consumers. However there is a potential for in-village production and consumption. How the poorest people obtain fish and their needs still need to be better understood.

On a larger scale, until the wholesale-export, debt-bondage cycle is broken, fish will bypass those who need it in Raichur District, and fish will continue to be a marginal product with minimal development of market demand and a culture of fish eating.

Marketing options available to potential farmers in Raichur District depend on several considerations. If fish are grown in seasonal ponds then it is likely they will only reach a small size. Such fish would possibly be consumed in the household, dried or sold locally. Given the length of time it takes for wholesale fish to reach consumers the freshness of local produce can command premium prices. For example 200g rohu, freshly harvested from a dried up seasonal pond can retail for more than 1kg fish imported from Andhra Pradesh (that may be four days old) (Haylor, IoA, pers. com.).

The potential for bulk acquisition of seed from the Government or private agencies by community institutions should be investigated.

Fishing and its allied activities have traditionally been the prevail of low caste groups (with women from these groups often carrying out marketing activities), and commonly it is more acceptable to sell fish for individuals from lower status groups. This ties in with the focus groups of this project, namely the poorer sub-sections of lower castes in the local society.

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Appendix 1: Markets visited

Wholesale / organised retail

Raichur City wholesale market, Raichur Taluk, Raichur.
Koppal Bhagyanagar market.
Hospet Market, Hospet taluk. Bellary.
Hublis, Ganeshpeth fish market, Dharwad.
Shimoga fish market, Shimoga.

Town retail markets

Gurgunta market (dry fish only), Lingsugur taluk, Raichur.
Sindhur market, Sinhnur taluk. Raichur.
Gajendragarth market, Bijapur.
Jowul market Dharwad.

Roadside Vendors

Tintinni Bridge, Lingsugur taluk. Raichur.

Tests for the importance of different parameters of fish:

Had 12 ranks and 12 scores in total, of which 3 did not correspond. Decided to use ranks and discharge non-corresponding ones.

Fr 4.71
df 4
p > .05

Test not significant so tested for gender sub-groups. Women first:

Fr 2.4
df 4
p > .05

Not significant for women. Now men:

Fr 12.32
df 4
p < .02

Significant for men but should try wealth groups because women not significant.

Only wealth group 4 present.

Fr 8
df 4
p > .05

Not significant so lack of priorities not caused by the presence of different wealth groups. Because all respondents are Walmikis, tests for caste cannot be carried out.

Test for meat consumption:

Data comprised 17 frequency ranks and 16 scores in total, of which 3 do not correspond (2 from the first visit and 1 from the second visit). It was decided to use ranks. Discharged non-corresponding results because have enough data to carry out test without these.

Fr 36.42
df 3
p < .001

The multiple comparison extension of the Friedman test was used to establish if which types of meat were eaten significantly more often than others. Significant (at a $\alpha = .05$ level of significance) results are shown below, where $> =$ eaten significantly more frequently than:

Chicken > wild animals > fish

Chicken > goat / sheep

Because significance found on village level, there was no need to analyse data for sub-groups.

Pai Doddi:

Test for importance of criteria for selecting fish:

Data includes 7 scores and 8 ranks, of which 5 do not correspond. It was decided to use ranks, as this was a village where the farmers seemed to understand this easily (scores posed more of a problem, probably due to translator problem). Non-corresponding ranks not discharged because otherwise there would be insufficient data to carry out the test.

Fr 10.44
df 4
p < .05

Multiple comparisons were carried out to establish which types of meat were eaten significantly (at a $\alpha = .05$ significance level) more often than others, and the results are shown below, where $> =$ eaten significantly more often than:

Size > the number of bones.

Tests for frequency of the consumption of different types of meat:

Data included 11 ranks and 11 scores, of which 3 did not correspond. It was decided to use ranks and discharge non-corresponding ones.

Fr 11.55
df 3
p < .01

Multiple comparisons between the different types of meat were carried out in order to establish which types of meat were eaten significantly more frequently than others. Significant (at the $\alpha = .05$ level of significance) results of the test can be seen below, where $> =$ eaten significantly more often than:

Goat and sheep > fish

Because of agreement on village level, there was no need to further analyse the data for gender, wealth and caste sub-groups.

Mallapur:

Test for the importance of different characteristics in fish:

Data included 19 scores and 10 ranks, of which 3 did not correspond and 1 has an additional parameter (cost) so can't be used. It was decided to use scores as more data was available (this was main method used in this village) and it was felt that by this stage the translators were better at making people understand the process. The data where rank and score did not correspond was not included, since overall there was enough data to do without it. The Friedman test modified for tied ranks was used.

Fr 8.352
df 3
p < .05

Test showed significance, so multiple comparisons were carried out to establish which criteria in fish were significantly (at a $\alpha = .05$ level of significance) more important than others. The results can be seen below, where $> =$ significantly more important than:

Size > number of bones

Because test significant at community level no need to carry out analysis for sub-groups.

Test for the frequency of the consumption of different types of meat:

Data included 20 scores, 20 frequency ranks and 9 ranks, of which 4 of the ranks and scores did not correspond, and 12 of the frequency ranks do not correspond to the scores and 6 not to the ranks.

It was decided to use scores and discharge non-corresponding ones for same reasons as above.

Fr 11.63
df 3
p < .01

Multiple comparisons were carried out to establish which types of meat are eaten significantly (at the $\alpha = .05$ level of significance) more often than other types. Significant results are shown below (where $> =$ eaten significantly more often than):

Goat and sheep > wild animals.

Because there was agreement at village level there was no need to analyse the data for the different sub-groups.

Appendix 3: Wholesale markets in the Raichur area

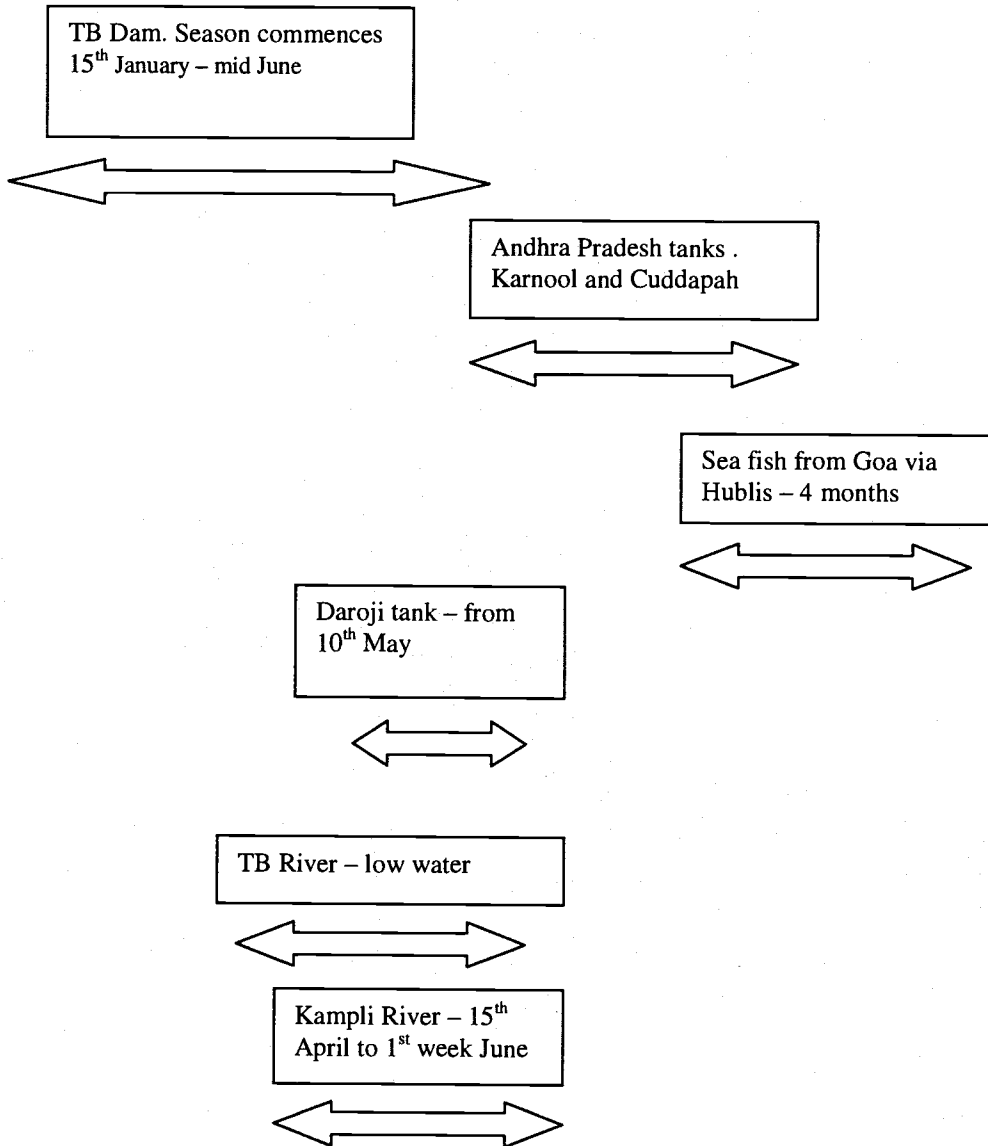
Raichur wholesale market: Over most of the western part of Raichur District, parts of Kurnool (Andhra Pradesh) and Gulbarga District the wholesale market is monopolised by the three Pashir brothers, who have effectively eliminated any competition over the last twenty years. They now hold the licences on eight tanks, 100km of the River Krishna and 80km of the Tungabhadra (TB) River. In addition, they purchase much of the produce of independent co-operatives within this area. They have over 150 fishermen working for them directly, and many more indirectly. Their tanks alone produced over 240mt in 1997. During the peak season (December - March when prices are highest) they sell up to 10mt per day, dropping to 1mt in the low season (April - August). They purchase fish only over 1kg and smaller fish are thrown back or consumed locally. They discourage the culture of silver carp in the district (even though it is encouraged through subsidy by the DoF) because of the poor transport qualities of this species (the flesh rapidly loses firmness).

Their order of supply is rivers, tanks, reservoirs and finally fish farmers, who having control over substantial volumes of regular outputs, can attract merchants from outside the area and command higher prices (K. Ramacharya, DoF Raichur, pers. com.). According to the Pashir brothers they pay Rs 15-20 per kg of fish, but one co-operative visited was paid as little as Rs 6 per kg. This co-operative had approached the KCIFF for help, and had been given 12 bikes and transport boxes. They purchased one lot of 1.5mt for Rs 22 per kg, but had not since returned. At auction the brothers can realize Rs 40-45 for catfish (*Mystus* sp.), Rs 60 for Murrels and Rs 35-45 for major carps. Transport prices were reported at Rs 10-15 per kg (including Rs 6-7 auction commission). This was confirmed in Hospet. All retail activity within Raichur City except for dry fish, is through four shops owned by the Pashir brothers. Alone the Pashir brothers currently wholesale over 1,200mt p.a. (K. Ramacharya, DoF Raichur, pers. com.) This is nearly one third of the total output of the district in 1997.

Hospet wholesale market: Elsewhere there is greater competition between wholesalers and the situation was usually less exploitative. To the east of Raichur District the main wholesale market is in Hospet (Bellary) which has an organised fish market (i.e. formally adopted with permanent retail structures). Here there are 14 wholesale merchants, most of whom also retail from twelve stalls in the market. The largest of these was Kutambo Rao (from Andhra Pradesh). Figure A3 shows how he manages to source fish throughout the year. During the low season he purchases freshwater fish from Andhra Pradesh and small volumes of sea fish from Hublis (after the end of the closed fishing season in August). Volumes are only sufficient for wholesaling from January - June when he sells up to 1mt per day. His main exports are of *Ompak bimaculatus* and catla destined for Calcutta by train. Combined sales in the retail market are 5-600kg on Sundays and 2-300kg on other days during peak season. He estimated that over 1,700mt of fish are wholesaled through Hospet each year.

Figure A3: Seasonal sources of fish, Kutambo Rao, wholesale fish merchant, Hospet. TB: Tungabhadra.

Jan Feb Mar Apr May Jun Jul Aug Sep Nov Dec



Koppal wholesale market: There are two markets in Koppal, one organised with wholesale capacity. The wholesale and retail markets are relatively small. The retailers in the latter market sell approximately 2-300kg in total per day and four small wholesalers sell between 400kg-1mt each per day during the peak season (here this is from May to June as they have access to many seasonal tanks). Most sales going to Hublis, Mirag Kohlapur and Solapur (the last three in Maharashtra). Bhagyanagar is a satellite market. It is exclusively retail and has an extra Rs 4-8 on prices margin, being located in an affluent area of the town. Wholesalers here also purchase surplus produce from 10 retailers, dispatching them late in the afternoon.

Gadag wholesale market: This is an organised market in Dharwad, mid-way between Koppal and Hublis where retail of marine sales is increased. There are five wholesalers who have joined together to produce a marketing and supply federation. They have effective control of nine tanks, five of which are perennial. They use these resources to try and achieve flat production by importing major carps from Hublis throughout the summer, sparing some of their perennial production for the winter low season. It is a medium sized market, wholesaling between 2-500kg per day of freshwater fish in low and high season, and up to 1mt of cheap mackerel (fluctuates from Rs 12-35kg⁻¹) during August to December.

Marine fish and Hublis wholesale: Marine fish from Goa and Uttar Kannada is distributed through the large Ganeshpeth fish market and auction house in Hublis (Dharwad), where prices are determined. Most of this produce is sent by lorry to Bangalore, Mangalore, Kerala, Bombay and Pune. All other and inland sales (to Hospet and Sholapur) are sent by train. The popularity of seafish is poor in the interior, and penetration beyond Hospet is low. Even here demand is poor. K. Rao sells only 50kg during the large Sunday market, mostly to immigrant Tamils. In Hublis, the situation is reversed with vendors of tank fish having a lowly position at the gate of the market (in 1998 marine fish was 30-40% more expensive than major carps). Here freshwater wholesales are only significant during the marine closed season from June to early August, averaging approximately 1mt per day, mostly arriving from Bellary, Hospet and Koppal. Total marine fish sales are around 10mt from January - May (the marine slack season) and around 20mt per day (10-15 trucks) during the August - November high season. Two suppliers, the largest of whom is Dadda Hyat Kerraty (DAK), dominate this wholesale market.