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Project R7799:

Changing Fish Utilisation and Its Impact on Poverty in India

Major Trends in the Utilisation of Fish in India and their Impact on the Poor

December 2001

A Project Funded under DFID's Post-Harvest Fisheries Research Programme

IMM LTD

ICM
Integrated Coastal Management

PHFRP
POST HARVEST FISHERIES RESEARCH PROGRAMME

OUTLINE OF THE PROJECT

The "Changing Fish Utilisation and Its Impact on Poverty in India" project is funded by the UK Government's Department for International Development's (**DFID**) Post-Harvest Fisheries Research Programme. The project aims to develop policy guidance to increase the positive impact of improved post-harvest utilisation of fish on the lives of poor processors, traders and consumers in India. Throughout this report the project is referred to as the IFU project.

This publication is an output from a research project funded by the United Kingdom Department for International Development for the benefit of developing countries. The views expressed are not necessarily those of DFID.

FURTHER INFORMATION

For further information on the IFU project contact the Project Manager on J.Campbell-IMM@ex.ac.uk or visit the project website at: http://www.ex.ac.uk/imm/ . Contacts for the SCL project collaborators are as follows:

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ABBREVIATIONS AND ACRONYMS

DFID	Department For International Development (UK Government)
IFU	India Fish Utilisation (the abbreviation used for this project)
PHOT	Post-Harvest Overview Tool

BACKGROUND

Background to the IFU project

Some of the poorest people in the fisheries sector in India are those engaged in the post-harvest sector. In particular women heads of households - who constitute a sizeable percentage of the small-scale fish processors - are extremely marginalised and vulnerable. That vulnerability is believed to be increasing with the rapid changes in the utilisation of fish which India is currently experiencing. These changes are influenced by large-scale trends such as the rising demand and static supply of fish, localised decline in catches, increases in the availability and distribution of ice, and changes in the aquaculture sector. The rapid shift in the macro-economic policies of the government in the 1990s, such as economic liberalisation and globalisation, have also contributed significantly to these changes, whose overall impact on the poor and vulnerable sections of the fishing communities has so far been negative. There are less fish available to small-scale fish processors than previously and their investment needs keep growing, making them vulnerable to external forces which are mostly beyond their control or understanding.

While the economic benefits to the fishers from improved post-harvest processes have been significant, the women - who play a dominant role in the economy of the fishing communities - get increasingly marginalised from the decision-making processes. Similarly, traditional management systems, which played an important role in preserving community stability and in regulating the exploitation of resources, were affected adversely as a result of the penetration of the market forces, which has serious implications in terms of responsible utilisation of fisheries resources. The increased movement of fish into distant and lucrative markets has also meant that the prices of fish have risen sharply so that the poorer segments of the coastal population are now denied access to this important source of protein.

While change is an inevitable, often irreversible, process, the small-scale fishers' ability to cope with it is constrained by a serious lack of suitable alternate livelihood options. Illiteracy and limited interactions with the external world, handicap the processors in obtaining gainful employment elsewhere. Small-scale fish processing, though employing large numbers of poor people, did not receive much recognition from the development agencies until very recently. This has restricted the scope for overcoming the problems in any meaningful way.

The response of government and civil society organisations to these changes has been constrained mainly by a lack of knowledge on the extent of these changes, their causes and their consequences for the poor. This lack of comprehensive and up-to-date knowledge and guidance for effectively tackling the problems has seriously handicapped both an effective policy response and the efficient use of scarce development resources targeting the poor, leading to a marginalisation of the poorer fish processors and traders from the development processes.

The project specifically addresses these problems and aims to provide a better understanding of their relative importance and what might be done about them.

Background to the current report

The first phase of the research has focused on gaining a broad understanding of the type of changes that have occurred in the sector across the country. This was achieved by developing and applying a Post-Harvest Overview tool (PHOT) and using it as the basis for a scoping study in each of five coastal states. These were carried out in Karnataka, Kerala, Tamil Nadu, Andhra Pradesh and Orissa. The authors of the reports were as follows:

- Karnataka: Professor Ramachandra Bhatta of the College of Fisheries Mangalore
- Kerala: of SIFFS
- Tamil Nadu:

- Andhra Pradesh: Venkatesh Salagrama of ICM
- Orissa: Venkatesh Salagrama of ICM

A workshop was held in Chennai on the 11th and 12th of June 2001 to review the findings of these studies. The aims of the workshop were as follows:

- Identify the key changes in utilisation by state
- Identify those changes that are generalsable across India and those that are site specific
- Begin to form cause-effect-impact linkages between these changes
- Try to begin to get an impression of the relative importance of these changes in terms of the number of poor stakeholders affected by how much

Structure of the report

The report summarises the trends in the fisheries sector based on scoping studies in five states. The review of these trends is discussed under the following headings:

- Trends in supply
- Trends in processing
- Trends in Marketing
- Trends in consumption
- Impacts on the poor

TRENDS IN SUPPLY

Trends in supply affect the whole of the post-harvest sector as these affect the overall supply of the and composition of the fish.

Changes in a marine landings

The available data on landings of marine fish in India tend to be controversial with considerable disagreement as to what is the reality of the situation. In most locations the official figures indicate that landings have increased although official research into landings suggests that these data might not always accurately reflect reality. Strongly associated with the recorded changes in these catches are the different perceptions of what those changes might be. Overall the indications from the data suggest that the marine catches overall have increased in recent decades but that for many stocks they are tending towards, or in some cases going beyond, the point where maximum yields on a sustainable basis can be achieved, at least from conventionally harvested stocks. However in many locations there is a strong perception amongst fishermen that catch rates have declined and become more unpredictable.

There has also been a shift in the species composition in many areas. In Karnataka for instance there has been a significant fall in the recorded landings of mackerel, oil sardine, and fishermen locally have strong perceptions that species mix is changing significantly. In Kerala there has been an increase in focus on the harvesting of wild shrimp stocks but in Andhra Pradesh and Karnataka wild shrimp landings are reported to be declining. The reasons for these changes are not fully known. Some may well be linked to changes in fishing patterns and technology (see below) that are becoming more species specific. There is also a growing perception of increased uncertainty of catches which, given the increased investment in many parts of the country, suggests a greater degree of risk in the harvesting sector. In Andhra Pradesh, for instance, fishermen note that the number of days per year when good catches are made has decreased substantially. Changes in the seasonal availability of fish is also a common observation. In the Karnataka study it was noted that there was now less variability between seasons and the major monsoon gluts have diminished.

Changes in other sources of supply

These changes in marine catches do not mean that supply of fish in any one location is constant or that fish supply overall is static. Certainly the growth of freshwater fish harvesting and aquaculture has added substantially to national supplies and interstate movements of fish now mean that in at least some locations fish supply is increasing. For example freshwater fish production in Karnataka and Orissa has more than doubled between 1989 and 1998. In Orissa the area used for brackish water aquaculture increased from only a few hundred hectares in the early 1980s to over 12,000 hectares in 1997. The demand for wild shrimp seed also grew substantially and this provided a source of work for many people in the coast until the practice was banned. This growth in production is also tempered by increasing flows of fish to foreign markets that have reduced the access that some stakeholders have to fish but has brought new participants into the sector.

The increase in the contribution of freshwater fish and harvests from coastal aquaculture to total supply has meant that the species composition of species entering the market has changed significantly. But shrimp have shown major fluctuations in supply as problems within the aquaculture sector have manifested themselves. Interstate movements of fish have dramatically changed the species mix and quantities of fish available in different states. In Orissa for example imports from other states rose from less than 10,000mt in 1992 to over 30,000mt in 1996.

Changes in the wider marine ecosystem

Closely linked to the supply of fish is the condition of the coastal environment. The coast has undergone massive change in recent years with increased population, industrial development, port and harbour development, and tourism. Also land-based activities in the coastal zone such as aquaculture and agriculture are becoming more widespread or intensive. There is considerable concern throughout India that these activities are affecting the quality of the marine environment and thus affecting the carrying capacity of the sea and thus potential fish harvests. In addition fishing practices that use small-mesh nets, explosives, and bottom trawls in ways that are unsustainable also threaten the resource. Increased motorisation of fishing craft is also contributing to aquatic pollution.

In ecosystems at or near the coast the effects of environmental degradation are most obvious. For instance Chilka Lake in Orissa is one example where human interaction with the natural environment has led to a localised decline in the fish stocks, fish landings and biodiversity, and led to a decline in the livelihoods of those who depend upon those resources. The adverse changes to the reef in the Gulf of Mannar are a result of multiple influences but these are reducing the catches that the local people can make from the reefs.

In many places the relationship between environmental damage and falling catch rates or changing catch composition cannot yet be supported by clear evidence but there is a strong perception by many of the stakeholders concerned that these are related. The extent to which coastal pollution is affecting fish quality is also not widely documented but people who live beside polluted waters complain of its health implications.

Changes in harvesting practices

There are changes in harvesting practices that have direct affects on, or are affected by, the changes discussed above. In general there has been a gradual shift in the technological complexity of harvesting capacity and a greater level of capitalisation of the industry. Whilst in some locations the number of traditional craft is increasing, there is a greater focus of motorisation and mechanisation. In Kerala for instance the percentage of total landings that are contributed by the traditional sector declined from 24% to 5% between 1985 and 1996 in favour of motorised and mechanised craft. In Orissa the contribution of the non-motorised traditional craft to the total marine catch declined from 50% in 1989 to 35% in 1995. In Karnataka all vessel sizes have increased but the greatest increase has been in the mechanised

sector, the non-mechanised boats have tended to increase their motorisation. In Orissa the traditional non-motorised craft have declined since 1992 but motorised and mechanised craft have increased in numbers. In most places all sub-sectors of the fleet have tended to increase their catching power through increased engine power and, at least in the larger vessels, the greater use of electronic equipment. In some states, such as Tamil Nadu, it is reported that fishermen are increasing the number of specialised gears they carry.

These changes require higher levels of investment in capital that in turn require longer fishing periods and there is a growing shift from single-day fishing to multi-day trips. This in turn requires better on-board handing and storage and has been accompanied by a greater use of ice. The changes mean not only increased capital costs but also increased operating costs because of greater dependence on ice and fuel for engines. The increased capitalisation, and some would say over-capitalisation, of the fishery has meant that different patterns of fleet investment are taking place. For many the risks have been too great to make the change, for others they have tried and failed, and for some the change has been a success. The fortunate people who have survived the transition now own more of the capital but there is an increasing trend for this ownership to be from financial sources outside of the traditional fishing communities, either through direct investment of by effect as the major lender to the owner can greatly influence the operation of the craft. In Tamil Nadu it was reported that many fishermen have moved from fishing for themselves to being crew on larger craft.

For some vessels there has been a more targeted approach to fishing, focusing on particular high value species, such as seer fish. This in turn may have contributed to the perception that there has been a fall in biodiversity. On the other hand, as greater competition in the shrimp trawler fleet reduces catch rates so they have landed a greater diversity of species and discards have declined.

The increasing competition for resources has resulted in increasing conflict between fishermen, especially between different levels of technology. The interactions between the motorised and mechanised craft off the Kerala coast are well documented but there are more localised conflicts throughout the country. In Andhra Pradesh there has been a growing level of conflict in creek-based fisheries where there are increasing disputes over use-rights. A past strategy of many fishermen responding to falling catch rates, particularly seasonal declines, has been to migrate to follow the fish availability and in Orissa there is reported to be a greater level of migrants from Andhra Pradesh fishing in the waters off Orissa, and fishers from Tamil Nadu fishing in Andhra Pradesh and Kerala. Increasing competition for resources now means that resident fishers are less tolerant of migrants into their areas.

Increased investment in vessels combined with increased landings following multi-day trips, has encouraged vessels to concentrate on larger landing sites, especially in Andhra Pradesh, Karnataka and Kerala. At these sites there is good shelter, more developed and reliable support services and a more regular attendance of fish buyers with greater access to funds. Such facilities have also contributed to wider changes in fishing behaviour, for instance in Kerala it was noted that better harbour facilities have allowed increased fishing during the monsoon period. On the east coast where cyclones are not uncommon, being based at large protected harbours becomes a necessity to protect large-scale investment. The cyclone in 1999 that hit the coast of Orissa did major damage to the fishing fleet, particularly the traditional fleet in unprotected areas of the coast.

In many cases the fish from the larger craft are destined for distant national or international markets and landing in close proximity to good communications is becoming more important. Likewise access to steady supplies of ice and fuel are important. In the larger sites the number of fish buyers tends to higher than in the smaller locations, they attend the sites more regularly and they tend to have greater purchasing power. This works to the advantage of the fishermen as competition for their fish is increased.

There is a perception amongst many of the coastal people contacted in the research that coastal populations are increasing and many new unskilled people are trying to join the

fishery. This has resulted in crew sizes increasing and for at least some locations competition for work in the sector has increased. For at least some of the fishermen this means that there is underemployment in the sector. In the past beach seines provided employment for large numbers of unskilled poor people, particularly women and the old. The reduction of this fishing method, in for instance Andhra Pradesh and Tamil Nadu, has led to a decline in work opportunities for many of the poor. But in other locations rising demand for fish coupled with static supplies have meant that incomes have gone up.

These changes have implications for the people who purchase the fish from fishermen and these will be discussed below.

TRENDS IN PROCESSING

Traditionally the processing of fish is predominantly a role of women who combine the activity with working in the home and looking after children, but these roles are changing. The changes in harvesting practices discussed above have had major effects on the supply of fish into fishing villages. In the main more fish is landed more often at larger landing sites in most states. This means that village-based processors have a reduced and more irregular supply of fish coming through the villages. This increases uncertainty over when landings will be made and also increases competition between the buyers. In spite of this there has been an increase in processors in some locations. In Andhra Pradesh for instance greater uncertainty in the harvesting sector has meant that the wives of some fishermen have had to process fish for longer periods of the year to help to maintain household incomes.

For those processors who are able to travel to the larger landing sites fish is regularly available. However, the increased focus on iced fish means that much of the fish find a market with fresh fish buyers. Where there is a concentration of larger buyers who are feeding supplies into distant markets, their ability to purchase large quantities is often considered by the fishermen to be beneficial and selling to the larger buyers is considered more preferable than selling small quantities to many small-scale operators. There has also been a small growth in the higher quality dried products market, for instance in Orissa processors in Paradeep are now targeting markets in north-eastern India and Bangladesh where demand for higher qualities of dried fish exist. There are also changes in the high-end of the post-harvest technology. At the larger centres there has been a growth in freezing capacity to allow products to move into the export markets. In the shrimp and high quality fish industry in Orissa many women are employed to sort, grade, pack and, in the case of shrimp, to peel. Initially these were women from Kerala who had the skills to do this kind of work but now more local women are becoming involved. There has also been growth in fishmeal production in some locations such as Karnataka which has seen a growth from 40mt/day capacity in the 1970s 184mt/day in 1998. Competition for fish is thus greatly increased for the smaller buyer, their operating costs are also increased as the fish needs to be transported back to the fishing communities where they live to access their local markets (if they are fresh fish traders) or to access their processing equipment.

Likewise in the villages, improved roads, increased ice production and use of improved storage containers and insulated trucks have enabled an increase in the use of ice for fish storage in many villages. The use of ice and refrigeration has been further facilitated by widespread electrification which has reached most rural locations in the country. The shift to ice in these better connected locations has been further enhanced by the growing shift in consumer preferences away from traditionally processed fish towards fresh fish. This is reflected in changes in packaging of fish, an increase in the availability of fish fillets and greater fish sales through supermarkets. Overall there is less fish available at the landing sites for traditional processing methods. However, there are still a number of remote and poorly served communities where ice has not reached and traditional processing continues at the same rate as before. In addition there are still specialised products, such as *mas min* produced in Lakshadweep, that find a ready market.

In many locations where coastal populations have increased there is also an increase in the competition for space. The development of coastal aquaculture has also increased demand for coastal land. This has directly affected the traditional processors in many locations where fish drying is practiced, particularly in southern Tamil Nadu where large areas of coastal land were used for fish drying. This is worsened where coastal erosion has removed large areas of the shoreline, the area often used for drying of fish. This has not been helped by the widespread cutting of forest in coastal areas for building materials and for fuelwood.

These changes are not only affecting the fish processors, the traditional fish basket makers are also seeing their livelihoods threatened through the introduction of plastic boxes and ice boxes. One beneficial change for the traditional processors has been the increased landing of by-catch from shrimp trawlers in some locations. This has provided an opportunity for those processors that have the capacity to travel to the larger landing sites.

TRENDS IN MARKETING

The value of fish exported from India increased nearly five times from 1990/91 to 1998/99. Where facilities in one state do not have certification to export to specific countries, such as the EU, they export their products to other states, for example fish is sent from Karnataka to Kerala to make use of the export facilities there.

Many of the trends mentioned above for processors also affect fish traders; landings are focused at larger sites, local supplies are more erratic, and competition has increased. In areas where coastal communications have improved, outside buyers can locate good fish landings quicker than before and can access those landing sites with larger vehicles carrying ice. Likewise improved feeder roads to coastal communities means that fish that previously only entered those villages by foot of cycle rickshaw can now often be transported by motorized vehicle.

In many villages the competition to buy fish has increased, not only because more traders are coming into the villages from outside, but also because more people from within villages are entering fish trade. Some of these are displaced fishermen, others are processors who have moved into fresh fish trading, and some are people who have been displaced from land-based activities. In the villages of northern Orissa most of the fish trade was traditionally done by men, often on bicycles, but in the south it was done by women head loaders. In the south more men are now entering fish trade and competing with the women. The increased dependence on ice, both ashore and onboard, means that the suppliers of fish and the suppliers of ice are more closely linked. In more remote locations it means that the ice suppliers often have preferential access to fish landings and this can displace local buyers. Increased competition is also a reflection of the increased access to inland markets, inter-state trade and overseas trade. Within the domestic market the increased preference for fresh fish over processed fish, its increased availability in distant markets and increased awareness of the health benefits of fish has increased the price of fish and thus attracted more people to become involved in trade either as a worker or investor.

Accompanying these changes has been an increase in the trade of fish based on cash transactions rather than loans. This has meant that reciprocal arrangements between wholesalers, processors, retailers and fishermen have tended to reduce and transactions have become more opportunistic.

The expansion of the iced fish trade and the associated investment has meant that in many locations the level of fish loss along fish chains has decreased and more fish is reaching the consumer in better condition. The greater landings of by-catch from the trawlers and the increased demand for this fish for human consumption has prompted a greater degree of grading of such fish into a larger number of groups to address different aspects of the market.

Whilst the expansion of demand for fresh fish has generally been beneficial for the petty traders, the increased quality consciousness of the consumers has meant that there is greater

pressure for improved use of ice which increases costs. The need to move the focus of purchasing to larger sites, or to compete with larger fresh fish buyers at the village level, has prompted many petty traders to form groups. This enables them to reduce competition between themselves and to buy larger quantities of fish, and thus more effectively compete with larger outside buyers.

TRENDS IN CONSUMPTION

The state-level studies did not focus too much on the consumption side of the post-harvest sector because the information in the literature was not extensive enough to draw conclusions and the work involved in generating new knowledge was beyond the scope of the research. However, some broad trends are beginning to emerge.

The export demand for fish is globally increasing making less locally produced fish available for local markets. Likewise, the different preferences for different types of fish at different times of the year, and the increased willingness to pay for fish, combined with improved transport and storage of fish means that there is greater interstate movement of fish throughout the country.

Overall the purchasing power of the average consumer seems to have increased at a faster rate than the increase in the price of fish. But this is not the case of all groups and poorer consumers now find it more difficult to access the types of fish they prefer at affordable prices. For some this has meant changing their diets to incorporate cheaper species. For many people in Orissa the price of freshwater fish has risen to such a point that there is an increase in the consumption of the less preferred marine fish but overall fish consumption there appears to have increased.

Associated with the increased desire for iced fish has been a general decline in consumption of traditionally processed fish in favour of iced fish. In Karnataka, for instance, the main purchasers of dried fish are now poor consumers from inland who cannot afford or access fresh fish. In Orissa, on the other hand there is still a large amount of traditionally processed product available.

This shift in consumption has affected different consumers in different ways. For the poorer consumers in some locations the increased price of fish has meant that they have to seek a greater proportion of their animal protein from other sources. This has resulted in a change of image of fish in some locations from being food for all, to becoming a more middle class food.

IMPACTS ON THE POOR

Poor in the harvesting sector

A key aspect of the fisheries in most of the states is that the coastal populations have increased and more people are now dependent on the fisheries for a livelihood. The open access nature of much of the fishery has provided opportunities for those who wish to make an income but the returns from working in the sector are becoming more polarised and uncertain.

In the fish harvesting sector there are several consequences for the poor but there is less uniformity than perhaps in other parts of the sector. There seems to be localised underemployment in the sector due to an increase in the number of participants. This has placed a greater burden on the women in the household and this is not helped by increased alcoholism amongst the men reported in some locations. Those more established in the industry are likely to have increased their incomes because of the increasing demand for fish and the higher prices paid. However, the risks and costs of operating in the sector are increasing, and the increased costs are leading to increased indebtedness in some areas and the high interest rates charged threaten commercial sustainability. Many people now talk of

greater wealth polarisation within coastal villages. How sustainable the benefits flows will be, considering the increasing competition in the harvesting sector and given the increasing pressure on the resources, is unknown.

For some of the fishermen, conflict in the sector, increasing competition, and the need for ever increasing levels of investment has meant that they have left fishing and moved into fish trade or migrated in search of fish harvesting work elsewhere. Fishermen from Andhra Pradesh have traditionally migrated to Orissa, but this is happening on a semi-permanent basis now and some fishermen have migrated to work on the trawlers in Gujarat. The impacts upon the families left behind are not well documented but the increased pressure on wives with families to take over more of the responsibilities for the household is reported. The traditional caste involvement patterns in fishing are also changing with more people from non-fishing castes entering the fishery, especially at the more mechanised end of the sector. In some communities fish carriers or transporters, who carry fish from the boats to the auction centres, make up a large number of the poorer workers. Where fish continue to be regularly landed in villages their work has continued. Where greater quantities of fish are now landed at larger sites the village carriers are finding that work is more intermittent. At the larger centres new jobs for carriers have been created.

The poor processors

For traditional processors in remote locations, with few connections to the outside, the situation remains largely unchanged. They continue to produce for the local markets and competition has not dramatically increased. For the majority of traditional processors, however, the supply of fish has reduced as has the demand for their products, and their livelihoods are becoming progressively marginalised. In the main the livelihoods of the traditional women processors are becoming marginalised. There is a tendency for more women than men to be involved in this area of work and it is likely that such changes are having impacts at the household level. For those who have made the move to purchasing from larger landing centres their costs have increased but their incomes have not necessarily increased to the same degree. Whilst group formation has helped to offset some of the competition the support to women to organise themselves is still limited when compared with the institutional organisation within the harvesting sector.

For households headed by women these changes can be particularly difficult. In households where the man is involved in multi-day fishing or has migrated to other areas to seek work the burden on the woman to take on greater household responsibilities has been noted.

For those wishing to leave the fishery the alternative income earning opportunities are few and where they exist the poor often lack the skills to take these opportunities up. In Karnataka women processors and traders also traditionally became involved in agriculture but in some locations the development of coastal shrimp farming has lessened the availability of such options. As rice production involves locally known skills and has a much higher labour demand than shrimp farming, the opportunities for local people to diversify into this have been few. The collection of wild shrimp seed for the aquaculture industry did provide a burst of activity but this has greatly reduced. In Andhra Pradesh women processors traditionally spent most of their time on processing with a little time spent on trading. There is now greater dependence on agriculture and aquaculture. In many villages there has been a move from cotton to synthetic material nets and the involvement of women in net making has also declined reducing this important work source.

Overall the position of many women processors seems to have got worse and many are reported to have left the sector but what they are currently doing is unknown.

Poor traders

The iced fish trade has grown and this has been beneficial to the poorer petty trader but this has attracted inward investment in trading, and increased the number of traders, commission

agents, head loaders and transporters involved in the sector. This increase in number of people involved in handling the fish is compensated for by the increased prices paid. But these changes have increased competition amongst the participants and not all have benefited equally. In both Southern Orissa, Andhra Pradesh and Karnataka for instance, there has been a shift from women traders to men traders in many of the local markets. This has led to changes in the power of women in the household.

Whilst some of the jobs traditionally done by women are being taken over by men the export processing activities, especially for shrimp, have provided new opportunities. For those that have managed to penetrate the larger landing sites and formed purchasing groups the situation, at least in the medium term, looks good. This has been helped by greater landings of by-catch from the trawler fleet. For fish trade there has also been a break down in traditional barriers, for instance in Karnataka the fish trade was traditionally run by Hindu women but more and more they are being displaced by Muslim women.

The reduced dependence on transactions based on delayed payment and reciprocal arrangements in fish trade has increased uncertainty in the sector and made fish trade more opportunistic. The impacts of this are likely to be most seen when processors and petty traders fall on to hard times and they need to fall back on such traditional mechanisms.

Poor consumers

For poor consumers the situation has got worse in terms of the availability of fish at prices that are affordable. To an extent this has been offset by increased availability of cheaper protein from other sources.

CONCLUSIONS

The fishing industry in India has seen major changes over the last ten years and these changes are having impacts across the fishery from harvesting to consumption. These changes are outlined in the attached diagram below.

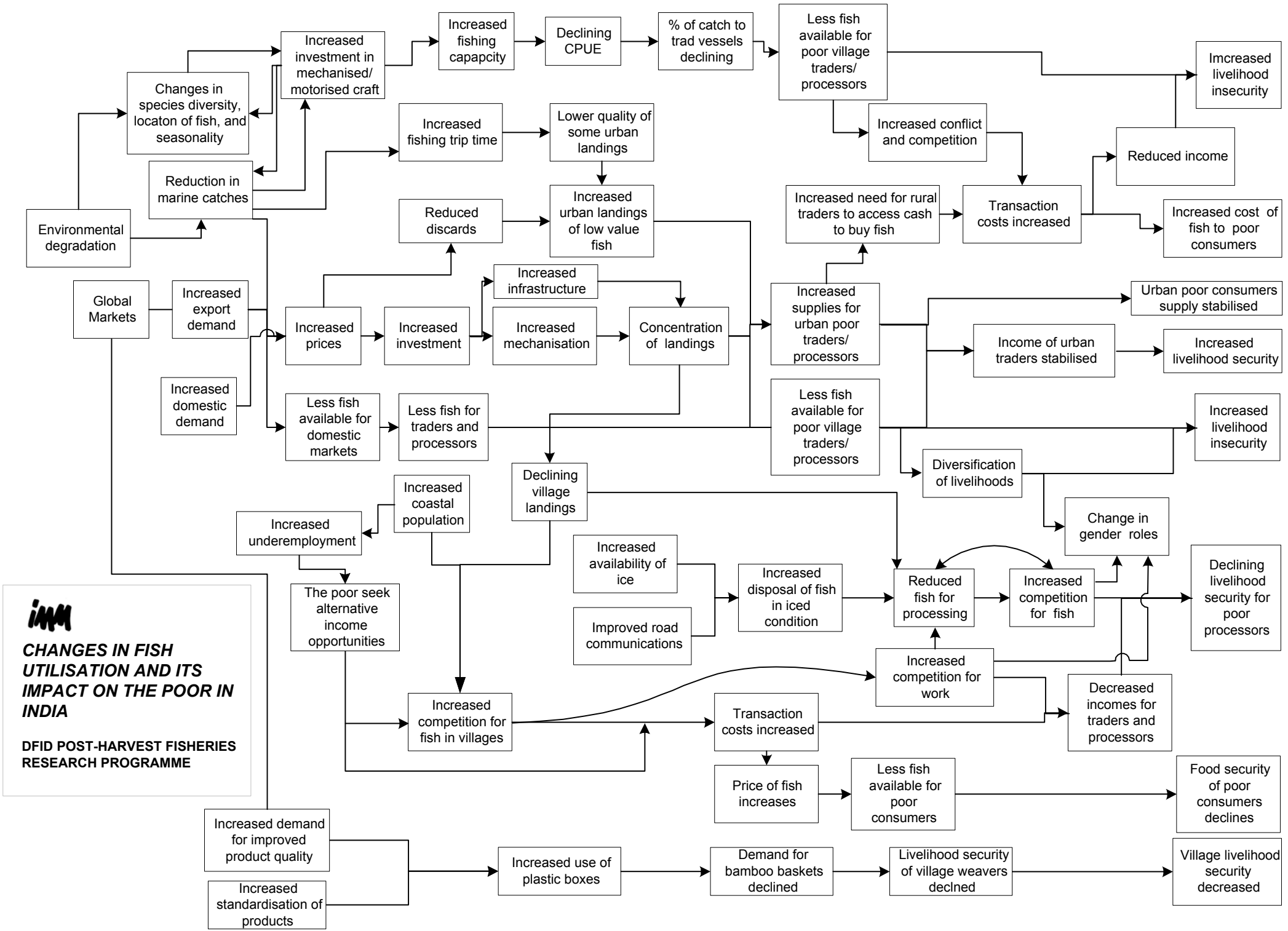
Whilst more data is required on the condition of the stocks and the environment that supports them, the perception of many in the industry is that these stocks are under serious threat. Whilst such perceptions cannot be taken as evidence of change they can be viewed as an important early warning that needs to be taken seriously. The supply side of the industry continues to grow with the expansion of freshwater fish from wild and cultured sources.

Changes in the capitalisation of the fishery and increased competition for resources has meant that more fish, is landed more often in fewer and larger landing sites. This capitalisation has led to changes in the ownership and working practices of the poorer fishers that have had effects at the household level.

Perhaps the most dramatic change in the post-harvest sector of the fishery has been the widespread uptake and use of ice. Associated with this has been a growing demand for fresh fish. This has had serious implications for the poor fish processors, many of whom are women. In many cases their livelihoods are being marginalised and few viable alternatives are currently available for them.

The expansion of the fresh fish trade has created new jobs but also increased competition. Rising fish prices have helped to offset adverse effects. The concentration of landings at fewer sites has necessitated changes in trading practices that have increased risks.

The industry is still changing but the trends here will help to guide the remainder of the projects more detailed research.


Increased investment in mechanised/ motorised craft
Increased fishing capapcity
Declining CPUE
% of catch to trad vessels declining
Less fish available for poor village traders/ processors
Imcreased livelihood insecurity
Changes in species diversity, locaton of fish, and seasonality
Increased fishing trip time
Lower quality of some urban landings
Increased conflict and competition
Reduced income
Reduction in marine catches
Environmental degradation
Reduced discards
Increased urban landings of low value fish
Increased need for rural traders to access cash to buy fish
Transaction costs increased
Increased cost of fish to poor consumers
Global Markets
Increased export demand
Increased infrastructure
Increased prices
Increased investment
Increased mechanisation
Concentration of landings
Increased supplies for urban poor traders/ processors
Urban poor consumers supply stabilised
Income of urban traders stabilised
Increased livelihood security
Increased domestic demand
Less fish available for domestic markets
Less fish for traders and processors
Less fish available for poor village traders/ processors
Increased livelihood insecurity
Diversification of livelihoods
Declining village landings
Increased coastal population
Change in gender roles
Increased underemployment
Increased availability of ice
Increased disposal of fish in iced condition
Reduced fish for processing
Increased competition for fish
Declining livelihood security for poor processors
The poor seek alternative income opportunities
Improved road communications
Increased competition for work
Decreased incomes for traders and processors
Increased competition for fish in villages
Transaction costs increased
Price of fish increases
Less fish available for poor consumers
Food security of poor consumers declines
Increased demand for improved product quality
Increased standardisation of products
Increased use of plastic boxes
Demand for bamboo baskets declined
Livelihood security of village weavers declned
Village livelihood security decreased
CHANGES IN FISH UTILISATION AND ITS IMPACT ON THE POOR IN INDIA
DFID POST-HARVEST FISHERIES RESEARCH PROGRAMME