DFYWA Working Paper 1

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Living on the Edge

Perspectives of the small-scale women fish processors of northern coastal Andhra Pradesh, India

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ACKNOWLEDGEMENTS

The District Fishermen Youth Welfare Association (DFYWA) is a community-based non-governmental organisation working with the small-scale fishers and fishworkers of northern Andhra Pradesh since 1992, implementing activities focused on developing sustainable fisheries-based livelihoods for men and women.

Over the years, the governing body of DFYWA has felt the need for more robust understanding of the current conditions in the sector. This is in order to facilitate the organisation to move on from immediate development interventions towards more strategic long-term programmes. To achieve this objective, DFYWA decided to take up a broad programme of studies to understand the living and working conditions of different actors in the small-scale fisheries sector. A series of working papers, covering various actors are intended to be developed, with a view to provide guidance to support their livelihoods in a more need-based, adaptive, manner.

This working paper is the first in the proposed series, focusing upon the fisherwomen involved in dried fish trade covering the four northern coastal districts of Andhra Pradesh. The working paper also takes a sideways glance at the potential impacts of the industrial fishmeal production on the small-scale processed fish production in the target communities. It is the intention of DFYWA to treat the working paper as a live document, to allow updating it at regular intervals, add more quantitative data as it is collected, and also use this as a baseline to understand and interpret future development directions in the subsector, both from within the communities and outside of them.

The study, based mostly on primary data collection, is undertaken by several members and staff of DFYWA, who are listed below:

- Srikakulam District:
    - Mr Surada Rajarao
    - Mr Karri Pandayya
- Visakhapatnam District:
    - Mr Busara Thavudu
    - Mrs Garikina Ratna
    - Mr Chodipilli Satyanand
- East Godavari District:
    - Mr Barre Lakshmi Narasimha Raju

DFYWA gratefully acknowledges the valuable assistance provided by the field study members who braved considerable odds in the face of the ongoing Covid 19 pandemic to spend extended periods of time with the processors, and visiting fish landing centres, fishing harbours, and fish markets for first-hand data gathering. They also compiled several case studies of individual processors, DFYWA intends to have them translated and published as a companion volume to this report.

The study suffered on multiple fronts on account of Covid 19, including the departure of some key staff members, which delayed the data gathering and consolidation much beyond the expected time. Mr Venkatesh Salagrama, fisheries consultant, stepped in to help with the consolidation, analysis, additional field work, and drafting

of the final report and DFYWA thanks him for his help. Mrs Ramya Rajagopalan and Mrs Sujata Salagrama provided ready support when the need arose for more fieldwork at a critical moment and DFYWA thanks them for their inputs and insights about the gender dimensions of the fish processing activity.

The list of women fish processors interviewed for this study in the three coastal districts of Andhra Pradesh is quite long (and given in Appendix 1) and DFYWA takes great pride in thanking each and every one of them for their patient and detailed responses and elaboration of issues in every instance. The study is intended as a reflection of their perspectives and we will feel justified in our efforts if the working paper has managed to capture even a fraction of the voluminous and thought-provoking information that these wonderful women have shared with us.

The study was made possible owing to three sources of support:

- The initial impetus and funding came from the research project, '***Dried Fish Matters: Mapping the social economy of dried fish in South and Southeast Asia for enhanced wellbeing and nutrition***', being implemented by the University of Manitoba, Canada, with support from the Social Sciences and Humanities Research Council (SSHRC). DFYWA gratefully acknowledges the support received from the DFM project and owes a special thanks to Dr Derek Johnson, the Research Director of the programme.
- Another component of funding – covering logistics, facilitation, and administration – was borne by DFYWA from its corpus funds as well as with voluntary contributions of some of its members. The executive body of DFYWA thanks all voluntary donors for their support.
- Another, substantive, part of the support for the study involved services offered by experts and field staff on wholly voluntary basis or by working for nominal honorariums, in the planning, field implementation, consolidation, analysis, and documentation. Their contribution to the study is gratefully acknowledged.

DFYWA realises that the study has several gaps and shortcomings, partly owing to the unique conditions imposed by Covid 19 and partly owing to its institutional limitations to undertake a task of this kind, and welcomes feedback, suggestions, and comments to improve the working paper.

ARJILLI DASU
Chief Executive, DFYWA

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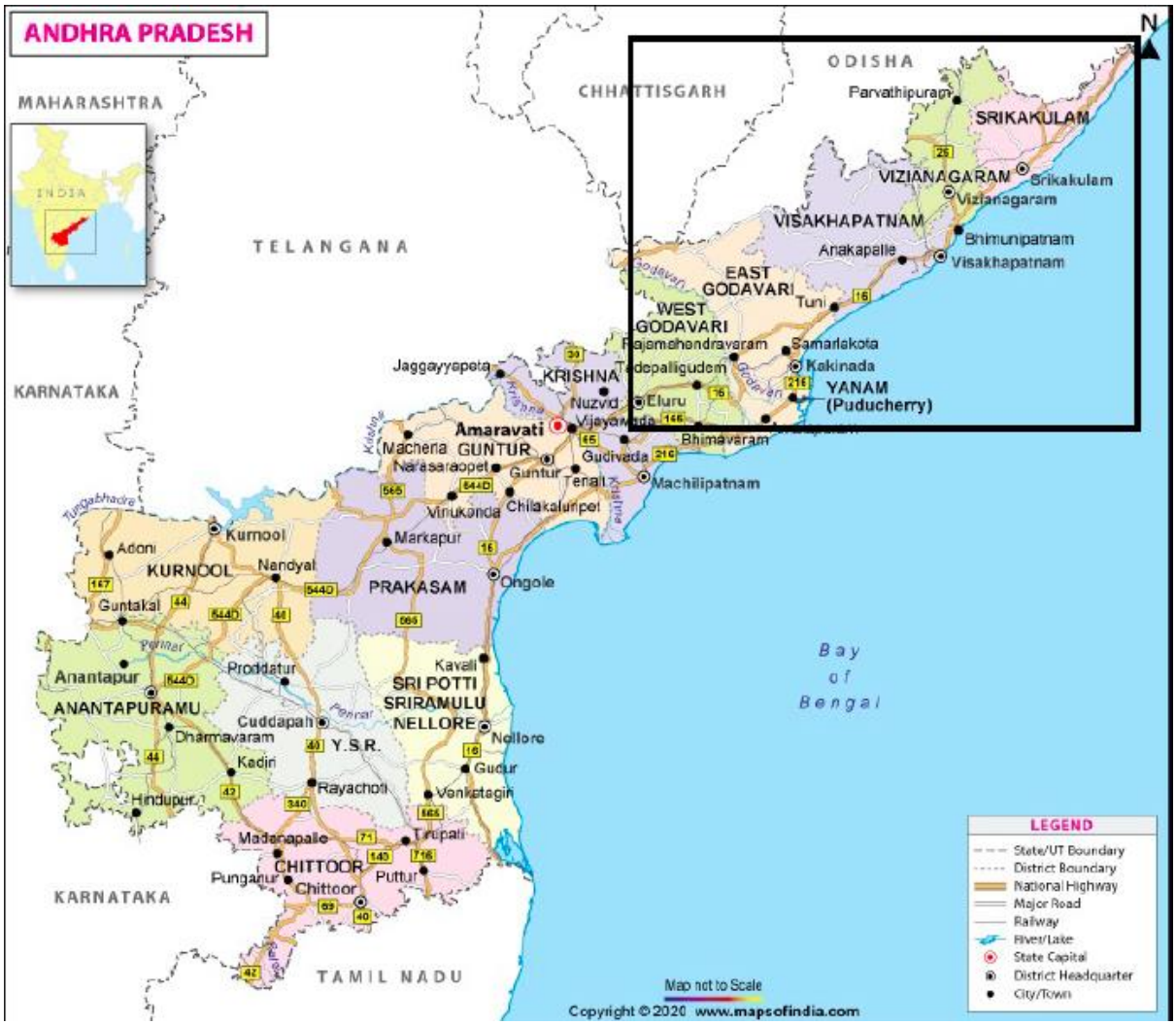

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LIVING ON THE EDGE: PERSPECTIVES OF THE SMALL-SCALE WOMEN FISH PROCESSORS OF NORTHERN COASTAL ANDHRA PRADESH, INDIA

1. INTRODUCTION AND BACKGROUND TO THE STUDY

In Andhra Pradesh, dried fish have traditionally played an important role in the small-scale fishing economies, in ensuring the food and nutritional security of large segments of population, and in supporting a wide range of livelihoods. Until the arrival of ice and transport systems into the sector in the 1990s, drying was (and, in some fisheries, still is) an important way to utilise and distribute the catches, and accounted for 50-70 percent of the fish landings. While the round-the-year availability of croakers, ribbonfish, and silver bellies kept the processors in business, seasonal predominance of fish like sardines, anchovies, and mackerels provided the necessary value-added to keep their businesses profitable.

Significantly, the importance of the dried fish lay in their contribution to the food security of the poorer segments of the population: the inland agrarian and tribal societies specifically and the Muslim households more generally are the important customers for the dried fish in Andhra Pradesh; elaborate networks of informal and intricate supply chains have existed to cater to the needs of these groups. Besides, the fishing households were a major consumer of dried fish, and took recourse to dried fish during the rainy seasons and lean fishing periods, ensuring a steady diet of nutritious food in the villages. Over time, as more fish caught in the small-scale fisheries have moved 'upwards' into urban high-paying fresh fish markets, it is the cheaper dried fish that the fishing communities themselves have turned to meet their nutritional needs.

Traditionally, dried fish production and trade has been associated almost exclusively with women, though men also worked in the activity. The women's active role in the dried fish trade exposed them to a wider geographical area beyond their immediate surroundings and helped them to act as an interface between the fishers and the rest of the world; the economic, social, and cultural implications of the women's vantage position in dried fish cannot be underestimated. As we shall discuss, even as the dried fish production and trade activities have come under increasing stress, women have continued to play an important role in the activity and, if anything, are more exposed than previously to new supply centres and new markets.

Even as ice took over from drying as the predominant preservation method in fisheries, dried fish (and their unique counterpart from the Godavari delta, the smoked fish – '*poga chepalu*' or '*archina chepalu*' in Telugu) continued to have a niche of their own in the traditional cuisine of coastal Andhra Pradesh. The persistence of demand

for dried and smoked fish is evidenced by the existence of a whole cornucopia of recipes[1] developed specifically around these fish products.

In the last three decades, small-scale fisheries in general, and the dried fish trade in particular, have seen a number of changes, which affected the lives and livelihoods of the various actors in a number of complex and dynamic ways. Such changes transformed the livelihood context of the people in fisheries to an extent that characterising a community (itself an increasingly contentious appellation) as a 'fishing community', a household as a 'fishing household', or even an individual as a 'fisherwoman' may not always be valid owing to the rapidly shifting occupational affiliations and diversity of income sources that have come to characterise their options at every level today. Such transformations are helped in no small measure by the increasing levels of literacy, information flows, and access to the wider world among the fishing populations. The ballooning demand for, and value of, the coastal land in which the communities reside has been an equally, if disturbingly, important change factor.

Overall, the changes affecting the sector can fall under three categories: (i) those happening within the sector (including the arrival of ice in the sector); (ii) changes as a result of external factors/forces impinging upon the sector and its dependents; and (iii) changes arising out of broader social and economic trends. An additional layer of changes is brought on by climate change and natural disasters, which are themselves frequently aggravated by human actions. The changes and their consequences are intermingled, and the cause-and-effect relations are quite difficult to work out not only because each cause is itself a consequence of another (and vice versa) but also because – like the snake swallowing its own tail – it could also be the outcome of the same consequence that it is contributing to.

Such changes are having quite a fundamental impact upon all aspects of fisheries and also (for the purposes of this study) on the processed fish businesses, to an extent where the long-term sustainability of these activities, and the livelihoods of the people depending on them, are in urgent need of reconsideration from the policy/development perspectives. Unfortunately, few of the recent changes that have affected the sector (especially the women fish processors and sellers) are adequately captured in the available studies in any detail. The current understanding at the civil society and at the policy levels about the fishing communities continues to draw from work done in the 1980s and 1990s when, as one woman processor interviewed for this study put it, '*the world used to be a different kind of place and we did things differently*.' Starting with a template derived from an outdated base of knowledge, current efforts in the sector go on to add newly emerging concerns (e.g., conservation, coastal development, climate change, social equity) into the development agendas, which thus remain doubly removed from the actual needs and aspirations of the men and women in the sector.

[1] Some highly prized dried fish recipes in the coastal Andhra cuisine include: dried fish cooked with brinjal or lentil soup; dried shrimp and egg; dried anchovies and spinach/sour greens; smoked shrimp and vegetables.

This study is intended to go some way to provide a more up-to-date, if partial, snapshot of the small-scale fish processing and especially its women actors *from the women's perspective*, and to assess what the future might hold for them. It is intended to be a curtain-raiser to explore an important area that has remained under-studied in the last few decades and give rise to more robust research and documentation of the sector and its people.

The District Fishermen Youth Welfare Association (DFYWA) is a community-based non-governmental organisation working with the small-scale fishers and fishworkers of northern Andhra Pradesh since 1992, implementing activities focused on developing sustainable fisheries-based livelihoods for both men and women. It has worked on a broad range of issues, covering fisheries management and conservation, post-harvest and value-chain development, climate change and natural disasters, livelihood enhancement and diversification, social justice and gender equity, etcetera. Women have been an integral part of all its programmes and the organisation's support to the small-scale fish vendors and processed fish producers has included: capacity development and awareness-raising, institutional development and strengthening, infrastructure and equipment support, market information and access (including innovative product/market interventions), and advocacy and lobbying for their rights and for development support, and to highlighting their issues through all relevant forums and platforms.

Over time, the governing body of DFYWA felt the need for a more robust understanding of the current conditions in the sector. This is in order to work beyond the conventional development tropes and programmes (whose obsolescence was becoming apparent over the years in terms of reduced overall benefits as well as declining community interest in the conventional 'capacity development' and 'awareness raising' programmes) and to facilitate the organisation to move on from immediate development interventions towards more strategic long-term programmes. To achieve this objective, the organisation has decided to take up a broad-based study to understand the living and working conditions of different actors in the small-scale fisheries sector in the communities where it has worked in the last three decades. A series of working papers, focusing upon (i) fishing boat owners and crew (in both mechanised and small-scale sectors) (ii) fresh fish vending women (iii) dried fish producers and vendors, including fishmeal manufacturers (iv) processing factory workers and (v) ancillary workers in the sector – are intended to be developed with a view to develop guidance to support their livelihoods in a more need-based, adaptive, manner.

The current working paper is the first in this series, focusing upon the fisherwomen involved in dried fish trade covering the four northern coastal districts of Andhra Pradesh – Srikakulam, Vizianagaram, Visakhapatnam, and East Godavari – where DFYWA has implemented several programmes since the 1990s. The working paper also takes a sideways glance at the potential impacts of the industrial fishmeal production on the small-scale processed fish production in the target communities.

The study, it is hoped, will help DFYWA as an organisation to develop a more balanced approach to its future interventions; and also help to inform development agencies – government and NGOs – to better target their efforts and focus attention on the critical areas of relevance from the fishers' and fish processors' perspectives.

2. OBJECTIVES OF THE STUDY

The objectives of the study are quite broad-ranging, and are intended to be more of a guideline to explore what can be known from a study of this nature based on the fisherwomen's perspectives, rather than as a means to undertake a robust exploration of the issues in exhaustive detail. These included:

- To understand the current status of dried fish production and the key trends affecting the livelihood context of the small-scale fish processing women of the northern coastal Andhra Pradesh
- To assess how the current levels of demand for fishmeal are affecting dried fish production and trade, and how the trends might impact the processed fish activity in the long-term.
- To understand the strategies adopted by the women fish processors (mitigation, adaptation, and diversification) to cope with the changes affecting their livelihoods, and assess the effectiveness of such responses.
- To assess the scope, value, and sustainability of dried fish business in continuing to provide livelihoods, food security, and value addition into the future.
- To begin to identify actions to inform future policy and support processes for more robust and meaningful dried fish support systems to be in place.

3. METHODOLOGY

Given the paucity of current information (both qualitative and quantitative) on the dried fish processors in Andhra Pradesh (AP), DFYWA's advisory committee felt that the studies should be based on primary sources, focusing upon the perspectives of the women fish processors. A particular intention was that the study should present the women's viewpoint, what they think, feel, and explain, from their own perspectives. Where necessary, the broader context in which they operated and which influenced their work, would be filled in by interactions with relevant people within the communities and beyond (senior fishers, village elders, DOF officers and other sector experts etc), but it felt important to focus on presenting the women's version of the story. This may mean that the study may not be as 'robust' as it might have been, but the subjective and impressionistic treatment was hoped to convey the human dimension that is often missing in the more systematic research studies. The villages to be covered were determined by discussions with the DFYWA field staff and the relevant community representatives, while the numbers of women covered by the study was based on *ad hoc* criteria, such as the women's availability and interest to take part in the process.

Secondly, it was decided that the actual data gathering would be undertaken by the field staff of DFYWA, rather than by professional researchers. Besides the considerations of budget, this choice was also driven by a realisation that, while professional researchers might have good exposure to research methodologies (and better analytical and documentation skills), DFYWA's recent experience had also shown that they often lacked the empathy and the in-depth knowledge of the sector, of the systems, and especially of the people. One of the key changes in the sector (that the study itself is expected to capture) has been that people's awareness and knowledge have improved significantly over the last two decades, so much so that they are able to articulate their opinions and experiences relating to the changing context of their lives and livelihoods without the use of expert 'PRA methodologies'

which are often too simplistic to capture the complexity of issues and could even be perceived as patronising.

The study was thus implemented by the field-workers of DFYWA who came from the same communities that they were investigating. The issue of bias (and the possibility of overlooking the obvious on account of its familiarity) was discussed but, given that this was to be a community-based effort at capturing reality from the 'inside', it was felt to be worth the risk. One major constraint that *did* arise from involving the field staff in the study related to their inability to put on paper all the rich information that they had captured through fieldwork. This was reflected further in difficulties with synthesising the data from different villages and finding common strands across the region. This necessitated the employment of a professional consultant to help with the documentation.

Coming to the methodology, the implementation of the study involved three phases:

A **planning phase**, which involved clarifying the study objectives and developing an implementation strategy; selection of sites and field workers; developing fieldwork checklists and training the field workers in data collection systems; and the validation of checklists in two locations.

A field research phase, involved quantitative and qualitative data gathering from selected landing centres. The quantitative data collection was to include information gathering at two levels:

- Weekly data collection at Visakhapatnam and Kakinada fishing harbours in order to understand the fish production and disposal patterns in different fishery value chains, and their relevance to the dried fish activities.
- A case study approach to be implemented at the sub-sector/individual level in nine coastal locations (3 urban/peri-urban; 3 rural; and 3 remote) to obtain an understanding about the volumes, values, and rates of return on investment in dried fish businesses at the large-scale, medium-scale, and small-scale activities.

The qualitative data collection involved: individual case studies, key informant interviews, and group interactions at the sub-sector level. Checklists, rather than questionnaires, were used for the interactions to ensure an informal, open-ended, interview process.

At the end of the data gathering, community meetings were organised to validate the key findings. This involved:

- Sub-sector-level: changes in fishing and fish distribution patterns and their relevance to dried fish business; key factors contributing to the changes and their impacts; sector-level strategies of adaptation and their effectiveness.
- Individual level: working and living conditions in the dried fish trade; key trends and impacts at the business/household level; key strategies to cope with the challenges.

Towards the later stages of this study, a few rapid visits were made to selected fish processing communities to address gaps in field data, clarify doubts, and discuss the potential options for improvements.

Finally, the **consolidation phase** involved synthesising the information from various sources; analysis in a group to identify the key trends and a SWOT analysis (i.e., an assessment of the strengths, weaknesses, opportunities, and threats) of the dried fish activities; validation of the findings in a workshop involving the fishers, dried fish workers, government and research bodies, and NGO representatives; and documentation by a sector expert. The process, though intended to involve an elaborate and detailed engagement with the women fish processors at different levels, had to be speeded up and some planned activities abandoned, on account of the fears of a revival of the Covid 19 cases in the country and of another possible lockdown at short notice.

The current phase of this study stops at taking stock of the current situation: a sort of 'situation analysis.' It does not go too deep into the ways and means to address the issues. The next phase of this work is intended to focus on identifying specific ideas that might have relevance to the women fish processors in terms of livelihood enhancement and diversification, and testing them in selected locations. The results from this work will eventually form the basis for more detailed policy guidance for wider replication.

4. GEOGRAPHICAL COVERAGE & TIMEFRAMES

The study was intended to cover selected fish landing centres across four coastal districts of Andhra Pradesh: Srikakulam, Vizianagaram, Visakhapatnam, and East Godavari, covering an area of roughly 500 km from north to south along the Bay of Bengal. Vizianagaram, with a short coastline of 30 km, is considered to have the same or similar characteristics (fisheries-wise) as Srikakulam to the north and Visakhapatnam to the south, hence was not explicitly covered, but the overall findings were shared and validated in meetings involving representatives from the district.

The study covered nine fish landing centres, which were defined as follows:

- **Three urban (and peri-urban) centres**: catches coming from mechanised boats (and also motorised boats), large number of actors, good supplies round the year and strong market access; many traders. Places covered: Visakhapatnam fishing harbour, Mangamaripeta, and Kakinada fishing harbour.
- **Three rural fish landing centres**: landing centres with sizeable landings of small-scale (motorised) boats, good amount of processing activities (both large-scale and small-scale), and good transport connections to markets; many traders visiting seasonally; Places covered: Uppada, Pudimadaka and D Machilesam.
- **Three remote landing centres**: rural landing centres with a few, scattered, landings; drying is a regular activity in the absence of ready access to ice; a number of small-scale processors; weak transport and market linkages; few traders visiting the villages; Places covered: Kaviti Mandal (Pedda Karrivanipalem, Idduvanipalem), and Santhabommali Mandal (Guppidipeta).

Alongside, two fish smoking villages – Boddu Chinna Venkataya Palem (BCV Palem) and Pallam – were covered in East Godavari district to obtain information regarding the trends in smoked fish processing activities there.

The idea of differentiating between urban, rural and remote landing centres was important because the location of a dried fish processor in any one of those areas influenced how her activities – and livelihood choices – evolved over the years. Thus, for instance, for a processor in an urban area (Visakhapatnam), while the access to dried fish continued to be good on account of her proximity to a major fishing harbour, the lack of drying space and the existence of a sizeable demand for fresh fish in the urban areas actually encouraged her to move into fresh trade. In rural areas, the access to fish varieties used in processing has come down as fishers have begun to concentrate more on high-value species, resulting in the women making several adaptations in terms of procuring supplies and selling the products. In remote areas (e.g., in Srikakulam district), the relatively few changes in the existing conditions have allowed the women to continue making dried fish locally.

The study commenced in late 2019 and was intended to be concluded by the end of 2020, covering one full year of data collection. However, by the time the planning phase had ended and the field research could begin, the Covid 19 lockdowns were implemented, and they remained in place until September 2020, and, even then, activities resumed only fitfully. The field data gathering could be undertaken only from September 2020 and lasted up to January 2021. Consolidation and analysis of key findings was undertaken during February 2021, followed by a rapid round of field visits to cover some of the gaps, seek clarifications, and discuss the recommendations. The final summary of the findings was prepared by March 2021, and was presented to a workshop involving the officers of the Department of Fisheries, central research institutions (CMFRI, CIFT, NIPHATT), other relevant bodies (MPEDA), NGOs (NetFish), and community/dried fish representatives in April 2021. Based on the feedback received, the study was revised and finalised for dissemination.

5. CONSTRAINTS/GAPS

As with every sphere of human activity during 2020, Covid 19 has been the biggest elephant in the room for this study. Initially, it was intended to collect regular data at three levels – at selected fish landing centres, at the processing yards in the villages, and in selected markets – over a period of one year. In practice, however, the COVID 19 pandemic made it impossible to gather any data over a large part of 2020. For a full six months and a further several months, Covid 19 disrupted fishing activities, fish trade and fish processing, as well as the fishers' movements to the landing centres and to the markets. Even after the lockdowns had been lifted and activities resumed, fishing and fish trade remained low-key and were struggling with a new reality that bore no relation to how things were prior to the pandemic situation.

Thus, even as the fisheries' activities returned to some semblance of normalcy, this was different from the old times when the operations had worked according to a different rhythm, investments, and logic. Even the fish processors admit that the state of affairs as it existed in the post-lockdown period was not typical; they are having to make a number of changes and adaptations to their businesses, and this has been the case with everybody in the sector, from the producers down to the consumers. Similarly, the supply chains – especially for industrial fishmeal production – remained

suspended, so it was difficult to map the movements of fish in this value chain and how they have evolved over the years. Social distancing norms, coupled with a steep rise in fuel prices, have meant that the cost of transportation and other essential trade-related goods and services have gone up. This too has had an impact on the womens' business, mobility, and ability to respond to the interviews from a long-term perspective. For the field staff, social distancing norms meant that visits to landing centres and especially markets for data gathering were difficult and frequently not feasible. Even on the few occasions they had managed to go to the markets, the conditions were so uncertain and the arrangements so haphazard that they could not make much sense of the data thus obtained.

This means that drawing conclusions based on the data from 2020-21 to be applied over a broader period could potentially give a lopsided picture, and not representative of the overall trends; the fishers' and fish processors' immediate concerns and needs in the face of long periods of lockdowns and lack of income affect the quality of their responses.

Going beyond the Covid 19, it needs to be kept in mind that dried fish traders have become more diverse in their numbers, scale, and range of operations; the extent of their dependence on fish drying itself has changed drastically over the years, and from place to place, which makes drawing any firm conclusions applicable across the board is neither easy nor always accurate. This study does not arrive at any clear conclusions or suggest clear recommendations relating to the future of the dried fish trade. Obviously, this owes to the limitations of the study itself, but – it is suggested – it also owes to the increasing levels of flux and fluidity that characterise the livelihoods of small-scale fishers and fish processors. In a system where occupational fluidity has become the norm, it is necessary to keep in mind that drawing any firm conclusions – and recommendations thereof – is liable to be a delicate and frequently doubtful proposition.

The weakest part of the study is the numbers, or lack thereof. The available figures – of the fish landings in different fisheries (mechanised, small-scale); fish going into different value chains; fish values from landing all the way to the consumers; numbers of people involved (including intermediaries and their stakes) in different value chain activities; investments and returns – are either not available or recent, or (where available) unreliable especially at the individual community/activity level. Efforts at collecting regular statistics as part of this study were constrained by logistical constraints and even more by Covid 19 imperatives. Given the seasonal fluctuations and the difficulties in arriving at reasonable numbers, or proportions, of fish going to different value chains, it has not been possible to find a satisfactory way to present the findings (in particular, about the dried fish production and fishmeal production from the fishing harbour catches) without raising more questions than providing answers. Hence, despite an obvious need to provide a quantitative perspective to the dried fish trade, numbers were avoided rather than using whatever was available, which could potentially be misleading. DFYWA, however, intends to redress this gap in its future work and focus on the current data collection systems from a methodological perspective as well as from the practical perspective (i.e., the validity of the available numbers).

Lastly, the issue remains sensitive and even controversial in the mechanised sector when it comes to fishmeal demand and supplies. Thus, for instance, in places like

Kakinada, whose 'speedboats' could be supplying a sizeable proportion of the fishmeal-grade catches to the fishmeal industries, the fishers become quite reticent to discuss the issue and, when provoked, they even turn aggressive. The fears of government regulations being applied to their bycatch activities make them wary about discussing this issue. An important conclusion that could be drawn was that the mechanised trawlers, especially the 'speedboats,' were depending on the fishmeal trade for a larger proportion of their earnings than ever, but the issue was less about the diversion of fish supplies from human consumption cycles to animal feed, and more about the fisheries management implications of its capture, seeing that a large proportion of fishmeal may be being constituted by juveniles and younger fish of commercial value. The reticence of the mechanised sector to engage with the study meant that it could only scratch the surface, pending more rigorous investigations later on.

6. DRIED FISH PRODUCTION AND TRADE: AN OVERVIEW

6.1. SETTING THE SCENE: DRIED FISH TRADE IN ANDHRA PRADESH[2]

Historically, dried fish production had been a critical factor in the development of marine fisheries on the east coast of India, even more so than the arrival of ice at a later period. Dried fish allowed people to move from fishing for subsistence to fishing for markets. By ensuring that fish could be stored for longer durations without spoilage, dried fish allowed the fishers to land bigger catches and move beyond their local markets to sell their catches. The ability to keep fish for long periods and access distant markets allowed the traditional fishing boats to get bigger and fishing gear more diverse and versatile, to target shoaling fish like sardines. Such fish had hitherto been little exploited (or caught only as bycatch) for lack of local demand, but could now be salted and dried for sale in the interior/upland markets within the state and in the inter-state markets (e.g., Kerala, Odisha). Ice would speed up the movement of fish even more at a later time, but there is no denying that the 'globalisation' of fish trade began when the fishers learned the art of drying their catches.

For a long time, dried fish continued to be an important motor of the small-scale fishing economy. Large fortunes were made in dried fish trade, and some of the richest people in the fishing villages tended to be dried fish traders, who were also (i) the primary financiers for fishing operations and (ii) the largest employers in the communities, recruiting both men and women in sizeable numbers in the processing and trading activities. The beaches became more than a place to land catches, berth the boats and store the nets; they acquired an economic value as they enabled drying large quantities of fish and were accorded due respect for that reason. Although notionally common property, the large processors frequently laid claim to large swathes of beaches for fish drying, and the villagers acquiesced because they too benefited from the large-scale processing. Also, with large areas of open land surrounding many villages, the medium and small-scale processors had no problem finding vacant spaces for drying purposes. "The smell of drying fish pervaded our world every waking moment of the day," reminisced a retired fish processor in

[2] Source: Key informant interviews with senior fishers in Uppada, Pudimadaka, and Kaviti Mandal.

Uppada. The Colonial administration placed much importance on the revenues from the sale of salt and had set up salt selling facilities – the 'Petty Yard Offices' – in many fishing villages specifically to cater to the curing and drying industry. The Petty Yard Offices survived into the 21st Century, manned by the Department of Fisheries officers, even though their work programmes no longer included selling salt.

Fish smoking in the Godavari delta

Fish smoking is an indigenous processing method found in different parts of the world. The Godavari delta was endowed with abundant catches of shrimp and estuarine fish like mullets around the year, but it was also characterised by numerous creeks crisscrossing the area and making transport to the mainland difficult. The fishers needed a means to keep their catches for extended periods before transporting and selling them in the markets. Drying was not an option on the fertile Godavari delta land, and in any case, the estuarine swamps were not conducive to drying fish. However, the mangroves offered ample firewood and the coconut plantations in the delta had a lot of coconut waste on offer. Thus, driven by the local exigencies and local resources, the women processors developed a smoking system by converting small huts into smokehouses to smoke shrimp and fish using mangrove wood and coconut husk for firewood. The resultant product lasted longer and also had a unique flavour sufficiently attractive to develop a niche market of its own, allowing it to survive – albeit in dwindling numbers – well into the 21st Century.

The dried fish products from northern coastal Andhra Pradesh found their way to markets all over the country, from Assam in the northeast (and beyond, going to Bangladesh through clandestine channels), and Kerala in the southwest. Well into the 1990s, pickle-cured sardines, mackerels, and sharks would be packed in bamboo baskets and sent to Kerala, while salt-dried (e.g., ribbonfish) and plain dried products (e.g., anchovies) went to Odisha and the tribal belt. Closer home, the inland agrarian communities and the upland tribal communities were major consumers of dried fish, it being the cheapest source of protein they could afford. Special weekly markets developed at strategic locations –Nakkapalli and several others in Andhra Pradesh, Humma in Odisha – which acted as the collection and transit points for bulk movement of dried fish across state borders.

Some of the common weekly fish markets where the women processors in the study area sold their products included:

Day of the week	**Market**
Sunday	Peddapuram, Amalapuram, Dhawaleswaram, Tadepalligudem, Tuni, Renigunta, Humma (Odisha)
Monday	Mummidivaram, Jaggampeta
Tuesday	Draksharamam, Kothavalasa,
Wednesday	Ambajipeta, Muramalla, Kakinada (wharf), Pusapati Rega,
Thursday	Kakinada (wharf, small-scale); Yeleswaram, Chandolu (Chirala)
Friday	Nakkapalli
Saturday	Manapuram

While large-scale processors frequented the weekly markets more, the medium- and small-scale dried fish processors covered towns and villages within a 50-100 km radius, selling fish mostly in door-to-door sales. However, despite a reasonable demand, dried fish could not account for *all* the fish landings in an area. Dried fish's orientation towards predominantly poorer consumers had a positive nutritional implication for them, but it also meant that the quality of the dried products remained consistently poor, as incentives for quality improvement were non-existent. Poor infrastructure and drying practices in insanitary conditions (especially by the roadsides) and under-processed product resulting in obnoxious smells, low storage life, and maggot infestation, put off the upper segments of society from dried fish, thus further reducing the incentives for improvement. In a state like Andhra Pradesh, with a low preference for fish consumption (unlike in other states like Odisha, Tamil Nadu, or Kerala), the poor quality of the dried fish further reduced the options for its wider acceptance, especially among the upper and middle classes.

The existing dried fish markets were constrained by limited demand- and price-elasticity, which meant that the arrival of glut landings posed a major problem: even if the processors could make all the landings into dried fish, it only contributed to depressing the demand for human consumption and actually led to losses. Even now, processors complain that bulk landings are as dangerous as nil landings. It made more sense for the processors to use as much fish as they believed could be absorbed by the markets for human consumption, dump the surplus catches in large pits, and bury them to avoid the stink.

During the 1970s and 1980s, the dried fish trade entered a new phase when the surplus landings began to be reduced to fishmeal to cater to the newly emerging poultry sector and, later, to aquaculture (first freshwater and then brackish-water). Before this period, a small proportion of the fish used to be made into fishmeal for local poultry farms, but the demand had been small. The dried fish traders – who were engaged in a perpetual struggle with glut landings – found in the fishmeal a big opportunity. Now, all fish that was landed could be made use of either for human consumption or for poultry/aquaculture consumption. The income from the latter might not be comparable to the former (it never was nor would be), but it meant (i) there was no more wastage and (ii) the lower margins from fishmeal were compensated by higher turnovers. Almost all large processor-traders in the fishing villages turned to producing both dried fish (for human consumption) and fishmeal (for animal feed).

Fishmeal production using the marine catches depended on two sources: (i) the low-value by-catch ('trash') from the trawlers and (ii) the glut landings of sardines and other low-value small pelagic species from the rural/remote landings. Of the two sources, the trawl bycatch was by far the more reliable because it was sizeable, available round the year, and comprised fish that weren't frequently (but not always) fit for human consumption.

Dried fish and fishmeal production came to coexist in a mutually reinforcing manner, especially as the same set of people were doing both. All processors who were interviewed for this study were clear that fishmeal could never compete with the dried fish for human consumption in terms of unit value realisation. There have been a few instances when the boom in the shrimp aquaculture (in the 1990s, and again in the first decade of the 2000s) led to sudden increases in demand for fishmeal, resulting in more of the small pelagic catches and the trawl bycatches going into animal feed,

but the demand did not last long and had little impact on the dried fish production for human consumption anyway.

A more radical transformation occurred in the 1990s, when ice made its entry into many of the coastal points in the study area (the fishing harbours at Kakinada and Visakhapatnam had access to ice even by the 1970s, but its usage had remained confined to shrimp). Ice brought truly transformative change and practically rewrote the rules of the game. It is ice that has had the most significant consequences for the dried fish business. Ice allowed fish to be kept fresh for extended periods, and together with improved and faster communication and transport systems (entry of ice coincided with India's economic liberalisation programmes in the early 1990s), it brought a number of new players into the sector. New traders and trade relationships, facilitated by generous fish-for-credit arrangements ('advances'), meant that the fishers could now sell their fish immediately after landing for unbelievably high prices that the dried products could never match.

For a while, a somewhat arbitrary barrier existed between fish that would be iced and sent to ex-state urban markets (which included larger species like seer fish, pomfret, sea perch-*Lates calcarifer*, snappers, croakers, etc.) and the smaller and cheaper fish (like sardines, mackerels, ribbonfish, eels, mullets) which continued to be dried. However, by the late 1990s, ice made inroads into most coastal areas and many hitherto-dried species entered the fresh fish markets in iced condition. It also meant that small pelagic species like sardines, which had been a mainstay of fishmeal supplies, also found a good market in iced condition in Kerala, thereby confining fishmeal supplies mostly to trawl bycatches.

The economic benefits from the change to fresh fish trade were sizeable – fresh fish fetched several times the price of its dried equivalent and, moreover, was less labour-intensive and more immediately remunerative compared to the dried fish – and it was clear that the use of ice would only increase thenceforth, to the detriment of the dried fish trade[3]. Also, bringing in new male players and new trade arrangements into the picture marginalised the women fish processors from the mainstream fishing economy.

Overall, in recent times, there are grounds for saying that the importance of the dried fish declined at the sectoral level, at the community level, and at the individual level; and it continues to decline further. Most actors in the sector - fishers, fish traders (including women fish vendors), and consumers – prefer fresh fish to its dried version. The continued relevance of dried fish in certain pockets is ascribed to the lack of access to adequate amounts of ice and icing systems: once ice would reach the villages in a consistent and sustainable way, the dried fish activity would likely see a slump, as evidenced from examples in several other areas. The once-thriving weekly dried fish markets are a lacklustre affair nowadays, handling only a small proportion

[3] Interestingly, iced fish faced (and continue to do so in several places) significant resistance from the consumers in many parts of the country on the assumption that only spoiled or semi-spoiled fish would be iced. The traders resorted to practices such as removing the fish from the ice a few hours before selling and sprinkling sand on them to make it appear that the fish had come direct from a landing centre. Such tactics eventually allowed the consumers to come to terms with ice.

of the dried fish that once passed through them. The women who continue to remain in dried fish production and trade have recounted several examples of ever-increasing odds they face to access fish; to process them; to transport them; and to sell them.

This gives rise to a fundamental question: is dried fish trade still relevant in today's and, especially, tomorrow's world? Increased demand for fresh fish in the markets (as well as a range of other factors at work in reducing the processors' stake in the fisheries), coupled with the new hopes and aspirations among the younger generation (whose plans encompass anything but fish, let alone dried fish), makes this a rather big question. Does drying have a future or is it on its way to becoming redundant – like the wooden log-catamarans, cotton nets, beach seines, and bamboo baskets – all of which had themselves been an important component of a system that supported the dried fish business and which have become, or are in the process of becoming, obsolete?

That is not to say that dried fish has disappeared, or even gives the impression of being on the verge of doing so. As this paper will show, dried fish continue to be made and sold and consumed in good quantities. In remote locations, such as the villages in Srikakulam, dried fish production still remains a major livelihood- and income-generating activity to the women, and an important strand of the fishing economy in the area. Even in other areas like Uppada, dried fish continues to be made from beach seine catches and glut landings of sardines. One factor that seems to keep most processors in business is the strong demand for dried fish that still persists in their traditional markets: the interior and upland communities. While not exactly a premium market, the demand seems to be able to compensate for the additional effort and expense that dried fish increasingly requires of the women. So if the dried fish business does not make the women rich, it at least makes sure that they can continue to make a living based on it. So long as this equilibrium lasts, and there are no better alternatives that the women can move into, dried fish will continue to prevail.

More immediately, dried fish continues to support a sizeable number of livelihoods (both direct and indirect): although numbers are hard to come by, there still exist a sizeable number of women depending (either solely or secondarily) on dried fish trade. Also, despite its weakening economic importance, dried fish still has an important food security function, not least for the fishers themselves who can no longer afford to eat the prime fish they catch and have thus come to depend on cheaper alternatives (which include dried fish) for their consumption needs. Finally, by accounting for the surplus catches that cannot be absorbed into the other value chains, the dried fish systems contribute to reducing food loss and wastages in the system. No matter what the future might hold for dried fish, these considerations would require that the activity be supported meaningfully for as long as it continues to provide such services into the future.

There have been few institutional efforts in the recent past to improve the activity or the people involved in it, and it is necessary to highlight the need for more efforts in this respect and also to indicate the directions in which those efforts should go.

6.2. CATEGORIES OF DRIED FISH PRODUCERS AND TRADERS IN COASTAL ANDHRA PRADESH

Dried fish producers and sellers are a heterogeneous group, based on the nature and extent of their involvement in the trade. Within the fishing communities, they include:

1. **Fresh fish sellers**, who use leftover fish from a day's sale for converting to dried fish. The vendors prefer to sell all their fish in fresh condition as far as possible, resorting to dried fish making only when it is unavoidable. Naturally, the quantities of dried fish produced in this segment are small, and the women sell them alongside the next batch of fresh fish to the same customers. The quality of the raw material being poor in the first place, the product too is seldom of a good quality; on the other hand, the fish used in drying tends to belong to a prized variety, i.e., it has a ready market.
2. **Fresh and dried fish sellers**: the women switch opportunistically between dried and fresh fish seasonally and/or depending on the availability of particular species. Thus, during monsoon months, several women sell only fresh fish; during January-April months, the same women make dried fish when good quantities of small pelagic catches are landed in the village. On a day when there are good beach seine landings, some of the fresh fish sellers buy small quantities of fish for drying and sell them in the markets or to the large-scale operators.
3. **Medium-scale dried fish processors**: These are women who might, at one time, have depended on the surplus local landings for drying, but who now source their supplies from the fishing harbours or, less frequently, from the neighbouring fish landing centres. To save costs, they work in a group to procure fish from the fishing harbours and bring it to the village, where it is shared and processed by each woman, for individual sale. Depending on the distance to the markets, the women either store the dried fish at home and carry small quantities daily to the markets or carry the entire lot to a market-village and spend several days there until the load has been sold. Also, depending on contingencies, the women would sell their product to large processor-traders within the village which pays less but reduces the cost, time, and effort required to sell in a distant market.
4. **Large-scale dried and fishmeal producers and traders**: these tend to be large-scale operators, involved in round-the-year operations of making and selling dried fish for human consumption. Depending on the availability of catches, the large scale processors divide a part of the catch for drying for human consumption, and use the rest to be spread on the beaches and other common areas to be reduced into fishmeal. They tend to work in villages with large fishing fleets operating small-mesh gillnets (for small pelagic species) and/or beach-seines, and increasingly near fishing harbours where fish is abundantly available. They also source finished products from distant areas (e.g., Balasore in Odisha) when the local supplies are not available, to keep the business moving forward at all times. The dried products are sold in wholesale markets, or – in more recent times – directly sent to wholesale buyers (usually based in a town); conversely, the traders come to the villages bringing their own transport systems to collect the product. Some of the buyers may provide advances to the processors, though the system of giving advances for dried fish is dwindling in all study villages.
5. **Fishmeal producers**: these are mainly present at the fishing harbours, and less widely in rural landing centres like Uppada and Pudimadaka, where they tend to buy cheaper, but bulk-landed, fish from the mechanised and motorised boats and make into fishmeal for sale to poultry and aquaculture farmers. A part of their

catch may go into dried fish, but fishmeal tends to be the mainstay of their business. The fishmeal tends to be either fully dried or semi-processed; in both cases, the buyers process them further and clean them before adding it to their own feed formulations at the farm level. The pathways followed by the fishmeal are frequently a mystery to the fishers and fish processors, unlike in the case of the dried fish made for human consumption where the processor-traders have at least a faint idea of their final destinations.

6. **On-sellers**: Some small- to medium-scale traders reduce their labour and investment risk by purchasing fully processed fish from a large-scale operator or from a fishing harbour (including from the fishing boats themselves of the onboard dried catches), and then use it for onward sale. These women buy a lot of fish for storage at their homes, and carry small quantities of it around to their markets for daily sale. Sometimes, they also act as wholesalers themselves – buying large quantities of dried product at the fishing harbours, and then sell it in small batches to small-scale traders. Occasionally, they purchase semi-processed fish (i.e., salted but not dried; or dried only partially), which are further processed and then sold.
7. **Onboard dried fish processors**: Most mechanised trawl boats carry salt onboard and the crew – who get a substantial share of the returns from dried fish – try to salt the better fish from their catches which would then be sold for processing after landing. Fish like anchovies, dried onboard without salt, fetch astronomical prices when landed on account of their fresh quality and contamination-free drying at sea. A mechanised boat crewmember could receive up to a third of his income from the sale of semi-processed and dried fish alone.
8. **Smoked fish producers**: the smoked fish producers tend to be exclusively involved in smoking operations and not in fresh or dried fish trade. There are some niche markets for smoked products and the women carry their products in bamboo baskets for sale. The activity is widespread in the Godavari delta, but most processors tend to be small-scale operators. An interesting aspect of the smoked fish is that, though it has a fairly lucrative market within its particular geographic area, it remains practically unknown outside of it.

Besides the women directly involved in fish processing, there are also a number of women involved as **processing assistants** who work on a daily wage basis. Usually, they tend to be housewives with a poor asset base. They work in a range of occupations, depending on whichever option is readily available to hand, including fresh fish trade.

It is also necessary, in the list of dried fish actors, to include the providers of equipment, material, and services: (i) **sellers of salt, equipment, and bamboo baskets; (ii) packers of dried fish** (iii) **private transporters** (rickshaws, vans and autorickshaws) who bring fresh fish from distant procurement centres and dried fish and the processors to the markets and (iv) **fish head-load carriers** who carry fresh fish from the beaches to the processing areas and finished product from processing areas to the trucks and transport systems.

A final and important category of the value chain actors exist beyond the fishing communities – **wholesalers, commission agents, retailers** – who are a critical component of the system. Many of these are men, and they procure their materials from diverse supply sources. They could not be covered by this study for logistical and Covid 19 reasons.

The point to make here is that all such people are usually not consistently recognised among the dried fish actors, but they are as dependent upon the dried fish economy as the processors themselves. Thus, for instance, the lean periods (including seasonal bans on fishing) affect them just as badly as they do the fishers and fish processors. The relationships between the traders and the producers also tend to be more than plain business transactions, and characterised by more complex, even cordial, mutual dependencies; contrary to conventional characterisation of such relationships, they are neither exploitative (at least not always) nor is their power balance always tilted to one-side. A more nuanced and balanced assessment of their relationship remains to be undertaken.

The heterogeneity among the dried fish value chain actors means that the needs and requirements of different actors tend to be different; an understanding of the people's diversity of activities, needs, and aspirations is necessary to make meaningful interventions, rather than apply one-size-fits-all solutions across the board.

6.3. CATEGORISATION OF DRIED FISH PRODUCERS BASED ON SCALE OF OPERATIONS

Based on the scale of operations, the dried fish producers can be classified into three (but not entirely watertight) categories:

A. Large-scale processor-traders:

- Usually handle large quantities, for both dried and fishmeal purposes
- Employ labourers, on a daily wage basis, based on the quantum of catches to be processed
- procure both fresh and dried fish from other locations and/or producers within the village for processing and/or direct onward sale
- have own arrangements and infrastructure for the procurement, processing, and storage of the dried fish, and for its transport to the markets
- sale of fish in wholesale markets or directly to the traders – the latter may, on occasion, also arrange to pick up the product directly from the processing yards
- Investments and returns are difficult to quantify, even by the processors themselves. In general, investments of Rs. 5 to 10 lakhs[4] are quite common. But it needs to be kept in mind that the fishers usually sell their catch on a credit basis, so the women could process and sell them, realise the money before actually paying the fishers. This means that there is literally no limit to the investment that a woman could make; because she doesn't always need any! All the same, the extent to which the fishers are willing to lend depends on the creditworthiness of the women, who bear the risk of having to pay whether or not they manage to turn in a profit.
- Although estimates vary widely, the income of the large processors can range from about Rs. 1 lakh per month (reported in Kakinada fishing harbour), going even up to Rs. 5 lakh in Visakhapatnam fishing harbour. The traders with whom these women generally deal have turnovers running into tens of lakhs of rupees. But such high numbers must be taken with a pinch of salt because the margins of trade

[4] One lakh is equal to 100,000

could swing quickly and hence carry high levels of risk; also, overall, the margins may not always be comparable to those prevailing in other trades when issues like seasonality, supply-demand/price fluctuations, investments, and opportunity costs are factored in.

B. Medium-scale:

- Handle both dried and fishmeal production, though mostly the former; these are mostly rural producers.
- Employ a few labourers, mostly involving family/kin, though wage workers too are employed.
- Procure fresh supplies from diverse sources (fishing harbour, the local and neighbouring fish landing centres) for processing and trade
- Limited infrastructure: dependent on traders and/or large local processors to provide support with the processing and (especially) trade.
- Direct sale at weekly markets or centralised marketplaces – both wholesale and retail – payment usually cash down, but occasionally (depending on the buyer) credit is allowed – about 30% of the sales usually involve credit transactions.
- Investments run up to Rs. 50,000 to 1 lakh; while in some villages the procurement is made based on credit, in others, the women must compete with others in open auctions and must pay the agreed amount on the spot. In case of purchases in a harbour, if the sellers and buyers have prior market links, credit may be allowed, but the women will have to forego a customary 10 percent discount that applies to sales involving ready payments.
- Average incomes run to around Rs. 10-15,000 per month.

C. Small-scale:

- By far the largest contingent of dried fish producers; nonetheless, collectively, their overall contribution to total dried fish production remains quite small.
- Usually, these are fresh fish sellers doubling as dried fish traders as a last resort, using fish that have remained unsold for the purpose.
- No wage labourers employed, work with family members or solo.
- Procurement is intended for fresh sale, except occasionally when customers specifically request dried fish of a particular variety.
- Little infrastructure for processing – makeshift and ad hoc arrangements will cover the need.
- Sale alongside fresh fish, usually cash down (regular customers may get credit).
- Average investments on dried fish vary because they depend on the unsold catch; average income from dried fish comes to around 10 percent of their income from trade, around Rs. 1000-2000 per month.

6.4. IMPORTANT SPECIES OF FISH USED IN DRIED FISH PRODUCTION AND TRADE

In the Visakhapatnam fishing harbour, the field work identified some 82 fish species being landed. Of these, the fish that traditionally catered to the dried fish markets were:

Round the year	**Seasonal**
1. Ribbonfish 2. Goatfish/threadfin breams	1. Sardines 2. Anchovies

3. Croakers 4. Silver-bellies 5. Paste shrimp (Acetes spp.; Kooniroyya; Royyapottu) 6. Anchovies – *Engraulis* spp. 7. Eye scad (Telugu. *Onugu*) 8. Soles	3. Mackerels 4. Rainbow sardines (Telugu. *moravalu*) 5. Catfish (Telugu. *jella*)

6.5. SOME SOCIO-ECONOMIC CHARACTERISTICS OF THE DRIED FISH PRODUCERS

Based on the fieldwork, a quick attempt is made here to characterise a typical dried fish producer based on some broad socio-economic indicators.

Gender

The majority (>95%) of the dried fish processors are women. An important point about the dried fish trade is that, unlike ice, it reinforces the gender-based division of labour that has existed in the traditional fishing economy. Women who are the main conduits for selling fresh fish in the neighbouring villages can undertake dried fish production and trade – and vice versa – without upsetting the prevailing social arrangements. Women dominate both the regular dried fish markets and the weekly wholesale fish markets; only when fish move over long distances do the women give way to men owing to difficulties in long-distance travel. From the wholesale markets (daily or weekly), once the fish moved beyond the market, it is again the men who travel inland and distribute the products widely. This raises the possibility that the idea of equating dried fish to women, while valid to a significant extent, may run the risk of overlooking the existence and the contribution of a minority of men in the subsector.

Age

The average age of the fish processors ranges from 40 to 65, and this has an implication for the long-term sustainability of the activity. Women over 65 are obviously too weak to carry on with the hard and strenuous work of fish drying. However, the absence of people under 40 makes an important point: *younger people are not interested in coming into the business*. Most existing processors have reported that they entered into the business around the age of 12, when they started by helping their mothers in the activity, and got more fully involved in the business after their marriage, which happened around the age of 14 to 16.

A few things changed when it came to the time of their children, the most important of which is that most children have gone to school for a period ranging from a few years to until the end of their local studies, or even beyond. One consequence of rising educational standards has been that the youth disdain dried fish (and even fishing itself) as a low-status activity and aspire to new options – given that there are few hopeful signs that dried fish business will yet become a lucrative activity, their unwillingness to join their parents in the business is not without foundation. It implies that fresh recruitment into the ranks of dried fish processors has dried up (helped further by the desertion of fish drying by a number of women who prefer fresh fish vending instead).

Marital status

Whereas fish trade – both fresh and dried – was once considered primarily the domain of single, poor and/or aged women, nowadays a few married women have also begun working. This reportedly became necessary on account of the declining incomes from fishing that their menfolk bring home. Another important factor is the migration of men from the coastal fishing villages to distant places like Chennai, Gujarat, and Goa, leaving their families behind. As the monthly remittances from the men tend to be intermittent, irregular, and frequently insufficient to meet the family needs, the burden of running the family falls upon the shoulders of women who – being closest to the sea and the fish – take up fish business as their first choice. This obviously increases competition at both the landing centres and marketplaces, but the women have no other choice. As indicated, the first choice of the women is always fresh fish vending, but – depending on the choices available – they also work as dried fish processors or, more often, as processing assistants.

Caste

In northern Andhra Pradesh, dried fish processing – like several other aspects of fishing – has largely remained in the hands of the traditional fishing castes (the *Vadabalijas*, the *Jalaris*, and the *Agnikula Kshatriyas* or *Palles*). Once the fish moves beyond the village, or where ancillary activities like basket weaving are concerned, the actors tend to belong to other castes and communities, but the actual process of dried fish making is a caste-fishers' occupation. Some labourers may occasionally be recruited from the neighbouring agrarian communities, but even such instances are few. Fresh fish trade reportedly attracts more women from non-fishing castes or inland fishing castes: *Nyla*, *Eeta*, *Yadava* etc. – but they tend to go to the fishing harbours, not the traditional landing centres, for their fish supplies. Overall, there is no evidence of outsiders coming into dried fish trade, and given the current state of dry fish, it is unlikely that the activity will attract any outsiders in the near future.

Literacy

Most of the women involved in dried fish processing are characterised by low (or nil) literacy[5], but they have good knowledge about all aspects of their business: supplies, processing, markets, and support systems. Thus, even as they find themselves unable to identify sustainable long-term adaptations to cope with the challenges to their existing livelihoods, they still have an enormous knowledge based solely on experience – relating to the fish, processing, markets, and consumers – that has not been tapped to its fullest potential. While themselves not literate, they are however unanimous in their emphasis on their children going to schools and moving on to better occupations.

[5] The women however are good at numbers; the conditions of the business – both procurement and sale – require them to be exceptionally numerate. Buying fish based on just eye-estimates and in a rush and selling the products by random measures such as heaps and fistfuls, would require the women to be astute enough to work out the economics of their business on their feet and without even articulating them aloud.

Investments and earnings

The study could not go deeply into the quantitative information regarding the dried fish activity on account of the Covid 19 pandemic and its disruption of the normal business cycles. However, the difficulties in assessing the average investments and earnings go much deeper and may have to be accepted as part of the system itself. This is owing to the nature of the resource that the women are dealing with. The perishability of the fish, the uncertainties in terms of how much is landed by a boat (or in a day), the extent of competition for the fish, and the market factors, make pricing quite volatile, and investments uncertain.

In remote landing centres (in Srikakulam district), fish are sold on a credit basis, allowing the women to process the fish and sell it first before paying back the pre-agreed price to the fishers. This flexibility in payment allows the women to buy almost any quantity of fish that is landed (and gives assurance to the fishers that they could sell any amount of catch they may land) – although the women frequently complain about having made a loss in the market and being forced to pay the fishers as per the agreement. In the urban and rural landing centres, where the women must pay cash immediately upon purchasing their supplies, it is easier to get a handle on their investments, though that by itself is not going to help in assessing the varieties and quantities of fish purchased or the eventual earnings from the investment. The nature of the system demands that the markets operate flexibly, which means that there are few standards for pricing and payments. Thus, a fish processor-woman could procure almost 240 kg of fresh fish from Visakhapatnam fishing harbour for a total investment of Rs. 15,000 on one day, and the same woman could hardly manage to buy 170 kg of supplies (of a similar composition as the previous week) for the same investment a week later. Interestingly, in both cases, she earned roughly the same amount of money.

The interactions with the dried fish processors in groups and individually indicate that their incomes are probably higher than those working as agricultural labourers (which is the one non-fisheries-related activity that most women often move into). The processors compare their higher earnings against two additional factors: more workload (requiring up to 10-14 working hours a day) and higher risk (there are as many cases where the women made a loss as there were when they made a profit). The issue of risk in the fish business – a subject that has never really been studied to any great depth in relation to small-scale fish marketing – is of uncommon significance in case of the dried fish processors.

As far as earnings are concerned, the women's contention is that while the markets have been adequately compensating for the declining production, it is just enough to help the women to (i) fill the gap in the men's earnings at home and (ii) keep up with the new needs such as the children's education etc. In other words, the earnings allow the women to keep afloat while not exactly giving them enough either to save or to invest in their businesses (let alone in new enterprises).

For the large-scale processors, whose incomes are reportedly higher, the risks offset any increased earnings; as one large processor in Srikakulam district put it, "*We are just happy to get our investments back, profits can come later!*" Despite this, the large processors continue with processing because, they explain, they have already invested a lot in it and would not be able capitalise their investments and invest in

something else ("*But what else is there?*")[6]. The medium-scale processors could not move on because there are no alternatives, while fish drying at least allows them some earnings and allows them to stay in their villages instead of migrating elsewhere. The small-scale processors have largely moved into the fresh fish trade and use only the leftover fish for drying, and even that only as a last resort.

7. AN ASSESSMENT OF THE LIVELIHOOD CONTEXT OF THE SMALL-SCALE FISH PROCESSORS IN ANDHRA PRADESH

Based on the interactions with the women dried fish processors, this section attempts to highlight some of the issues having an impact upon their lives and livelihoods.

7.1. CHANGING AVAILABILITY AND ACCESS TO FISH

The availability of, and access to, fish of the right variety and quality to make into dried fish has been declining significantly over the years. In Visakhapatnam fishing harbour, where according to the local processors, 70 percent of the landings went into dried fish in the 1980s, only about 30 percent go into it now (with a third of it being accounted for by fishmeal). The decline is steeper in rural landing centres like Uppada and Pudimadaka which were once thriving dried fish producing centres, but now allow only 5% of their catches to go into drying. In the remote villages of Srikakulam district, the quantum of supplies for dried fish trade has remained more stable, but this is reported to be mainly on account of ice not yet reaching the villages to the required extent. In any case, even here, the women frequently make trips to Vizag fishing harbour (over 250 km away) to procure the supplies they cannot get from their own landing centres.

The usual explanation offered for the non-availability of fish is that the catches are declining, especially in the inshore waters. Fish are no longer available in sufficient quantities to meet the needs of all fishery value chains, so some value chains – e.g., those catering to ex-state/urban markets – may be doing better at the expense of others like dried fish production systems. There is clearly a decrease in the varieties of fish used in drying, and also in the size range of the important species (e.g., ribbonfish, catfish, eels, and mullets) made into dried fish.

However, fish declines alone do not explain the change, not least because the declines are not uniform across species or across time. The species that show the most declines are reportedly the high-value varieties in which the dried fish value chain has no interest anyway. In fact, catches of traditionally dried fish like sardines and ribbonfish may have increased in the last decade due to new fishing methods like ring seines. Also, going by the fishers' own estimates, the overall catches have been more or less stable in the last decade, as evidenced by the relative stability of numbers of fishing boats in places like Kakinada, Visakhapatnam, and Srikakulam.

[6] There is also no denying that the large processors do make good profits, and an occasional killing, on account of their ability to handle large volumes and sell them directly to the wholesalers.

Thus, while catch declines may be accepted as one contributing factor for the declining availability of fish for processing, the fishers also point to a few other developments – technological, market-related – that must be taken into account.

Firstly, many small-scale fisheries have come to be focused on high-value fish, which they can do owing to the availability of a wide range of fishing nets. There is evidence that the motorised FRP fishing boats have been shifting to new, more species-specific gears to catch high-value fish at the expense of the low-cost fish on which the dried fish activities depend.

In Pudimadaka, most fishing effort has switched over to long-lining for high-end fish (yellow-fin tuna, marlin, skipjack, little tunnies, sailfish, swordfish, marlins etc.), reducing the availability of small pelagic shoal fish like sardines. Fishing practices in the Godavari delta switched from estuarine nets targeting fish used in making dried/smoked fish (e.g., mudskippers) to more shrimp-specific fishing gears for higher incomes.

In Pudimadaka, as against dozens of large processors who operated in the village in the late-1990s, there are only six families currently involved in dry fish production. There are 50-60 small traders involved in dried fish selling, but they source their supplies from the six producers, or buy finished products at Nakkapalli weekly or market or the Vizag fishing harbour, or use the leftover fish from their fresh fish trade.

This indicates that the declining availability of fish for the women processors may well be **due to the non-capture of particular fish species rather than to a decline in** fish stocks. The specialisation of fishing efforts to target high-value species means that a bulk of the fish landings in most rural fish landing centres are not appropriate for the women's needs; they are either too expensive , or their markets are elsewhere. The specialisation of effort is also complemented by the decline in the numbers of beach seines in most villages, which were once a major source of supply of fish for processors. Consequently, the women are forced to travel long distances to fishing harbours to procure their fish. The **concentration of fish landings to fewer areas** (discussed in the next section) also meant the access to fish to the local fish processors has come down.

Next, the fishers suggest, in rural and remote landing centres of Srikakulam, the decreased landing of fish could be owing to **a large proportion of the fishworkers (over 50 percent in a number of villages) having migrated** to distant places like Chennai, Gujarat, and Goa to take up work on mechanised boats, among others. With the existing workforce moving away and new recruitment into fishing at a low ebb locally, there is a decline in overall fish availability, including the dried fish processors.

The arrival of ice has been a major change factor in changing the course of fish movements. Firstly, it enhanced access to fresh fish for the inland communities, which had hitherto been depending on dried fish for their fish consumption needs. Once fresh fish became widely available, the demand for dried fish automatically came down. Secondly, ice also helped to foster linkages with distant urban markets which have come to account for a major proportion of the fish landings (by value, if not volume) in any landing centre. **Ice and the changing market context** meant that the varieties of fish that the women depended on for drying have moved into more lucrative value chains, going either into local or distant fresh fish markets, leaving only cheap or low-quality fish for the local fish processing. A good example is the flying fish

that landed in good quantities in Pudimadaka and once used almost entirely in dried fish production, but which has now entirely gone over to fresh fish sale in the local markets.

While the rapid increase in the numbers of ring seines might have been expected to lead to an increased availability of sardines, mackerels, carangids, and other small pelagic fish for drying, the exact reverse has come to pass in Visakhapatnam and Srikakulam, where most **ring seine catches are sent to Kerala** in insulated containers. In Kakinada, however, about half the ring seine catches are sold to the local dried/fishmeal producers, while the rest goes to the ex-state markets.

In fact, good catches of ring seines are no longer landed in the villages but go directly to the harbour where traders are waiting to buy with ice and transportation systems to carry the fish to Kerala. That the traders are willing to take any amount of the catch and pay quickly for it (unlike the women processors who will need to time to process and sell the fish first before being able to pay and who, moreover, try to bargain for a lesser payment in case of a loss). It has been suggested that the fishers' preference to land their catches at a major fish landing centre than in their village owes not only to the promise of a ready sale, but also to their wish to avoid the complications that invariably attend upon selling fish catches (on credit basis) to the local women.

The increased demand for sardines (as well as other fish such as tuna) in ex-state markets has led to **an overall increase in the value of such fish** even in the local markets, so they are now costlier than before. This situation makes their use in the dried fish processing more expensive. The dried fish processors' trade margins are so narrow that they cannot afford to rise their bids beyond a bare minimum from the average. Even the local fresh fish vending women fare better in this respect because the margins in fresh fish trade are considered to be higher. The fresh fish traders' risk is also covered by their short business cycles (which work on a daily basis unlike the dried fish business cycles that can take a week or more), and this helps to recuperate any shortfalls in a day's transactions with better returns from the next.

In addition to the above factors, a **growing number of women are also entering the business** as fish vendors and as trade intermediaries supplying to other value chains, leading to high levels of competition, less per capita availability of fish, increasing costs, and further squeezing of markets and margins. The newcomers are from within the fishing communities, whose need to find a means to earn a livelihood is readily met by the opportunity to get into the fish trade, but this has impacts for the longstanding players – like dried fish producers – in terms of squeezing their supplies and margins.

7.2. DEPENDENCE ON MULTIPLE SOURCES OF SUPPLY AND MARKETS

Fishing boats, as indicated, tend to land their good catches not at their village landing centres, but at a centralised location like a fishing harbour or a major fish landing centre in their neighbourhood. The presence of sizeable numbers of buyers at centralised places ensures that the fish get a good price and the payment is readily made, while the boat can also stock up on its fuel, ice, and other requirements. Fishing harbours like Visakhapatnam and Kakinada have come to handle fish caught hundreds of kilometres away from their location.

The fish vendors and dried fish traders have started congregating at the fishing harbours for a similar reason: the assurance of being able to procure fish of their choice, and frequently at a cheaper price than in their own village. Whenever possible, they also visit other landing centres near their village for the fish, but it is the fishing harbours that attract the largest number of buyers. Visakhapatnam fishing harbour, for instance, has people coming from all four districts covered by this study; the women from Kaviti Mandal in Srikakulam regularly travel more than 250 km by train or by bus to come to Vizag for procuring their supplies, and hire a mini-truck to carry their purchases (and themselves) back to their villages.

An interesting sidelight of the centralised landing centres is that the traders do not always come only to buy fish but also to sell their product. In some major landing centres (like Matlapalem near BCV Palem), the same processors are involved in both buying fresh fish and selling dried/smoked products simultaneously. As a result, the landing centres have also begun attracting sizeable numbers of consumers, increasing the attraction of the central landings to all actors.

While the procurement of fish from central landings assures the women of their supplies, it also means a number of complications.

- The additional expense of traveling long distances (and taking care of incidental costs) and to arrange the transport of fish in the return direction. Since it is too expensive for individual processors to undertake such a long and expensive trip, the women usually work in groups of 10 and share the costs among themselves, but the costs are still high.
- Whereas the women's fish purchases in their villages were often made on credit basis and required no ready investment of their own, the procurement at the harbour is a different matter altogether: the women must pay ready cash soon after purchasing their fish in an open auction and arrange to have it carried away quickly. This requires the women to carry large sums of hard cash on them, which adds to their fears of safety and security.
- The ready availability of fish at the harbours attracts a sizeable number of processors from a wide area, and given regional variations in the demand and supply, the competition for fish in the open auctions is intense and frequently unequal. For instance, a fish processor from the south of Vizag might find it worthwhile to invest more in a particular fish compared to her counterpart from Srikakulam district. On the other hand, the Srikakulam processors' desperation to be able to buy fish as quickly as possible and return to their faraway homes, forces the women to become incautious in their bidding regardless of their chances of being able to make a satisfying return on the investment.
- Given the distances and the need to be at the landing centres at early hours in the morning (when fish landings usually take place and also because the women must return and/or sell their fish in their own markets), the women must start in the small hours of the day (around 1 AM in many cases), and this gives rise to considerable hardships both to the processors and their family members, on account of multiple challenges and concerns.
- The shift from procurement of supplies from a local fish landing centre to a distant harbour adds considerably to a woman's daily workload – the women from Pudimadaka, for instance, spend up to six hours every day only in procuring their fish. For the women from Kaviti Mandal, a procurement trip to Vizag takes a couple

of days and involves long hours of uncomfortable traveling in vans or crowded trains.

- By far, the most difficult of the hardships that the women face is that the harbours and central landing places lack basic facilities for water (for drinking and bathing), rest, sleep, and toilet, and the women must hold all their needs until they returned home. Lack of sleep, dehydration, urinary problems, and skin problems are some of the usual problems most women fish vendors suffer from.
- The long distances involved and the poor quality of transport – fish are put in baskets and carried in the back of a mini-van or an autorickshaw – mean that the quality of the fish is badly compromised by the time it reaches the village and the women get around to processing them. The women suggest that the quality difference is such that dried fish made using locally landed fish fetches twice as much as the harbour produce; on the other hand, the higher rates of spoilage in fish brought over long distances mean that it must only be processed rather than sold fresh.
- Traveling regularly to the faraway landing centres is something that only women with access to money, domestic help (to look after the family affairs in their absence), facilities for storage (to accommodate the larger quantities of fish that justify the journey and expenses in the first place), and good knowledge of the systems, can undertake; poorer women, or those familial responsibilities, or physically not agile, find themselves marginalised from the activity.
- The market fees for selling dried fish in different markets have gone up with increased numbers of processors visiting different markets. Whereas earlier the fees were charged on a per capita basis for each processor, nowadays they are charged according to the quantum of product they bring (no. of baskets etc.), which the women complain makes the market fees a significant burden.

Alongside procuring their fish from multiple landing centres, the women processors also take their product to a number of markets. Previously, when transport facilities were poor, they were constrained in terms of visiting more than one market, which kept their opportunities for sale low. Given that a number of women tended to congregate in particular markets on any given day, the demand would slump and result in losses. Now with better transport and communication facilities, the women hire private transport in groups of five or ten, and get dropped off one by one in different villages along a particular route; and thus are able to widen their marketing range to cover many villages (not all on the same day, but on successive days).

The advantages of being able to sell in several markets are many, but so are the disadvantages. While some of these (e.g., additional expenses on travel; long working hours; lack of basic facilities for sanitation, bathing, and relaxing in markets and especially in door-to-door sale) are similar to their experiences while buying fish, there are some that are unique. For one thing, door-to-door sales depend upon a rapport between the seller and her customers; by reaching out to a wider number of potential buyers, the seller risks weakening her ties to her regular customers and gives an opening to her competitors to capitalise upon her infrequent visits. Whereas earlier the women could sell their produce on credit, now they cannot afford to do so – and many of their buyers would not be in a position to buy the fish unless offered on credit. The women's outsider status in the new villages and market places also places them at a disadvantage in relation to the local traders who have better-established rights and practices. In cases where the woman is unavoidably delayed, she cannot take the local hospitality for granted, and both economic and personal safety concerns

force her to sell her product quickly and leave as early as she can. A common problem in selling in new places is that individual traders find it difficult to obtain a return transport from a distant market location back to their villages, which is a matter of considerable worry both to the women and their families. While some processors use cell phones to communicate with their families, many women are not familiar with their use and hence face difficulties in contacting their families in case of need.

7.3. CONTESTED ACCESS AND USE RIGHTS TO PROCESSING AREAS

Fish drying requires much space and the long beaches in front of the villages offered an immediate – and free – opportunity to spread the fish and dry them. The beaches are not the best of options for drying fish on account of exposure to sand and other kinds of contamination, but given the particular conditions in which this happens, there is no better option for the small-scale fishers to dry their fish. As a processor in Idduvanipalem remarked, "It is the beaches that allowed fish to be dried in the first place. Without them, nobody would have dreamed of fish drying at all." The women processors had usufruct rights to the beaches (and any common areas surrounding the villages) to use for drying their fish and, given their economic importance to the local fishing economy, such rights were respected.

Over time, the space available for drying has become more constricted – and also contested – owing to several factors:

Erosion: Many villages in all four districts have been facing a serious problem of beach erosion, as the sea continues to encroach upon the beaches.

- In Uppada, where erosion has been a century-old problem, developments like the construction of the shipping port further south led to changing water currents and increased erosion, reducing the beaches farther to the south of the village.
- In Visakhapatnam, the new port is said to have increased erosion along the villages to the north of the City.
- In East Godavari district, upstream constructions have been cited as a reason for annual floods in the delta area, which erode large portions of the riversides.
- In many parts of Srikakulam district – e.g., Karrivanipalem and Idduvanipalem in Kaviti mandal – the coast is being eroded for a long time due to the villages' location in the neighbourhood of the openings of rivers arising in the Eastern Ghats, which are prone to seasonal flash floods.

The proposed plans of the state government for construction of more new shipping ports in the state (at the rate of one per district) and the fishers' own demands for new fishing jetties and safer fish landing places could – if implemented – also potentially increase the erosion and further reduce the space for berthing the boats, storing the nets, and drying the fish.

Green belts: In Srikakulam district, patches of the coastal areas have been identified for the development of 'green belts,' with a view to protecting the coast and the coastal habitations from cyclones while also improving the green cover in the coastal environments. Although presented, and initiated, as a community-based forestry programme, the activity – once launched – is quickly taken over by the Forest Department, which prohibits all further activities and even movements in the green

belt area to the local people. For the women, who used the land for their drying activities previously, this means a loss of drying space. In the case of fish smoking activities near mangroves, the conservation activities have made it impossible for the women to have access to even dry mangrove wood for fish smoking purposes; alternatives like cowpats give an acrid flavour to the fish, so the women have to use mangrove wood obtained clandestinely or fold up their activities altogether.

Development activities: New development activities like industries, ports, tourism, entertainment parks, and aquaculture (including hatcheries) have become by far the most prominent and intrusive presences in the coastal areas adjacent to, or right in front of, several communities in Visakhapatnam and East Godavari districts, and this necessarily results in the fish drying space being curtailed for the women processors. The coastal stretch from Mangamaripeta to Pudimadaka in Visakhapatnam, and that from Uppada to Addaripeta have been associated with several such problems.

Urbanisation: The rapid growth of urban areas like Visakhapatnam, Kakinada, Bheemunipatnam, and Srikakulam has led to a manifold squeeze upon the coastal areas:

- Firstly, they encircle and absorb the vacant land around the village (which includes the common land on which fish are dried)
- Secondly, they contribute to the land values shooting up to an extent where it becomes attractive to the villagers (or their leaders) to sell or otherwise alienate the community lands for a tidy profit. Frequently, the government also steps in to acquire the land for development purposes, in which case the fishers have little say in the decisions.
- Thirdly, the growth of urban sprawls leads to increased pollution and sewage problems, affecting hygiene and sanitation all round.
- Finally, the women face stiff resistance from the administration for drying their fish on the beaches which have been developed as tourist attractions and are consequently swamped by large number of urban dwellers at all times for leisure activities.

Examples include: Suryarao Peta (near Kakinada), Mangamari Peta (near Visakhapatnam), and Pudimadaka (near Achyutapuram village which has developed into an industrial hub).

Local development: As the communities, such as BCV Palem in East Godavari district, grow and become spatially squeezed, new development initiatives – sewage pipes, sanitation facilities, new schools, temples and community halls – have to be located in the common areas which the women have previously used for drying fish. With increasing literacy rates and better awareness of hygiene and sanitation standards, there is also resistance in several villages to drying fish in their vicinity. Many processors recounted how their own children find it offensive to have fish dried and/or stored near their homes. As real estate prices shoot up and the legal ownership of land becomes more lucrative and contentious, places hitherto considered village commons would suddenly become private property. In the BCV Palem area, much of the common areas have now been converted to privately owned aquaculture farms, which has again led to the women losing their access to fish drying areas. That many coastal fishing communities took the ownership of land lightly until recently

mean that their claims to the land on which they have lived and worked for generations are not always legally documented and proven.

Competition amongst the processors themselves is a major cause of friction for drying fish in the open spaces near villages. With space being a constraint, and the available infrastructure for drying being confined to a couple of badly maintained government-built drying platforms, there is competition amongst the processors to use the space for their own fish, which leads to all sorts of confrontations and festering rivalries which are reflected even at the level of village politics and other commonwealth-related issues. In Moolapeta village, to reduce friction, the platforms are being auctioned off to the highest bidders, which reduces the friction at one level but also means that a number of processors are barred *formally* from being able to dry their fish on the platforms.

The heart of the issue may be that, despite the women having used the beaches and common areas for generations to dry their fish, their use rights have not been recognised or legitimised even at the village level. So that, whenever a new opportunity presents itself to alienate the land for an immediate gain to the village (or to some vested interests within), the women tend to lose their drying areas. So long as the communities remained small and relatively isolated from development, and land had little value, this posed no problems. However, once land became scarce and multiple demands have come to be placed upon it, the women's traditional use rights to it have become more uncertain. As drying itself has started to lose its economic importance to the communities, the women's claims have come to be ignored with impunity, and even their own communities do not take them seriously anymore.

The issue of the lack of rights is also reflected in another significant way: as a common property resource, the women would use the drying places in the neighbourhood for their activities by whatever means they could muster with minimum cost and effort. When the government constructed drying platforms on the beaches in the 1980s and 1990s, they were the first-ever infrastructure to have been built to facilitate drying activities. In some places, the drying platforms were poorly sited – either in sensitive areas like near a temple (in BPV Palem) or in a central location that was subsequently used to construct a school (BCV Palem), in both cases leading to the women being denied the use of the infrastructure for their business purposes.

But even this meagre infrastructure support stopped with a few platforms; neither the government nor, even more importantly, the women processors themselves have built anything further. Despite a lot of competition for using the platforms, and notwithstanding the women's strong protestations asserting the efficacy of the platforms to dry fish, not one new platform has ever been built by the processors on their own, no matter how big their own businesses are. The women keep asking for development assistance to build more platforms, but are loathe to invest in one on their own. A similar state of affairs prevails in the other facilities used in drying: the processing sheds, salting tubs, and storage facilities required in the processing activities tend to be makeshift structures that could be set up with minimum investment dismantled at short notice. Lack of clear rights to the land on which they work forces the women to settle for the poorest quality infrastructure and services rather than attempt improvements on their own, individually or collectively.

The point is that the common property nature of the drying areas has been a constraint in terms of the women claiming any rights to it and thus invest more substantially in the necessary infrastructure. Naturally, fish drying has tended to be of poor quality, with lots of wastage and losses in physical, economic and nutritional terms. With the pressure on the land continuing to increase, and even the fishers realising the value of real estate, it is likely that the women's access to the drying grounds will be further squeezed in the coming years, and become a further disincentive to undertake new drying activities.

7.4. STATE OF INFRASTRUCTURE AT THE LANDING SITES, PROCESSING AREAS AND MARKETS

If there is one constant in fisheries over the last half-century, it is that the infrastructure facilities in many fishing villages – for fish landing, auctioning, sorting, processing, packing, and storage – have remained the same as they have always been: poorly developed, almost to the point of being non-existent. Even where they exist, they hardly address the needs of the fishers, the dried fish processors, and other small-scale fish vendors. A critical problem with the existing infrastructure is that there is never any provision - or a sustainable institutional mechanism - for its maintenance and management; the communities also use the available infrastructure for as long as it lasts and then give up on it. As an example, one can point to the drying platforms that dot the beaches in many fishing villages, especially in Visakhapatnam and Srikakulam districts.

Fish drying platforms, mentioned in the previous section, were cement structures built decades ago and are mostly in bad shape, but continue to be used as they are by the women. The chief complaints about them are that: they are (i) insufficient to dry all the fish that is usually processed; (ii) inefficient on account of getting warm during the day time and leading to breakage or burning of the fish flesh and also to remove fish quickly at times of sudden downpours; and (iii) inaccessible to all but a few processors in the village. As discussed, the common property nature of the platforms means that everybody is eager to use them, but nobody will invest in maintaining them. With few women having ownership of land near the beaches or landing centres, which is a prerequisite for drying fish, there are no independently owned drying platforms (the issue of protecting them from other processors and activities also remains an issue). Drying racks, though much promoted, are not evident in the fishing communities; the processors complain that the racks are inadequate to dry large quantities of fish that they usually dry and are in any case too expensive.

The result is that the processors are content to dry their fish on the sand, by the roadsides (sometimes on roads themselves), in areas with poor sanitation and sewage disposal, in residential areas, and in any available vacant space, even if it is dirty and unhygienic. As a result of poor processing conditions, physical losses are endemic in the dried fish. The losses are particularly severe during the monsoon periods, when a sudden rain or a blowfly infestation could wipe out a woman's entire investment in one burst.

Transport and communication facilities are one area which show significant improvements. From a business perspective, they help the women reach distant landing centres and markets quickly and safely and enable better market information, coordination, and access. While private transport services are a

welcome improvement over the public transport – which used to be uncertain and frequently forbidding to the fish vendors – the transport by the former is not without its problems. With the fish dumped in the open trucks or at the back of autorickshaws, the transportation systems expose the fish to sunlight and dust and delays and sundry contaminants, contributing to irreparable damage in quality.

Over-crowding and overloading on the vans and the autorickshaws lead to accidents – resulting in severe injuries and loss of material that the women cannot easily cope with. Lack of medical insurance or other support systems for the fish processing women affects their ability to take recourse to formal services, and adds considerably to their costs in terms of opportunities lost and medical costs.

The existing market infrastructure hardly ever caters to the specific needs of fish trade, so both the traders and the consumers have to struggle with inadequate, inappropriate and unhygienic conditions. Weekly dried fish markets offer few facilities for proper marketing, and the infrastructure is hardly fit neither for sale of food products, nor to meet the fish vendors' basic needs like sleeping places, toilet and wash facilities, drinking water, and food. Poor management leads to the market infrastructure being in a dilapidated condition, despite being in heavy demand. Where the women are forced to sell their fish by the roadside, they face resistance and complaints from the local residents.

In Kakinada, the traditional dried fish market has been converted into a public park, leaving the dried fish traders to sell their products by the roadside, creating traffic snarls and congestions and exposing the women to regular harassment from the police. A similar state of affairs exists in Peddapuram, where the dried fish market was converted into a bus station, forcing the women to sell their product also by the roadside: the additional loss had been the storage space that the old market offered on hire to the women so they could keep their unsold product until a later time at a nominal cost. In places like Humma (in Odisha) and in Nakkapalli, it is reported that new facilities are coming up, but by and large, the physical conditions in the markets are not conducive to efficient dried fish trade or the wellbeing of the traders and the consumers.

7.5. ISSUES RELATED TO FISH PROCESSING

For the dried fish processors, their supplies – comprising cheap and small varieties of fish – seldom get to be iced onboard the fishing boats (frequently, they are not even removed from the nets until returning to the shore) and are allowed to stay for a long duration on the beaches before being auctioned and transported, means that the quality of the fish is already poor by the time it reaches the processing yard. If the fish is purchased at a centralised location, the poor condition of the fish is further aggravated in the subsequent stages of packaging and transport.

All actors at the landing centres contribute to the poor state of affairs by not paying the least attention to cleanliness and hygiene. Fish are simply thrown on the beaches, exposed to sand, sun and diverse foraging animals for extended periods of time, and the overall system seems only too well designed to ensure maximum damage and deterioration of fish quality. This state of affairs can be partly – but not wholly – blamed upon the exigencies of the situation; the women (and all the other actors) too bear a responsibility in contributing to this. Even the processors admit that their lax attitude

towards fish quality is almost intentional, as explained by a woman processor in Mangamaripeta: "*There are times when I feel so bored by the work, work, work, that I simply let things go. I know it would help me if only I paid better attention to matters, but it is so difficult to be always worrying about things*."

The widely prevalent practice of using the beaches for open defecation affects the quality of the fish as well as the health of the fishers themselves, but – despite active promotional campaigns and generous support packages offered by the government – many fishing villages remain immune to the idea of having more hygienic sanitary arrangements.

Specific areas of concern at the landing centres include:

- Poor access to clean water for drinking, washing and processing purposes; conditions have improved to a good extent in many villages in the recent times, but with access to drinking water still a luxury, the women cannot afford to use it for washing their fish. Seawater collected from the beaches is used for washing, but it is often contaminated with fish and organic wastes as well as with industrial or urban wastes depending on the village location.
- Weak/non-existent waste disposal systems – human, fish, and other non-fish wastes are simply dumped everywhere on the beaches; these are augmented by wastes from maintenance of fishing boats, engines, and nets;
- prevalence of diverse insect and animal pests, which contaminate the fish quite easily.
- Poor or absent sanitation facilities and sanitation protocols on the boats, landing centres, in fish handling and related areas; and no institutional mechanisms to facilitate this.
- crowding on the beaches and the landing centres;
- time-consuming processes: a woman fish vendor could spend three to four hours to collect sufficient supplies for a day's trade. For the dried fish processors, the difficulties include having to get the fish transported after the procurement has been done.

Dried fish processing has remained largely the same down the generations, despite the possibility of reducing losses and adding value through relatively simple means. The women processors continue with their traditional practices, which they justify on the ground that doing it any better isn't going to pay better, and justify it further with a saying that roughly translates as, "*If it ain't broke, don't fix it*!"

Thus, the various steps in fish curing and drying include:

- Preparation of fish for curing: involving one or more of the following - gutting/gilling/de-heading/scaling – prior to washing, usually in seawater or other water from the nearest source, rarely potable. Issues of concern also include the equipment used – knives, baskets, etc.
- Curing the fish in salting vats which could be cement vats sitting exposed on the beaches (most common) or permanent rectangular structures under shade (large processors), plastic containers (small processors), hollowed-out palm tree bases (traditional, small processors), or (widespread practice in Srikakulam) pits dug into the earth on the beaches and lined with polythene sheets. The curing vats are frequently in need of washing themselves.

- Salting involves either arranging fish and salt in layers (large and medium fish); more frequently, it involves preparing a saturated brine solution in which fish are submerged, with the top layer of fish being held down with weights (stones) to keep them submerged under brine, but only with partial success, as blowflies get at the fish and maggots appear by the next morning. Fish are again washed after removal from salt after 24 hours (longer – 36-48 hrs – in case of bigger fish and shorter – 10-12 hrs – with smaller fish) prior to drying.
- Drying is on the platforms (if available, which is rarely the case); on mats or plastic sheets laid out on the beaches; or directly on the sand and on the roadsides. Cast off nets are spread over the fish to safeguard them from the animal and bird pests, only with limited success. The sand content in the dried fish can be high, even where precautions are taken.

Dried fish are collected in baskets or in gunny bags and, once prepared, are kept as short a time as possible with the processors who do not wish to risk keeping fish for long (i) because of spatial constraints to store at their homes; (ii) to avoid potential risks like attracting moisture, pests (e.g., beetles), other animals; and (iii) the need to generate working capital for their next cycle of operations.

A few improvements in processing over the years are reported to have included:

- Better moisture control in dried fish: as the consumer awareness raises and quality becomes more important, the women dry the fish better than in earlier times; as against a fresh to dried yield of 50 percent in earlier times, the current practices aim for a 40 percent yield.
- The women also suggest that the quality of salt they use has improved: it is whiter and also more efficient, so they do not need to use as much salt as in the past. The frequent occurrence of pink discolouration in the dried fish of yore has also been overcome with the use of improved quality salt. In the past, the salt used in processing was being made in the neighbourhood of the village (right adjacent to it in case of Pudimadaka); now the salt comes from a long distance, likely from Tuticorin in Tamil Nadu.
- Although fish processors used to avoid having anything to do with ice at one time, this has changed: the longer distances that they travel for procuring fish, and the need to store it over longer durations, has given rise to a need to use ice and iceboxes for the fish used in processing. However, two major constraints faced by the women in this matter relate to (i) the cost of iceboxes and (ii) the difficulties they face in accessing ice, especially during the summer months. Consequently, only a handful of women can afford the iceboxes while the rest continue to suffer losses. Similarly, the lack of access to adequate quantities of ice frequently leads to under-icing, which defeats the purpose while adding to the costs. All the same, the use of ice is a positive development in the dried fish sector.
- Fish intended for human consumption are no longer dried directly on the sand or on bare surfaces; the women spread the fish on mats, tarpaulins, straw, old nets or whatever is readily and cheaply available to them. While not fully fool-proof, this at least reduces the opportunities for contamination (though the use and reuse of some of these materials without proper precautions could itself be a cause of contamination). The women also try to erect a net canopy over the fish to save them from predation by animals and birds.

Such minor improvements notwithstanding, despite decades of 'awareness raising' and 'capacity building' in making better quality dried fish, significant losses – physical, value, nutritional – continue to persist in the system. The processors work out the economics of their drying operations in a way that such losses are accommodated into the system rather than being addressed.

The problem is, at least partially, systemic: in small-scale fisheries, as several fish processors pointed out, big catches of small pelagic species are as much a problem as no landings in the villages: they only mean extra costs and effort to the fishers to bring them back and land them; they put pressure on the local processing infrastructure that simply cannot handle quantities of fish beyond a point, and they depress the market values.

Given the existing levels of infrastructure and the market potential of the dried fish, there are no simple solutions to processing all the fish without losses. As with the demand for fish landing jetties and ice plants that are made in every village, the economies of scale do not permit a huge investment in drying infrastructure to be made to account for large-scale landings that are infrequent and uncertain. In any case, the women processors do not have (and cannot afford) the investments necessary to handle large quantities of seasonal catches anyway.

The existing systems are thus designed to accepting a loss of half their catch as being par for the course, because they simply cannot afford to make investments in infrastructure to handle and process all the catch hygienically. And no practical solutions have yet been suggested to the women to address the problem effectively.

Thus, while it can be suggested that it should be technically possible to make good quality dried products for human consumption from fish that are simply allowed to rot on the beaches or, at best, sold as poultry feed, this assumption needs to be tempered by other considerations: logistical; infrastructural; financial; access-related; and most importantly, market-related (*what incentives can the processors expect for making the extra effort and investment to make better quality fish?*). Unfortunately, most 'awareness generation' programmes on reducing losses stop with the technical advice and rarely cover the practical issues of implementation, even as the markets remain completely ignored. The result has been that most of the northern Andhra coast's fish processing activities follow basically the same patterns and practices that were in vogue even 50-60 years ago.

A question that arises here is: if a system has remained unchanged for decades and shows no signs of being able to innovate or improve itself, or tap into new opportunities and markets, does it indicate that the system is failing to keep up with the times, that its failure to do so might affect its continued relevance in the coming years? Or, as the women processors proclaim, does it mean that the system is so self-contained that it perhaps does not need to reinvent itself continuously to survive?

7.6. CREDIT AND DRIED FISH PROCESSORS

Credit has always been an integral component of fishing: as one elderly fisherwoman in Pedakarrivanipalem noted, it is as important to the people as the fishing equipment itself. In the early stages, the fishermen had to sell their fish on credit to the women processors who would sell the fish either fresh or dried in the markets and then pay the

fishers, a system that still prevails in several fishing villages where good landings of small pelagic species occur and are sold for local processing. With the arrival of motorisation (requiring investments) and ice (allowing long distance transport of fish), the fishers had both a need and an opportunity to obtain credit from traders and, as a result, elaborate systems of credit-trade linkages came into existence, depriving – wholly or in part – the local women fish traders and processors of their regular supplies. A consequence of the credit-trade linkages at the fishermen's level has been the need for the women fish processors to travel to central landing centres to obtain their supplies, which led to the women themselves requiring access to credit to pay for the ready-cash transactions: a case of access to credit at one level begetting the need for credit at another level.

Over time, with the uncertainties in fish catches, the prevalence of fishers' migrations, and the concentration of fish landings to central landing places, the fishers' access to credit from the traders is declining even as their investment needs have been mounting. The reluctance of the banks to finance fishing equipment and activities, on the one hand, and the total marginalisation of men from the local micro-credit/micro-finance initiatives (implemented since the 1980s), on the other, meant that the men had few sources to finance their operations. They either had to move out in search of other sources of work or depend on their women to meet their credit needs.

Thus, the women-processors faced a growing need for credit on three counts: one, to pay for their own businesses; two, to pay for their men's investment needs in fishing; and three, with reduced income from fishing (or uncertain remittances from their migrant-menfolk), to cover the family expenses. Fortunately, this increasing need for credit also coincided with the launching of several women-centred micro-credit initiatives at the community level, which despite several ups and downs, have yielded positive benefits.

Thus, in terms of access to institutional credit, the fish processing women's conditions have improved over the years. While the NGO-supported Self Help Groups could not amount to much (though they succeeded in providing a model for the government to draw inspiration from), more extensive government programmes like the Development of Women and Children in Rural Areas (DWCRA)[7] made institutional credit accessible, affordable (the cost of credit being extremely low), and reliable, to *all* needy women. Under DWCRA, a woman could hope to get a loan of Rs 25,000 to start with and, over time, increase her credit potential up to Rs. 1 lakh, which is more than sufficient for most small-scale/middle-scale processors to meet their business needs. The programme – which has wide coverage in the state – is reported to have led to a reduction in the number of private financiers in the sector and also to the women taking on a more proactive role in the household decision-making processes. According to the respondents, both their access to credit and the cost of credit are less of a problem now than was the case 10-15 years ago.

[7] The privately-managed micro-finance initiatives during the early 2000s had been successful for a time, but – for various reasons – soon joined the long list of flash-in-the-pan footnotes that dot the history of Indian fisheries.

However, from a broader perspective, a significant problem with the institutional credit programmes – be they from the government, the NGOs, or the micro-finance institutions – has been the tendency to view credit as an end in itself. The echoes of the 'Bottom of the Pyramid' business model that views the poorer women as 'clients' or 'customers' in transactions involving credit as the only commodity on offer ignore the more complex and tacit ways in which credit is integrated into the overall fabric of the life and livelihoods of the fishers in general, and fisherwomen in particular. This reductionist view of credit-as-an-end-in-itself may have led to improved access to the same for the women, but whether it contributed to an improvement in their overall conditions remains doubtful.

Moreover, by fostering the idea that a 'self-help group' is an operational mechanism to channel credit to the people and to ensure its efficient circulation amongst them, the institutional credit programmes may also have contributed to weakening the complex social ties – which are by no means unproblematic – that existed amongst the women and reduced their social relations into a single economic dimension. That self-help seldom moved beyond credit programmes meant that the more critical areas like markets remained out of the 'self-help' concept anyway.

At a more practical level, while the DWCRA loans are intended to help the women to meet their business investments, a large part of them are reported to have been used to cover other kinds of expenses:

1. *Investing in fishing equipment*: with the men effectively ruled out of the institutional credit programmes – both by the banks and by the government – their chief source of credit has been the women, who thus are forced to use their loan amount to meet their husbands' investment needs, rather than their own.
2. *Household expenditure*: In a situation where the fish processors' personal and professional lives overlap all the time, it is not always possible for them to invest their money based on calculations of investments and returns alone. Several women in Pudimadaka and Idduvanipalem reported using bank loans to construct houses, conduct their children's weddings, and take care of health emergencies and other large-scale household expenses. When it comes to their actual business needs, the women take short-term business loans from private moneylenders because they prefer to repay the loan from the returns of sale and to keep the repayment periods short to save the interest.
3. *Servicing of old debts*: Credit is a way of life in the fishing communities; seasonal incomes with limited surpluses make loans as good as a livelihood strategy during the lean periods. Most people are indebted, and new loans are often a means to pay off, or service, old debts. Most development credit seems to have been used to pay off the loans borrowed at a higher rate of interest, thereby reducing the interest burden but actually leaving the women with no capital of her own for business purposes. This has meant that the women borrow from multiple sources of private finance and recycle the DWCRA loan amount to service these loans.

So, even as their loan burdens eased, it appears that many women processors still depend on private financiers for loans, the cost of credit being around 5 percent per month. The financiers deduct the interest component at the time of disbursing the loan and recover the capital within a stipulated time period on a daily or weekly basis. For the women, daily payments in short sums is easier to pay off from their business than to pay a larger lump sum later, even if that means a sizeable sum as interest.

Thus, a fisherwoman in Karrivanipalem reported having taken a loan of Rs. 10,000 from a private financier who had given her Rs. 8,500 (i.e., after taking out the interest component of Rs. 1,500 at the time loan disbursement itself); at the time of the interview, she was in the middle of repaying her loan @ Rs. 100 per day over 100 days.

A matter of concern for the DWCRA women's groups at the time of the field study was the impending implementation of a promise made by the incumbent ruling party at the State level to waive all pending DWCRA loans: this gave rise to the women worrying whether their loans would also be included in the loan waiver, while a few voices were also raised questioning the rationale for the waiver and its potential consequences for the future sustainability of the programme.

7.7. MARKETING SYSTEMS IN DRIED FISH TRADE

An important factor that keeps dried fish processing going as an economically viable activity is the big demand that dried fish continues to have in the markets. All processors are agreed that the consumers may not be able to pay a higher price for better quality product, but the demand for dried fish itself remains quite strong and vibrant, and allows the processors to make a living. The women dried fish sellers have several different ways to sell their product:

- Central wholesale/retail markets: usually available only to the local women, traders from other areas are not always welcome to operate from the central markets; however, in certain markets (e.g., Amalapuram), all women are allowed to sell their fish provided they have paid a market cess.
- Weekly wholesale/retail markets
- Direct sale to traders and/or commission agents (the latter are declining in numbers)
- Street vending: door-to-door sale involving the women carrying dried fish (frequently alongside fresh fish) by head load.
- Roadside sale: small-scale dried processors find any commercially attractive location by the roadside to set up their sales outlet.
- Apartment sale: a newly emerging opportunity.
- Local village sale: the women sell dried fish in their own village, usually by sitting in a central location: fisher households and others in the village buy a few pieces of dried fish for their own consumption.

As with the processing practices, the dried fish market systems also have changed but little over the years. The critical gaps that pertain to the existing dried fish markets include: (i) poor infrastructure, not customised to address the needs/requirements of dried fish trade, with economic, nutritional, and food safety implications; (ii) informal arrangements involving numerous intermediaries, aggravating uncertainty; (iii) consumer indifference to quality and value-addition prospects; and (iv) no efforts at developing and nurturing new market opportunities targeting new consumer categories (e.g., urban middle-classes, targeted through better-packaged products sold through super-markets and other new marketing systems), etc.

Dried fish markets are informal institutions, which is an adaptation to deal with: (i) the peculiarities inherent in the fisheries sector (species, size, quantity, quality, seasonality, accessibility etc.) and, (ii) the particularities of consumer preferences (plain dried, dry-

salted, light-salted, wet-salted, semi-dried, dried with or without guts/head/gills/scales, dried as whole/split/partially split and so on.).

Whilst the informal trade practices have their own rhythm and are attuned to the unique conditions in which the dried fish processors and traders exist and operate, they also add to the element of uncertainty that prevails in the sector. The oft-repeated complaint of the women processors that they lose as many times as they make a profit in their transactions is not really far from truth: they chances of making a loss are quite on par with those for making a profit. Obviously, the losses tend to be smaller than the profits and can be easily covered by successive cycles of operations, otherwise the women would not be carrying on with a losing proposition. However, the point is that the systemic imperfections – not the market demand – contribute to losses of both fish and incomes, and they will need to be taken into account.

Most of the dried fish trade transactions are based on word-of-mouth, *ad hoc* arrangements, with no written contracts or IOUs, and the terms of trade are negotiable to an extent where no two transactions follow the same pattern. The units of sale, until recently, used to be counted by numbers – of fish, gunny bags, or baskets – but they are gradually giving way to weight-based transactions. Most women complain about the weights used when they buy fresh fish and sell dried fish; frequently, the weighing scales employed are dubious, and the size and rush of transactions preclude any opportunities for the women to verify the weights carefully. A loss of up to 10-15% at either end of the value chain is attributed to short weights alone.

Price agreements remain fluid, with even pre-agreed sums constantly being renegotiated until the last moment. The agreed sums are seldom paid either by the women when purchasing their raw material or by the traders to whom in turn they sell the dried product. In the weekly market trade, the trade arrangements are seldom watertight and follow the market logic, as both buyers and sellers are always on the lookout for a good bargain and take advantage of it whenever one arises. This ensures better returns in the short term, but also means that there are no strong bonds between processors and their buyers and, occasionally, the women being cheated partly or outright in transactions involving unknown parties at the weekly markets who take the product and run, leaving no traces for the women to track them. This kind of risk is being better addressed now, as firmer and more long-term linkages are being forged directly with wholesalers by the processors.

In large-scale processing, whereas the practice in the past was to carry the dried fish to a weekly market like Nakkapalli or Humma, there is an increasing shift towards directly supplying to the wholesalers. This change has been made possible by the arrival of cell phones on the scene, enabling women to contact a number of wholesalers to ascertain the best price before deciding whom to sell. In villages with large-scale operations, the wholesalers themselves will bring their transport vehicles to carry away the product, and where that is not possible, the women arrange the transport to the wholesalers' warehouses. Payment methods have also shifted from cash transactions to bank and digital transfers, making it less risky and simpler for both parties. The once widespread practice of advancing money by the traders to large-scale processors has dwindled now. Credit-based sales still prevail – between the fishers and the processors on the one hand and between the processors and the traders and/or consumers – on the other. Although bad debts are rare, tortuous

transactions and delayed payments leading to occasional bad blood are more common.

In general, in urban areas, there has been a swing in preference towards fresh fish – both marine and freshwater (the latter sourced from aquaculture); but in rural areas, the processors feel, demand for dried fish continues to be as good as ever, as the people buy dried fish either because they are deterred by the cost of fresh fish or out of habit; however, even in the conventional dried fish consuming areas, there is an apparent trend towards consuming more fresh fish.

Consumer awareness about dried fish has been reportedly increasing (whether it is 'improving' is a different matter): TV and digital communication channels have led, on the one hand, to fish being glorified as 'health food' and hence to their being consumed more. On the other hand, in relation to dried fish, the women traders have reported instances of some unfounded reports being circulated on the web that linked dried fish consumption to increased incidence of thyroidism, an apparently bogus claim which, however, found widespread acceptance and led to people curtailing their dried fish consumption. More credibly, there are fears about the consumption of salted fish leading to hypertension, which too affected the trade. The women also complain about the news reports on TV channels highlighting the unhygienic practices of dried fish being made by the roadsides and other such places, which they say are – though justified – used as a stick to beat *all* dried fish producers, irrespective of whether or not they used such practices. Also, one processor suggested that all such complaints are frequently a ploy to bargain for a low price rather than rooted in genuine fears about their health implications. "If you are truly worried about dried fish affecting your health, you'd avoid it altogether rather than get into long bargains about the price even as you keep complaining about its effects on your health!" she suggested.

The mushrooming of apartments in towns of all sizes has led to the emergence of new market opportunities for fish (both dried and fresh). For the rapidly expanding middle-class segment in the country, more particularly for the new entrants into the class (such as the educated youth from the fishing villages), moving into an apartment symbolises – both literally and metaphorically – an 'upward' mobility in social terms. Furthermore, it is these new middle-class households which seem to form the demand base for the dried fish in the apartments. Specific high-quality dried products like anchovies, ribbonfish, and shrimp are said to be mainly purchased, while cheaper fish like croakers and threadfin breams are ignored. The advantage for the dried fish processors with the apartments is that – if they manage to sneak inside (which is a big 'if') – they can manage to sell good quantities of product all in one place and at a fairly good price too. The flip side is that many apartment owners have also been banding together and travelling to the processing sites or weekly markets to purchase dried fish in bulk – an occurrence that would have been difficult to envisage in the olden days, when each family had to make its purchases for its own use alone – and thus depriving the women fish traders of the opportunity to sell their wares for days, or even weeks, to come.

Talking of the future, some institutional responses have tended to focus on value addition and market development (urban supermarkets, branded products sporting quality/equity/ecological certification, and such like have been suggested). Nothing concrete has ever come out of the ideas that tended to focus more on the product

than on the producers; in any case, both value addition and market development remain problematic where resource-poor women fish processors and their consumers are concerned. On the one hand, value addition implies improving quality, leading to increased requirement of investments for the processors and increased prices for the consumers – neither the existing producers nor the existing consumers can really afford that. New market development works for the women when the necessary investments and the appropriate institutions exist: in a context where neither is in place, new market opportunities are more likely to attract large-scale private entrepreneurs (as the examples of products such as pickles, *papad*s and countless other, previously homemade, products would show), thereby further reducing the supplies and market access for the processors.

7.8. ORGANISATION OF DRIED FISH BUSINESS

The women processors resist all efforts at collectivising their selling operations: although there is a growing trend towards a number of women working as a group to source their supplies from a centralised landing place to save costs (on transport as well as on bulk purchase), once the fish is brought back to the village and parcelled out among the women, it is a case of each woman for herself from then on. They also use common transport to go to their respective villages/towns for sale, but the actual sale process is individually done.

Thus, even as the women spend considerable time together on the beaches or in traveling to the fishing harbours for their supplies, have similar problems and take advantage of similar opportunities, the extent to which they get involved in one another's business is clearly bounded. Until a decade ago, in places like Uppada and BCV Palem, dried fish production used to be a joint operation, where two or more women worked together and shared responsibilities: one woman did the procurement and sale while the other(s) looked after the actual processing. However, such arrangements seem to have disappeared for various reasons: it has been suggested that there is not enough work to justify two-person operations; that the opportunity costs of the operation worked out to be more expensive than when each woman traded individually in fresh fish; and that the breakup of joint families led to fewer opportunities for sharing responsibilities.

In Idduvanipalem, Kaviti Mandal, it is reported that groups of women collaborate in all aspects of the business, but in a majority of cases, individualised style of operations remains the predominant method, which has its advantages and disadvantages. The disadvantages of individualised practices include: the processor having to bear any losses in her business all by herself; having to work alone and not be able to draw upon her fellow-traders for any support; and safety and security concerns in traveling alone back to the villages.

The inability of the women to collectivise their operations has an immediate implication in that the fish they handle become more expensive to buy and less profitable to sell - competition from bigger buyers (or from other value chains) at the landing site and from fellow fish vendors in the markets contribute to that. In the long term, this also implies that, in the absence of collective efforts to sustainably hold on to their markets, the women face the risk of total marginalisation from the processing activity itself, as has been happening to some extent already.

7.9. WORKING CONDITIONS IN DRIED FISH PROCESSING AND TRADE

When it comes to working conditions, the women processors' situation remains as bad as it has always been, probably even worse. From fish procurement and transport to processing and trade, little has improved for the processors.

Most women in processing have long working hours: in many villages, the women have reported starting for the landing centres at 1AM and working continuously until 10 PM, handling both professional and domestic chores without a break. As the fish landing centres and the markets move farther away, so does the need for women to spend longer hours traveling. The arrival of motorised private transport may have reduced their hardships and helped them to avoid walking long distances to the markets, but considering the amount of additional travel that the women have to do, any benefits are marginal at best.

Appendix 2 provides indicative time investments of several fish processors/traders to show how much time on average they have to spend working on their businesses alongside their domestic chores. It indicates that a woman could spend 16-17 hours in a day taking care of her business and household needs. Her ability to sell all her fish in time, the timely availability of transport and other exigencies of the situation could prolong her day. When she travels to procure her supplies and/or to sell the product in the market, her day could start around 1 AM, and end only around 10 PM, or even 11 PM.

The harsh working conditions compound the long working hours: the processors are always in a rush and under considerable strain. As they keep running around to buy fish and arrange for its transport, they hardly get the time for even a quick bite; many forego that luxury in order to save the money, settling for a cup of tea instead. They also avoid drinking water and other liquids – despite spending hours under the scorching sun – for a more sensitive reason: they lack ready access to safe toilets, they try not to urinate frequently, and avoid drinking water as their coping strategy.

The women's troubles with lack of toilets is not confined to their fish procurement areas and the markets alone. Even in their own villages, sanitation facilities are a major concern. For the women in several fishing villages, the single most important necessity is the construction of safe toilets in the absence of which they suffer untold miseries. Open defecation – usually confined to early or late hours in the day – is not only physically uncomfortable but also unsafe; increasingly, as new developments encroach upon the common areas, the women lose both space and privacy. Where they are built, community toilets tend to be too far away from the habitations, poorly managed and maintained, and generally not used.

A fish processor's days are as hectic as they are tedious, and even as she is busy running to buy or sell fish, there are long waiting periods that punctuate her working day which are tedious and unproductive (waiting for fish to arrive, waiting as the fish are transported, waiting while the fish are being dried, and waiting at the markets for a sale) as she could neither relax nor do anything productive. That her concentration is entirely on ensuring her supplies or sale of fish, and on obtaining a decent margin on her money investments, a woman's time investments become secondary or completely overlooked in her calculations, but the implications are felt all the same in terms of their health.

A woman's working hours are also not predictable, and depend on such wild variables as the time of arrival of catches, the woman's ability to buy and sell quickly, finding transport on time, etc; depending on her success in procuring/selling her fish, a woman's working day could stretch for a long time, causing immediate problems such as fatigue and weakness, and deeper concerns relating to her safety and security, as well as social opprobrium. Door-to-door sales of fish also pose several uniquely difficult problems, including health issues (carrying heavy weights over the head, dehydration, lack of ready access to toilets, and no fixed times for eating), but with no alternatives, the women must do it.

Back in their villages, they have to prepare each batch of fish for drying, then wash and salt it, and – later – spread it in the open for drying. They have to stand guard over the drying fish, protecting them from the weather, animals and poachers, and turning them from time to time to ensure uniform drying. All such activities require long and backbreaking work, and take place with the harsh glare of the sun beating down on them relentlessly which, as one woman processor put it, 'is better than having rain, which means a total loss'. Whereas earlier fish processing used to be a family-based enterprise involving several women, today the women have to work alone or employ wage labourers, as joint/large families have given way to nuclear/small families and the younger generation are unwilling to get into the traditional businesses, one reason for their reluctance being the difficulties involved in the operation.

In the case of the fish-smoking women, a large part of their day is spent exposed to continuous smoke in closed surroundings as the fish are arranged, and turned at regular intervals, on bamboo platforms with a fire going underneath (actually, it is more smoke than fire). The heat and the smoke lead to all sorts of health complications for the women, who must also turn the fish over at regular intervals in the hot chamber.

Lack of space, poor services and heavy workload have an impact on the health of the women and many women suffer from a number of occupational health problems, including sleeplessness, hypertension and anxiety, dehydration, and restlessness. With no healthcare systems to diagnose and extent support to the women, it is hardly ever that they go to a hospital for treatment – more than the cost of the consultation and medicines, they fear the loss of working time; the women are unwilling to lose it.

As the women processors explained, improving the economic efficiencies in fish drying might be a priority (reducing losses and improving values and prices of fish), but they are the least of their problems; they can improve their practices by themselves if only they are taught how. What is more important for them is to make efforts to optimize their daily workload so they can get a few extra hours' rest and work in less strenuous conditions. The occupational health issues of the fisherwomen processors have so far received little attention or, as one processor put it, "We have been taught more about how we can keep our fish looking well than about keeping ourselves healthy."

7.10. GENDER AND DRIED FISH TRADE

In the case of men, notwithstanding the stereotypes that ignore their hard working conditions at sea and the sizeable contribution to the family earnings, it is still the case that their contribution to the household incomes is dwindling. There is much under- and unemployment in the fishing sector, and a decrease in daily incomes from fishing. While their increasing inability to earn good incomes from fishing have led some men to move out in search of alternatives, the additional burden this places on women to start earning enough to fill the shortfall in their men's incomes is also considerable. That many men also spend a sizeable part of their earnings (and even a part of their wives' earnings) on their daily drink makes the woman's lot truly painful.

Fishermen in Srikakulam district have started moving out of their native villages in search of new job opportunities, and even as they succeed in finding work and manage to send monthly remittances, there remains a gap at their homes which the women must fill somehow. The burdens of a grass widow's existence – aggravated by the need to make a living in fish trade (or something else) – is an area that remains little studied and less understood, let alone supported in any meaningful way either at the community level or from a development perspective. In most Srikakulam villages, some 30-40 percent of the fish processors exist as grass widows; the other districts also have significant numbers of women whose husbands spend nine months out of a year away from home. The women look after not only their children but, frequently, their ageing parents as well.

In relation to fish processing, it remains the case that despite its obvious importance (economic, social, domestic), dried fish is still considered as a marginal activity in the communities, unlike fishing which is considered a masculine activity, with the result that there are few community-based support systems, or infrastructure, or any facilities that make life easier for the women in plying their trade. As mentioned, fish landing centres, fish markets, and even fishing communities are notoriously lacking in such basic facilities as toilets, which is symbolic of the way women are side-lined from the mainstream.

Thus, for instance, the two-month annual fishing ban is compensated for the fishers by handouts from the government, but the same does not extend to the women fish vendors and processors who are as affected by the ban as the fishers. At times of natural disasters or freak weather conditions (like sudden rainfall), the loss of boats and gears are covered to a greater or lesser extent, but not so the losses suffered by the fish processors whose life investments have been washed away by the calamity. Even from a value chain perspective, little attention has been paid to addressing the issues, constraints, and needs of the women fish processors; hardly any stage in the long and strenuous business cycle by the women seems to have been addressed developmentally.

Credit may have been one area where attention has been paid to the women, but this is as part of a general programme to help all women, but the specific needs of the dried fish processors have received little institutional help. A few NGO-supported SHG programmes, some dried fish platforms and drying racks, the occasional equipment support, and a number of 'awareness programmes' and 'capacity building' programmes do not add up to anything really supportive of the women.

Thus, the women's daily struggle involves:

- the midnight trip to the landing centre on her own to purchase fish,
- the extremely convoluted processes of procurement and transportation to the village,
- the hardships of preparing the fish for processing and then drying,
- the problems of safeguarding the fish until it is ready for the market,
- then packing it and carting it off to the markets
- to begin another round of convoluted acrobatics to sell her fish;

even as she is also engaged the whole day with:

- looking after her family's needs
- cooking
- fetching water from a distance
- washing and cleaning
- preparing children for school
- and so on and so forth.

The list of the woman's chores is nearly endless, yet none of it can be said to have been covered by any means of development support.

Even as the woman practically manages the household and keeps it afloat day in and day out, she remains subject to societal and cultural inhibitions and constraints in the village: her ability to travel independently and to spend long enough at a supply centre or at a market in order to get the best bargains, are subject to her remaining within the societal norms of what is acceptable and what is not. Even as the woman must spend long uncomfortable nights at fish landing centres and at markets in order to pay for her family's subsistence, she must make sure that she is not overstepping her freedom. Her business might require extended stays and uncertain hours, but the women cannot afford to spend the extra time without drawing attention to themselves, especially if they are not old.

Within the village, the women's role in the decision-making processes has improved over the years, but it is still not commensurate with her other role as an important income earner in the family. Even in the meetings to discuss the dried fish trade, men would chip in with their own take on the issue under discussion, lightly dismissing the women's point by saying, "She doesn't know."

7.11. DEVELOPMENT ISSUES OF RELEVANCE TO DRIED FISH TRADE

Over the decades, women have been put at the forefront of receiving development support from the government and NGOs. Community institutional development, awareness and capacity raising, credit and technical support for new/improved activities, linkages with government and other development support, better healthcare services, literacy, subsidised food and other essential services, and improvements in overall social development context are some of the key areas of development that the women recognise as being important to their lives and livelihoods.

That a lot of development work and resources have gone into supporting the women and their work also masks a significant gap, already alluded to in the previous section: that the development interventions have never really taken cognisance of the specific characteristics and the specific needs of the fish vendors, resulting in one-size-fits-all development approaches, with the interventions hardly addressing the more pressing needs of the fish processors (who, as we have seen, comprise a wide range of actors, with gender adding another layer of complexity to the issue).

Thus, despite the women having been on the forefront of fish trade and fish processing in the sector, there still remain big gaps in the development support to help the women in fish trading and fish processing. Some of the areas where women have not been served as well have been discussed in the foregoing sections, and include:

- Ensuring legitimacy of access and use rights to the women's processing work areas, and support for better facilities and infrastructure
- Gender-aware development programmes to help the women to fulfil their professional and personal roles and obligations more effectively
- Attention paid to improving the domestic fish trade conditions: market development; market infrastructure development, management, and maintenance; consumer awareness; food health and safety regulatory frameworks and implementation; market access and facilities for women-traders.
- Value chain interventions that covered all the stages from production to trade, with special attention to supporting and strengthening women's roles.
- Support for adaptation and mitigation strategies to cope with the challenges facing the dried fish sector.
- Water and sanitation programmes at the community level better aligned with the women's work-related needs.

If there are any winds of change, they are blowing away from the women fish processors. The Pradhan Mantri Matsya Sampada Yojana (PMMSY), a Central Government project launched in 2020 with a total estimated investment of Rs. 20,050 crores, to address 'critical gaps in fish production and productivity, quality, technology, post-harvest infrastructure and management, modernisation and strengthening of value chain, traceability, establishing a robust fisheries management framework and fishers' welfare,' hardly mentions the women and their critical role in the post-harvest small-scale vending, dried fish processing and trade, let alone offer any support to them. The National Fisheries Policy 2020 does touch upon the women processors and intends to make efforts at 'strengthening the role of women in small-scale processing and retail marketing by providing them with the necessary support to make them business savvy and play a key role in this segment of marketing'; only, the suggested 'key areas for intervention' would involve developing 'novel ways to popularize fish consumption,' 'product development and new marketing methods such as online marketing,' and 'close-knitted producer-processor value chains to reduce the role of middlemen.' In other words, the women's agency in the whole process is more or less ignored.

7.12. YOUTH AND DRIED FISH

A challenge facing the small-scale fishing communities, and not just in relation to the dried fish trade, is the unwillingness of the younger generations to enter into the sector. A transformation marks the last two decades in terms of literacy, widespread access

to digital media (smartphones, in particular), and ready means of travel to the urban areas (motorcycles), and the educated youth in the fishing villages are no less influenced by them than their urban counterparts. The increasing standards of life have given the younger generations new aspirations and the confidence that they can move out and live better.

The youth considers fishing, fish processing, and the fish trade to require too much hard manual work, pay little, too uncertain, and socially not attractive. Many parents too hope to see their children working in other land-based, non-fisheries, occupations rather than take after them. There have been some employment opportunities for educated youth within the villages (as teachers, health volunteers, field workers implementing government programmes, cell phone sellers/repairers and providers of other services etc.), outside the villages (in the neighbouring urban areas), in the new industries that came up near the villages (e.g., the pharmaceutical and textile industries near Pudimadaka; in aquaculture and hatcheries in East Godavari), and in major cities like Hyderabad and Bangalore (as software or service professional[8]). Even where the youngsters have not managed to get the employment that they aspire to, they refrain from entering into fishing or fish trade unless compelled by circumstances.

The result has been that there is a sizeable number of educated youngsters – both men and women- in every village – who have not always been successful in finding employment in other sectors, but who do not view fisheries and the fish trade as attractive options. While a person's career choices are her/his own to make, the existence of the growing number of people who remain unemployed remains a matter of concern.

It,however appears that the disdain for the dried fish amongst the younger women does not extend to the same degree in case of fresh fish vending: girls as young as 18 are seen to be entering this business. This is justified as being necessary for the women to contribute to the family income: fresh fish business being readily available, requiring less hard work compared to dried fish, and giving ready income, makes it an acceptable choice. Not surprisingly, a number of women who *are* fully into the dried fish trade are also not above venturing into fresh fish businesses from time to time, for the same reasons. In fact, when it comes to the small-scale and medium-scale dried fish processors, it is difficult to characterise their occupational affiliation: they are equally at home with fresh fish trade as with fish drying, opportunistically shifting their allegiances (and investments) from one activity to the other. Also, given a choice, most women – including the processors themselves – unequivocally prefer to stay with fresh fish sales rather than continue with the dried fish.

Many elderly fishers feel that the unwillingness (and also inability) of the youth to enter their family businesses in fisheries is a major challenge affecting the future of the dried fish business. Dried fish, which entails more hard work and uncertainties, might indeed

[8] One of the most lucrative work opportunities in cities being to find work as 'watchmen' in apartments; the title is deceptive – the watchman's (and his family members') job description is all-encompassing and so rewarding that finding job as an apartment watchman is considered to be the best adaptive strategy among migrants.

fare worse than other activities like fishing and fresh fish trade which, when all other options fail, allow the youth at least to make a ready living.

8. FISHMEAL AND DRIED FISH

8.1. THE PROBLEM OF UNDER-UTILISED CATCHES IN FISHERIES

In fisheries, both small-scale and mechanised, a certain proportion of the catch must risk going to waste on account of not being consumed or owing to spoilage and/or damages in catching, handling and landing of the fish. Seasonal landings of juveniles of several commercial species are a major component of 'trash,' with research undertaken in the 1990s indicating their contribution amounting to over 90% of the trawl landings during the monsoon months.

The immediate sources of bycatch and other fishmeal-grade supplies in Andhra Pradesh include:

- In **mechanised trawl catches**, the bycatch (or the so-called 'trash') comes from fish that are damaged and semi-spoiled by the time they are brought onboard; it also includes undersized & juvenile fish; and fish catches that are not used for human consumption or are too low value to be worth processing into human food. The trawl bycatch is by far the more reliable source of fishmeal because it is landed in sizeable quantities and in centralised locations, available round the year, and comprises fish that were generally (but not always) unfit for human consumption.
- In small-scale **gillnet fisheries**, seasonal bulk landings of small pelagic species; also, a proportion of fish are damaged while being removed from the nets; the manual process of removing each fish from the net is also time-consuming and contributes to spoilage; the inability to store large catches onboard – in ice or under shelter – also contributes to spoilage. Catches of **beachseines** too include damaged fish; under-sized fish or juveniles of commercial species.

Even as they have low or no value in terms of human consumption, such fish comprise a sizeable proportion of the catches and require some mechanism to generate value. Poor market value realisation and low demand mean that such catches have always been a major nuisance and – until the demand arose from poultry and aquaculture sectors for fishmeal as animal food ingredient – the fishers struggled to dispose of the unwanted catches. Before fishmeal and ice came along, big landings of even prime fish and shrimp were sometimes used as fertilizers in agriculture and coconut orchards and fishers still recall countless instances as late as the 1980s when glut landed sardines and ribbonfish were buried in holes dug on the beaches to avoid their stink. Well into the 1990s, as studies by the Bay of Bengal Programme had shown, about 130,000 metric tonnes of 'trash' in the shrimp trawl bycatch was being discarded at sea.

8.2. DEMAND FOR THE 'TRASH' AND BYCATCH: AN HISTORICAL TRAJECTORY[9]

Using a certain proportion of the dried fish to feed cottage poultry farms had been part and parcel of small-scale fisheries for a long time, but in northern coastal AP, the real demand for fishmeal began in earnest in the late-1970s, as the poultry industry took off in the state and elsewhere. This coincided with the increase in the size, numbers, and engine capacity of the fishing fleets (both mechanised and motorised) and the introduction of a wide range of fishing gears that could target a wide variety of species in a range of marine environments (coastal, offshore, deep-sea, estuarine). The expansion of fishing effort contributed to an explosion of fish catches through the 1970s and 1980s, alongside an incredible growth in shrimp and prime quality fish markets. The bycatch – also called 'trash' – was an integral part of the trawl fisheries, but it had little value, and the boat owners had little interest in it.

Thus, in places like Kakinada fishing harbour, the growth of the poultry industry in its hinterland led to a proportion of the catches being reduced to fishmeal, but only as an ancillary activity because the owners had no interest in it and the income from it hardly compared to that from sale for shrimp and other export (and, later, ex-state) fish. In fact, even now, the proceeds from the bycatch in trawl fisheries mostly accrue to the crew, even as the owners keep trying to increase their own share. The poultry farmers would procure it – either fresh or semi-processed or fully dried – for further processing and add it as a protein supplement to the poultry feed.

It is the women fish processors – who made dried fish for human consumption – who took the lead in manufacturing the dried and semi-processed fish employing labour to spread and collect the fish on the beaches. Dried fishmeal production involved the simple process of throwing the fish on the beaches – with or without prior salting, depending on the quality of the fish – with no effort at ensuring cleanliness and hygiene and, once done, scooping it up (along with sizeable quantities of sand) into gunny bags for transport to the markets/wholesalers/ poultry farms for further process and/or usage. With the cost of raw material being low, and with hardly any investment involved in the processing operations (only labour), the product could be sold at almost any price, and the processors could still turn in a profit. Fully dried fishmeal-quality product frequently consisted of sand and other wastes alongside the fish, which was why the poultry farms preferred to buy semi-dried product for further processing and were willing to pay more for it.

As with most boom-and-bust ideas in fisheries in the past, the governments were interested in promoting fishmeal for better utilisation. In states like Karnataka and Odisha, the state departments of fisheries (or their quasi-government affiliates) set up industrial fishmeal plants in the 1970s. In Odisha, two government-run fishmeal plants existed, one near Paradeep and the other near Chandipur in Balasore, but they folded up by the early 1990s because the economics did not work out. Even as they floundered, the women dried fish processors living in the same neighbourhood

[9] Source: interviews with senior trawl-boat fishermen and retired DOF officers in Visakhapatnam and Kakinada

continued to make fishmeal alongside dried fish for human consumption and generate a decent living from it.

Even in the late-1980s and early 1990s, the 'problem' of 'trash' and its discards at sea in mechanised landings was a significant enough problem for the Central Institute of Fisheries Technology (CIFT) and the FAO's Bay of Bengal Programme to work on it and develop economically and nutritionally sustainable fishmeal for non-human consumption, with few practical results. The BOBP, for instance, attempted to develop an indigenous fishmeal using trawl catches for use in brackish water aquaculture in the 1990s, but the economics did not work out.

With the arrival of aquaculture – freshwater aquaculture began in the 1970s and brackish-water aquaculture in the 1980s – a new, bigger, demand opened for animal feed. Through the 1980s and 1990s, large quantities of bycatch from the trawlers found their way into aquaculture farms, to be used as an ingredient in the indigenous feed formulations. By the late 1990s, as the input-supply services to aquaculture came to be streamlined and centralised industrial feed production (often run by corporate groups and multinational corporations) became a viable option, the private sector started procuring bycatch from the trawlers for use in their feed formulations. The fishmeal production systems got streamlined for smoother operations, albeit as a low-profile/low-value supply chain. It needs to be noted that, given the uncertainties that aquaculture faced for two decades starting from the 1990s, the farmers' and feed manufacturers' ability to procure fishmeal was based upon its availability within a narrow band of pricing.

An important change over the same period had been that the trawl fishing operations nosedived: shrimp, the mainstay of trawling, came to contribute less and less of the earnings and the competition from increasing shrimp production from aquaculture meant that the exporters' interest shifted elsewhere. With the share of shrimp in the catches and incomes declining, while the cost of operations went up[10], the mechanised operators began to focus on bringing as much bycatch – including 'trash' – back to the shore as possible. Another adaptation involved switching from shrimp trawls to fish trawls ('high opening bottom trawls) to catch more fish.

As the income from fishing, even after the switch towards more fish landings, still remained less than satisfactory, with mounting costs of operation (fuel, labour, maintenance accounted for a sizeable proportion of the incomes). There was a time in the early 2000s when the trawling sector was facing an existential crisis with no obvious ways out. Diversification into longlines for tuna – with government support – worked out only partially, and for a majority of the mechanised fleet, trawling remained the mainstay of survival. Proposals submitted for the government to implement a buy-back scheme received a cold reception. Things became dire for the trawl operators who were earning more from a paltry diesel subsidy paid by the government than from actual fishing. The duration of fishing was reduced to 1 or 2-

[10] The fuel price alone has increased by over 25% during 2020-21 alone, which is just one trend among several similar ones affecting all subsectors of fishing. (https://www.ppac.gov.in/WriteReadData/userfiles/file/PP_9_a_DailyPriceMSHSD_Metro.pdf)

day trips, both to reduce costs and to bring back as much bycatch as possible without discarding it at sea.

Although fishing picked up for about a decade (from the mid-2000s to mid-2010s), it was at best a bare reprieve. By 2015 another slump was imminent, and the boat owners had to scramble for alternatives to shrimp and high-value fish to stay solvent. One natural adaptation was to bring back more of the 'discards' (and even catching more of them) and sell them to fishmeal industries. While the prices of fishmeal were in no way comparable to that fetched by fish (let alone export species like shrimp), their low unit values were compensated by high volumes of landings. As we shall discuss, this has eventually led to one of the more destructive fishing methods developed to date, the 'speedboats,' whose economic viability depends on catching as much 'trash,' which is mostly comprised of juveniles and younger commercial fish and shrimp.

The trajectory of Indian mechanised fishing has reached the lowest point, i.e., depending on the erstwhile 'discards' and 'trash' for its survival at the expense of destroying their future chances of catching high-value fish and shrimp. If things went beyond this stage, there would be no more safety nets for the mechanised fleets. Even the boat owners know this only too well, which explains their reticence to talk about the fishmeal industry and its role in supplying it.

8.3. SOURCES OF SUPPLY TO FISHMEAL FROM ANDHRA PRADESH

MAIN SOURCES

While fishmeal supplies come from both small-scale fish landing centres (where small gillnet landings and beachseines catches are landed) and fishing harbours (where trawl bycatch is the source of fishmeal), the latter are by far the more important and consistent source of supplies.

From trawl catches

There are two major fishing harbours in the study area – Visakhapatnam and Kakinada – but it needs to be noted that the boat owners' associations at Visakhapatnam fishing harbour had taken a voluntary decision some five years ago, prohibiting their boats from bringing back any of the 'trash' they catch to the shore. This means that there is little direct supply available for fishmeal; the fishmeal supplies must come from the catches that are also intended for dried fish production. In Kakinada, 'trash' is allowed to be brought back to the shore, so a larger proportion of bycatch is available for fishmeal supplies.

The decision of the Visakhapatnam mechanised boat owners' associations to not bring the 'trash' fish back is intended as a fisheries management/conservation measure; by releasing the bycatch back into the sea, they expect at least some of the released fish to survive. It remains doubtful how the fish (mostly juveniles and small fish), after they had been caught, left in the net for a few hours, then hauled into the boat and, after a further lapse of time in which they would be sorted and segregated, could still survive when they were released back into the sea. A better

solution, one might argue, would have been to avoid catching it at all and, if it must be caught, to bring it ashore and make use of it somehow.

However, the way things have turned out at Kakinada fishing harbour, where landings of trash are allowed and sold to fishmeal industries, seems to suggest that what the Vizag fishers did was, if not wholly appropriate, then at least the lesser of two evils. With demand for fishmeal mounting, the fishing fleets of Kakinada (and, reportedly, those of Machilipatnam and Nizampatnam further south) are reportedly bringing back larger quantities of bycatch than ever before. The boat owners deny that they specifically aim for fishmeal-grade catches and insist that what they are bringing back is the erstwhile discards which are no longer being dumped into the sea, but it does seem that the seasonal spikes in demand for fishmeal do encourage the fishing fleets to capture more of it.

From small-scale fisheries

In the small-scale fisheries, fishmeal production is confined to the exigencies of the moment: e.g., when the fish are too small in size or when the landings occur in rainy seasons and at other difficult periods. If the catches consisted of any good-sized fish, the demand from fresh fish and dried fish value chains would be lucrative enough for the fish to be absorbed into them. In a context where the women must make periodical trips to Visakhapatnam fishing harbour to source their supplies at considerable effort and expense to themselves, it is impossible to let any locally available supplies to slip into fishmeal – neither the producers nor the traders will allow it.

What is more likely to have happened in the small-scale fisheries was the focus shifted to high-value varieties to an extent that there are fewer fish available for processing – either for human or animal feed purposes. Thus, fishmeal supplies from small-scale sources (gillnets and beachseines) have come down significantly in districts other than Srikakulam. In Pudimadaka and Uppada, for instance, it is said that their dried fish component itself hardly amounts to 5 percent of the catches, so supplies to fishmeal are quite difficult to arrange from these sources. In villages like Mulapeta, in East Godavari, fishmeal production is still important, but is seasonal.

Beachseines, which were another source of fishmeal (and dried fish), are themselves declining in both numbers and size in all districts. While they remain in business, the nets have become smaller and their catches tend to be used mostly for human consumption, especially within the villages themselves. Their operations have also become part-time and seasonal: labour being a major constraint, beachseines can be operated– communally – on days when there is a large idle work force available in the villages. Their overall significance thus remains more social and nutritional than economic, and their contribution to fishmeal is quite small.

'SPEEDBOATS'

An important recent development in mechanised fishing has been the 'speed boats' – trawl boats of 14-metre OAL are fitted with Chinese engines of high horsepower (326-350 HP as against the original Indian-made 120-160 HP engines in the past), which allows the boats to trawl the fishing grounds at high speeds thus allowing nothing in the path of the nets to escape. Of the 540 boats operating from Kakinada fishing

harbour, some 120 bigger boats have reportedly been converted to 'speedboats'. The speedboats carry several varieties of trawl nets, but depend more on fish trawls than on shrimp trawls, so their fish catches are naturally more; their fishmeal-grade catches tend to be higher because of the prevalence in the catches of smaller fish (like silver bellies, as well as juveniles and younger fish of prime fish) which are unable to escape from the nets at higher speeds. Even fish that would otherwise have been sold fresh or dried could be damaged in the speedboat operations so there is no option but to sell them as fishmeal, although the operators deny this.

Unlike in the normal trawling operations, where the crew get the full value of the bycatch (which constitutes about 30 percent of the total landings by weight), the speedboat crew only receives 20% of the income from sale of bycatch. The rest of the bycatch goes to the owners, which is explained as the reason for the owners' insistence on icing fishmeal-grade bycatch to sell it to distant fishmeal plants. Going by the available (albeit piecemeal) information about this secretive sub-sector, the opportunity to supply to the fishmeal companies may have been an important consideration in their development. Seasonally, each speedboat allegedly lands fishmeal-grade bycatch of over 2 tonnes a day, but this remains to be verified.

There is some resistance to the speedboats among the other trawl groups, because speedboat operations are considered to be catching a larger proportion of juveniles than the normal trawls (whose catches of juveniles and younger commercial fish are scandalous enough). Moreover, they are accused of denuding the fishing grounds not just of its fish, but also of all their natural features, thus making the grounds unattractive for resettlement of flora and fauna for a long time: a literal case of fishing down to the bottom. More prosaically, the speedboats also compete with the mechanised trawlers and catch more fish as a result of their bigger engine capacities. The efforts to have them stopped have not been fruitful yet.

The speedboats have their own travails: despite being able to catch large quantities of fishmeal quickly, they find good varieties of fish eluding them and they are also running out of fishable grounds quickly. Their desperation leads to catching more juveniles and smaller fish, despite being clearly aware (as discerned during the interviews) that such practices are harming their catches of good fish irreparably. In Visakhapatnam, some of the speedboats have been encouraged to diversify into long-lining for tuna, but the viability and sustainability of the shift remain doubtful. Overall, the older trawl fishers predict that speedboats might prove to be another flash-in-the-pan in a long series of boom-and-bust initiatives in the saga of modernisation of Indian fisheries, but in the meantime, they have the potential to make much mischief.

8.4. WOMEN IN FISHMEAL PRODUCTION

For the women fish processors, fishmeal is part and parcel of their daily work. In Srikakulam district, fishmeal production using catches from motorised fishing continues to be an important activity for large women processors, who use the bulk landings of small pelagic species (sardines, mackerels, ribbonfish, croakers) landed by the local gillnet fisheries or in beachseines for the purpose. Frequently, the decisions concerning whether to use their supplies to make dried fish (for human consumption) or fishmeal are based on various ad hoc considerations: species, supply and demand conditions, values, logistics (e.g., the cost and availability of labour and transport), quality and

quantity of supply, season (rainy season encourages reducing fish to fishmeal), trade arrangements (e.g., advances from traders), etc.

Women also dominate fishmeal production at the fishing harbours, although men are more prominent in the supply of raw materials and as trade intermediaries. There is no ostensible competition perceived between the traditional and industrial actors involved in the procurement, as the same open auction process that characterises all fish transactions at the landing centres is applied to the fishmeal supplies as well. The fish intended for industrial processing do not enter the markets anyway and, like shrimp and high-value fish, are loaded on trucks immediately on landing and carried away to their distant destinations.

8.5. PROPORTION OF FISHMEAL IN THE OVERALL LANDINGS

In Visakhapatnam fishing harbour, data collected as part of this study on a weekly basis indicated that the average proportion of fish going into dried fish for human consumption and animal feed during the period of study worked out to 30% of the total landings. As a rule of thumb, the processors suggest that about a third of the fish intended for drying goes for animal feed, or roughly 10 percent of the total landings in Visakhapatnam fishing harbour.

In Kakinada fishing harbour, estimates based on the fish landings and interactions with boat owners and crew indicate that, in the normal trawl operations, fishmeal grade bycatch accounts for 25-30 per cent of the total landings (three times higher than that from Vizag harbour, on account of the latter dumping their 'trash' in the sea). Of this, around half the fishmeal grade product is iced for sale to Mangalore-based plants, and the remaining is dried with or without salt for their regular buyers from the poultry and aquaculture farms within the state. Needless to say, there are seasonal variations in the quantities of fish going into fishmeal – both overall and in the quantities going to fishmeal industries.

The speedboats are said to generate more fishmeal-grade bycatch than the usual mechanised trawlers. Thus, whereas in the usual mechanised trawling operations, the fishmeal-grade bycatch comprises about 30 percent, that in the speedboats reportedly goes up to as high as 50 percent seasonally. In Kakinada, as a thumb rule, some 20 percent of the total catch by the normal trawlers is calculated to go for dry fish operations for human consumption. Considering that the speedboats supply only small quantities to the dried fish trade, it can be assumed that the additional 20 percent that goes into fishmeal from the speedboats is constituted by fish that might otherwise have been dried for human consumption.

Unfortunately, without more reliable, day-to-day, data collected daily for at least one year, it has not been possible to quantify the total volume and proportion of fish going into the fishmeal trade, and how much of it could have been diverted from the dried fish trade for human consumption.

8.6. INDUSTRIAL FISHMEAL SUPPLIES FROM NORTHERN ANDHRA PRADESH

Currently, the demand for fishmeal reportedly comes from:

- Within Andhra Pradesh, Nellore and West Godavari districts which have several aquaculture farms and also corporate interests in the ancillary businesses such as feed manufacture; and East Godavari which plays host to a big poultry industry as well as aquaculture. There are also several small-scale industrial units in these districts, catering primarily to the aquaculture sector, but the proportion of their uptake from the local landings remains unclear. Fishmeal sent to the small-scale manufacturers reportedly consists of dried product (for poultry feed) and salt-dried product (for aquaculture feed).
- Ex-state markets for fishmeal include Karnataka (Mangalore) and Kerala. The fishmeal sent to these areas tends to be iced.

In the trawl sector, owing to the increasing costs of operation, decrease in the proportion of shrimp to the overall catches, competition and conflicts with local fishers for their traditional fishing grounds, and the increasing value of fresh/dried fish for human consumption, there is an increasing effort to bring back as much bycatch as possible in good condition. Once the sole property of the crew, now the sharing of the bycatch returns has become a lot more contentious and subject to several intricate arrangements by which the owners try to take a share of it. Also important in this regard is the shortening of the voyage times: as against 2-3 weeks as was the norm a few years ago, a fishing voyage from Vizag or Kakinada tends to be of a smaller duration – 1 week at most – which is an adaptation to ensure that more catches can be brought ashore in good condition for sale. In the case of speedboats, a 5-7 day fishing trip is the norm, while several small mechanised boats in Kakinada confine their operations to one or two days. All such considerations go against using humanly-edible bycatch for fishmeal purposes, especially when the prices paid for bycatch are by no means comparable to their counterparts in fresh and dried markets.

When the fishing crew onboard a trawler observe a good catch of 'trash' in the first few hauls of a fishing trip, which indicate the potential for good bycatch landings, they immediately communicate with the distant processing plants in Mangalore, Kerala or Nellore through their brokers stationed at Kakinada fishing harbour, to see if they will be able to buy the catch. Upon receiving the green signal, the bycatch starts being put in the fish hold along with ice (the companies purchase only iced fishmeal), and bring it back on a daily basis because the catches are large enough to fill the hold within a day and, in any case, they need to replenish the ice daily.

At times, the demand from the fishmeal factories is so high that huge quantities of bycatch are landed for immediate transport. At other times, the demand tends to be low, and the fishmeal-grade catches are sold to local processors. In such cases, the boats tend to keep their fishmeal (mixed with salt carried for the purpose) in barrels and land their catch at the end of a fishing trip which may last several days. The boat owners claim that the composition of the catch they get determines how they will sell the product: that, notwithstanding the demand, what they catch is what they sell, not the other way round. The glut landings of fishmeal grade product in the catches are explained as owing to their abundance during particular seasons, rather than a conscious effort at catching them. "*Who will go after trash that sells for Rs. 15 a kg if they have the opportunity to catch shrimp or fish that sells for several times more?*" asked a boat owner.

One problem in quantifying the supplies to the industrial fishmeal centres is that the channels of supply are not clear; they source the supplies through intermediaries

('brokers') who have already been involved in landing-side operations of procurement and transport to different fishery value chains either as traders or as commission agents. There is considerable competition among the brokers to procure fishmeal for industrial operations at the harbour, but this tends to vary from time to time. This means that the procurement processes for the industrial units are not transparent or easy to unravel. The practice of using intermediaries is explained as being due to past experience, when the arrival of new buyers into the landing centres automatically led to a shooting up of the prices (often artificially as the existing buyers tried to run the new competition out) making the new activity unviable.

The experience of Hindustan Lever, which had set up a Surimi-production unit in Visakhapatnam in the 1990s to make use of the cheap varieties of fish that landed abundantly by the mechanised boats, is instructive. Within days of Hindustan Lever starting to procure the bycatch, the prices of raw material shot up and the industry could not survive beyond a few seasons.

The economies of scale in industrial fishmeal production are reported to be so sensitive that they could procure the fishmeal only if the prices remained within a narrow range; any upward swing in prices would make their purchase unviable. To avoid the prices shooting up, the procurement must remain low-key and (as far as possible) unobtrusive, which is what has actually been happening. The different actors at the fishing harbours in Kakinada and Visakhapatnam are aware that quantities of fish are being purchased to be used in the industrial fishmeal plants, but the demand is not so significant as to encourage fishing efforts to be directed specifically at catching fishmeal (though it happens seasonally cannot be ruled out), or to lead to substantial price inflation. Even the speedboat operators insist that, despite half their catch being of fishmeal grade, they get a larger proportion of their income from commercial-grade fish than from the fishmeal. The women processors involved in dried fishmeal find no apparent changes in their procurement practices at fishing harbours which suggests that the competition from the industrial sources is not really apparent, nor has it led to increased prices for procurement.

That the industrial plants insist on the fishmeal-grade supplies to be iced makes supplying to them both an extravagance and also an option of last resort: if the catches – of any species – are of a good size to be sold for human consumption, it makes far better sense to sell them as fresh or dried fish, rather than to the industrial plants. It is only when the catch is of a poor quality that the boat operators deign to sell it to fishmeal – iced or un-iced. That a majority of fishing boats cannot afford to ice even the whole of their good catches means that an insistence on icing bycatch is never a viable long-term proposition for them.

However, one inducement that the boat operators have for selling their catches to the industrial plants is that they buy their catch and pay immediately. Also, during particular seasons, the plants buy almost any amount of fishmeal that can be landed. If the same catch were to be sold to the local fishmeal buyers, it would take days, and the payments require lots of haggling and compromises, which the boat owners cannot afford. All the same, given that most of the fish in fresh form can fetch two or three times as much as the fishmeal, they do take care to sort the catches according to their size and marketability onboard, and sell them according to their true market value.

The procurement for the industrial units has – to the extent ascertainable – been taking place only at the fishing harbours; the small-scale fisheries landing centres – even where they have large supplies of dried fish for fishmeal purposes – have not been targeted directly. In the case of the latter, it is still the large-scale dried fish processors who buy the fishmeal-grade supplies and process them, and it is possible that their product finds its way to the industrial units in a roundabout way. Thus, for instance, the women in Srikakulam district talk about some agents coming from West Godavari and Nellore districts, where aqua-feed manufacturing plants exist in good numbers, to procure fishmeal in bulk from the wholesalers in the local urban centres. But the quantities procured are such that the existing production accounts for them – there is no evidence that additional fishmeal production is being encouraged to cater to these buyers. The economics will not justify this.

Finally, for the industries themselves, the quality of the raw material reportedly poses some technical problems: the diversity of species, their size and composition, seasonal variations (e.g., in terms of fat content), etc., mean that standardisation poses a significant problem for them while utilising the catches. This latter issue means that the bycatch – though still an important ingredient in the feed formulations – has to be supplemented by other, more consistent, sources of cheap protein.

Overall, there is little evidence – except in the case of the speedboats – that the demand for fishmeal has increased so that larger proportions of marine fish have begun to be sourced by the fishmeal producers due to the growth of industrial fishmeal factories within or beyond the state. The supplies going to fishmeal have remained constant and consistent with the past trends, and there are no indications at any level in the sector of fishmeal becoming the new big actor. Speedboats, as will be discussed, fall into a different kind of problem.

In summary,

- the contribution of small-scale fish landings to fishmeal appears to be small and declining; an optimistic estimate puts the quantum of fishmeal from a village's landings at 5 percent.
- the contribution of the mechanised sector – which accounts for the most quantity of fish going into fishmeal – ranges from 10 percent (Visakhapatnam, on account of there being no landings of trash) to 30 percent (Kakinada);
- the speedboats seasonally contribute up to 50 percent of their catches to fishmeal industries, though their annualised contribution could be around 30-40%.

While generalisations across the sector can be hazardous, different estimates by the people with long knowledge about the sector and those with current experience of working in the sector suggest that about 15-20 percent of the total landed fish in northern Andhra Pradesh going into the fishmeal business, out of which about 35-45 percent may be going into industrial fishmeal plants in Nellore and West Godavari within Andhra Pradesh and in Mangalore in Karnataka. The proportions are season- and species-specific, hence there are wide variations in demand and supply in a year. However, ignoring the speedboats and their iced bycatch for industrial supplies, the overall production and disposal of fish into the fishmeal business has been widely claimed to have remained constant over the years, or at least constant enough to not make any obvious difference to the other stakeholders, especially dried fish makers and their consumers.

8.7. IMPACT OF FISHMEAL ON HUMAN FOOD SECURITY AND DRIED FISH TRADE

Two questions that this study was expected to address are:

(i) whether the growth in fishmeal is happening at the expense of food security of the people?
(ii) whether the growth of fishmeal has been at the expense of the dried fish trade for human consumption?

FOOD SECURITY IMPLICATIONS OF FISHMEAL PRODUCTION

As to whether growth in fishmeal is affecting the food security of the traditional consumers of fish (especially dried fish), the answer is that a large proportion of the fish going into the fishmeal segment of the value chains does so because it is considered unfit for human consumption. There are broadly five categories of catches that constitute fishmeal:

1. fish badly damaged and/or semi-spoiled by the time of landing and/or sale – almost 10 percent of the small-scale fish landings also fall into this category on account of poor handling and other onboard constraints; lack of ice along the value chains add to the losses.
2. undersized & juvenile fish (including that of all commercially important species), that have no commercial value, though their presence is important from a management perspective;
3. fish not used at all for human consumption (e.g., squilla, small watery crabs, pufferfish, octopus; *mangali mullu* – English/Latin name unknown);
4. fish landed during monsoons and/or affected by sudden rains, floods, or infestation problems; and during 'auspicious' months; i.e., at a time when either the consumers are not buying fish or when the processors and traders are in no position to handle/process/sell the catches;
5. fishery waste (crab shells, fish waste, shrimp shells)

Seasonally, there are times when the fishers are forced to sell their catch – even if it is fit for human consumption – for animal feed rather than as human food. However, by and large, fish catches are made into fishmeal *not* because it is a profitable proposition but because there are difficulties in selling it for human consumption and converting it to fishmeal generates at least some income while also ensuring that the protein is not entirely lost. In other words, if they are not made into fishmeal, they would remain inedible and/or unavailable for human consumption. The reasons for this state of affairs can be many, including:

a. use of nets of a small-mesh size (less than the legally permitted mesh sizes)
b. seasonal abundance of juveniles and younger fish of commercially important species in the trawl catches
c. manual operations to remove fish from the nets, leading to fish being damaged in the removal process
d. delays in the extraction of fish from the nets, in landing and at sale, leading to spoilage of fish and making them unfit for human consumption
e. exposure to direct sunlight for extended periods for lack of shelter and storage space onboard, leading to further spoilage,

f. bulk landings of small pelagic species that cannot all be used for human consumption, whether in fresh or dry condition
g. lack of infrastructure, workforce, and investments to preserve/process them for human consumption
h. drying of fish is difficult and/or problematic on account of rains and/or infestation
i. the inability of the markets to handle the influx of large quantities of dried fish for human consumption
j. consumer choices to avoid fish during auspicious months and other occasions.
k. sudden demand fluctuations on account of changes in supplies or demand from different sources
l. lack of ready transport facilities, especially during the monsoon months, at times of natural disasters or during festivals and health emergencies (such as Covid 19).

Some of these constraints stem from technical and logistical issues (which have no easy, immediate, or practical answers), some concern issues of fisheries management and conservation practices, while some others relate to investment and market weaknesses. Thus, for instance, when it comes to the juvenile catches of mechanised trawlers, the question is not so much whether those fish could have been used for human consumption as whether they should have been caught at all. Also, technical problems – such as handling bulk catches onboard and processing them for human consumption – have no ready answers, and the answer to this problem lies not in blaming external factors like fishmeal industries which are merely taking advantage of an existing loophole, but in addressing the current failures (at the institutional and individual levels) to plug the gaps, losses and wastage in the existing systems.

Unless such structural and systemic issues are addressed, fishmeal remains an important way – whether sustainable or (more likely) not – to effectively address the problem of bulk/under-valued/lost catches. As things stand, it is their being rejected as human food that largely forces the fish to be sent for fishmeal, rather than the other way round.

IMPACT OF FISHMEAL ON DRIED FISH

In Visakhapatnam fishing harbour, when the fish catches are landed, the export and ex-state varieties of fish are directly taken to the processors/ transporters for onward movement, while the rest are segregated onboard itself and landed for auction, according to their quality and the potential destinations:

- Local fresh fish supplies – accounting for up to 30-40 percent of the landings
- Dried fish for human consumption – about 20-25 percent
- Fish meal – about 10-12 percent

In the last two categories, fish are further sub-divided based on their quality: dried fish for human consumption are graded into good and average (grade 1 and 2); fishmeal supplies are graded into three groups:

- Grade 1: whole fish, less spoilage and more bodily damage, bigger in size – dried fish processors sometimes try to salvage a small part of it for drying purposes.
- Grade 2: Not-so-fresh, spoilage more pronounced, small-sized fish

- Grade 3: Poor quality, badly misshapen or mushy.

Based on the specific requirement and investment potential, each processor/trader has ample opportunities to make her choice as to what fish she would buy, and goes about it accordingly. Competition is intense, but so is the camaraderie. There is little, if any, evidence of the competition between the women fish processors and the men fishmeal suppliers being more – or less – intensive than that between any two trade competitors in the sector.

Species: The study has identified some 82 major varieties of fish being landing in the harbour around the year, from around 1,200 boats (750 mechanised, 350 motorised, and about 100 non-motorised) that operate from the harbour. Almost all of them have a good demand in the export, ex-state and urban, local, and dried fish markets, which means that – unless there is a specific factor affecting their uptake in the human value chains – none of them is likely to go into the fishmeal. The main species going into fishmeal are given in the following table:

Main constituents in fishmeal supplies: A quick summary

- *Used for human consumption: small sized varieties of silver-bellies, threadfin breams, croakers, trevallies, lizardfish, anchovies (porava), oravalu (need English/Latin name), sardines, rainbow sardines, scads (odugulu), bull's eye (Priacanthus spp.).*
- *Not consumed as human food: squilla, small crabs, other small arthropods, octopus, pufferfish, starfish, various molluscs with shell on, etc.*
- *Fish waste - heads, tails, bones, and guts – generated from the harbour-side preparation of fish for the other value chains are also absorbed by the fishmeal value chain, reducing wastes and improving hygiene in the immediate environment.*

Seasonality: The availability of fish for fishmeal is good during one quarter of the year (October to January) when the Northeast monsoon is considered to be active and brings unexpected rains. Also, the season is marked by several festivals and holy periods when people desist from consuming fish, so the demand is sluggish, and the price of fish comes down sufficiently to allow procurement for fishmeal. During June to September, the demand for dried fish is particularly high as people – both fishers and the inland/upland communities – depend on it for consumption during the Southwest monsoonal days, and little fish is available for fishmeal. During February-April, the supplies for dried fish tend to be smaller, and the dried fish for human consumption gets the upper hand in absorbing most of the landings. Overall, the fish movements into fishmeal mostly happen during one quarter of the year, although occasional bursts of demand from the trade could add to the supplies.

Size: Only the small-sized fish would go into fishmeal – all bigger fish in good shape and condition are accounted for either as fresh or dried products.

Price range: Comparative prices per kilogram of fish sold as fresh, dried and fishmeal at Visakhapatnam fishing harbour in February 2021 are as follows:

	Fish variety	Fresh-small	Dried-small	Fishmeal-all small
1	Ribbonfish	50	80	Rarely sold
2	Goat fish	90	120	25
3	Ice-cod	40	65	20
4	Mackerel	70	100	30
5	Anchovy	120	400	No sale
6	Sardine	40	60	20
7	Silver bellies	30	45	15
8	Croakers	50	70	30
9	Lizardfish	100	150	25
10	Catfish	90	140	No sale

A comparison of the average prices of fresh fish sold for fishmeal production and dried fish for human consumption at Visakhapatnam fishing harbour shows that the fish going for human consumption pay several times the return that fishmeal would provide.

Value chain	Grade	Price/KG (in Indian Rupees)
Fishmeal	I	20-30
	II	15-20
	III	12-16
Dried fish for human consumption	I	50-150
	II	30-75

Comparative prices of fish as fresh and dried at Kakinada fishing harbour in February 2021:

Fish	Fresh	Dried
Ribbonfish	32	70
Croakers	52	66
Rainbow sardine	35	45
Threadfin bream	45	66
Humphead (*Poosapariga*; Kurtis spp.)	45	200
Hairfin anchovy (Thokapariga; *Setipinna* sp.)	40	180
Spider prawn (*Nematopalaemon* spp. Chingudu royya)	66	500
Shrimp	72	300
Catfish	50	65

The average price of fishmeal-grade product (mixture of diverse species) at Kakinada fishing harbour:

Variety of fishmeal	Average price per kg in rupees
Salted fishmeal (sold for local aquaculture farms)	17-18
Unsalted fishmeal (sold for poultry farms)	28
Iced fishmeal (for Mangalore companies)	17-18

In summary, to answer the question of whether fishmeal is affecting the availability of fish for dried fish trade:

The value of fish for human consumption – mainly fresh but also dried – has been going up so rapidly that, the fish processor-women claim, despite selling much smaller quantities of fish now than they did a decade ago, they are still able to maintain themselves at the same level as before. The complaint about dried fish is not so much that it is not a paying proposition, as that it involves much hard work. The traders repeatedly point out that the limiting factor to their trade is not flagging demand or the prices that they obtain, but their own inability to source bigger quantities of fish, keep them in good shape and transport them which involves a lot of hard work and the necessary labour is not easy to find. If such issues are addressed, the women claim, they could easily handle ten times as much fish as they are doing now and earn that much more.

Another evidence for the growing demand for fish comes from the increasing numbers of fish traders – mainly fresh – who have been observed in all villages. The fish they usually deal with are small, cheaper varieties that, in the past, would have been dried, but are now fetching a good price in fresh condition: so much so that even so many women competing for the fish and handling smaller per capita supplies are still able to make a reasonable living. Furthermore, the number of traders is still increasing, which indicates that the value/demand for fish for human consumption is high, and will continue to increase further. This situation means that selling the fish for fishmeal – which is usually a distressing measure – is unlikely to be a viable option.

Also, a large proportion of the women being forced to travel long distances in search of fish for drying and/or fresh sale means that the catches in the local landing centres are mostly catering to the high-end markets and have little to offer to the smaller traders/processors, let alone fishmeal companies. At the same time, the arrival of so many women to the fishing harbours actually reduces the amount of fish that would go into fishmeal because the women are purchasing the same species – if landed in good condition – for their business purposes. A visit to any fishing harbour will show that the women fish vendors and processors are the stronger competitors in any auction. And the sharing patterns onboard the fishing boats are such that the crew have a reason to ensure that their catches are landed in good condition so their own share from the sale would be higher.

The fresh fish trade is where the competition for dried fish comes from, and it is a competition in which the latter is losing. The prospect of fishmeal assuming such proportions as to threaten the availability of fish for human consumption does not find much purchase at the processors' level. There are no noticeable impacts on the availability of dried fish for human consumption owing to the fishmeal sector.

In summary, the increase in demand for bycatch for fishmeal is a result of gaps and failures in the existing structures, policies, institutions, and processes relating to fisheries

management, technical and infrastructure support, investments and labour, and market support, rather than the possibility of making good profits from it. The existing demand for fish for human consumption is so much more lucrative and bigger that the feed manufacturers can offer no competition at all: if they do, they'll end up being the losers because their margins are so much smaller compared to that of even the smallest fresh fish vendor or a dried fish processor.

9. STRATEGIES ADOPTED BY PROCESSORS TO COPE WITH CHANGING CONDITIONS IN DRIED FISH PRODUCTION AND TRADE

As the study has indicated, the dried fish processors have a good understanding of their businesses' strengths and weaknesses, the challenges and constraints that face them, and even some of the ways of addressing them. Their activities are optimised to make the most of whatever is available, accessible, and appropriate to their particular circumstances. If there were a change in the conditions, as far as possible they would work around it rather than try to tackle it directly. With growing uncertainties of supply, the activities are focused on minimal investments and minimal returns. This is reflected in the flexible and opportunistic modes of operation, where each cycle of operations is an end in itself and compromises in terms of quality, quantity, and value are the norm.

That the women processors have managed to come so far speaks volumes about their capacity for adaptation. As each new challenge arose, they made the necessary changes to their work patterns either by accommodating each challenge into their work (e.g., if the markets would not absorb all the dried fish that the women could make, they made it into fishmeal which fetched less but at least allowed them to earn a bit; also, accepting that a part of their fish must be lost in the processing chain, they accommodated the loss into their business calculations and *normalised* the loss); or by doing their work differently (e.g., when fish landings began to be centralised, the women travelled to where they were landing; when ice arrived, the women opted to focus on the cheaper fish that had less value in fresh condition; with fresh fish proving to be a safer bet, most processors entered into fish vending, and only secondarily involved in making dried fish).

As the study shows, the women made changes to the way they sourced their supplies (from centralised landings, involving group procurement practices; using private transport); processed their product (using less salt, with better moisture levels, and making customised products to cater to the new middleclass consumers); and sold it (directly to the wholesalers instead of in the weekly markets; using phones to communicate with their customers; taking advantage of new opportunities like apartments etc.). These changes may not be substantial – they are not intended to be, on account of the lack of resources and of the risks implicit in going for big changes – but they at least allow the women to keep going in a state of equilibrium.

However, it needs to be noted that the dried fish value chain and its main protagonists (i.e., the women processors) can only take so much strain and no more. Unlike fresh fish value chains, where traders have more leeway in terms of their access to supplies, investments, markets, and returns, people in the dried fish value chain have limited space to manoeuvre. What this means is that while the women can make some short-term changes to their ways of work and business to make ends meet, they cannot undertake radical changes to the way things happen – not only because they lack

the resources but also because the dried fish value chain limits the choices for action beyond the most basic ones. In order to take that extra jump, it requires a much bigger vision and a heavy-duty support programme, which, however, do not seem to be anywhere in the pipeline.

Overall, the women's adaptation strategies to cope with the changing conditions in the dried fish business show four levels of responses:

1. *Business-as-usual*: i.e., carry on as usual, hoping that things will stabilise eventually. No major changes in the working patterns, unless unavoidable, in which case, find the next best option to keep things on a steady keel. The women processors in Srikakulam offer a good example for this kind of adaptation (or lack of one): their operations have remained largely the same over the decades; however, the women were aware that ice would arrive sooner or later into their area and that they would have to be prepared to cope with the challenge it would pose to their businesses. However, they believe that they would survive somehow; a hope tinged with fatalism because the women have no clear strategic evidence to back up their optimism.
2. *Do it better*: i.e., address the challenges by finding alternatives sources of supplies, processing technologies/practices, markets, and institutional mechanisms. This study has provided numerous examples where the women have sought to expand their sources of supply and markets, transportation arrangements and consumer base.
3. *Balance it with another one (or keeping their feet in two boats)*: i.e., as dried fish business by itself is unlikely to support the women's livelihood needs, they seek to diversify into other occupations to balance their income levels. The most important activity that a majority of women processors have shifted into is fresh fish vending; while in rural areas, they work seasonally in agriculture, although the overall opportunities for diversifying their activities are fairly limited. Where opportunities exist, the women also take up work as shrimp peelers and processors in export-processing units (e.g., BCV Palem, Uppada in East Godavari).
4. *Ditch it for another*: i.e., shift altogether out of dried fish trade to make a living in another activity; once again, switching full-time to fresh fish vending is on the rise. In urban areas, working as domestic labourers is one of many options pursued by the women; working as construction labour, cooks in the tourism sector, and running small businesses, accompanying their husbands in their migratory paths, have also been indicated, though the processors' low literacy levels force them into unskilled, low-paying, occupations with no fixed tenure.
5. *Just shut down operations*: i.e., women stop making dried fish and depend on their family members to support them. Several women and men have reported that they stopped fish drying and smoking to avoid the stress and hard work, and stay home. (BCV Palem, Pudimadaka, and several other locations).

10. DISCUSSION: IS DRIED FISH STILL RELEVANT?

Since the beginning of the 21st Century, the fisheries sector has undergone significant changes affecting the supply, demand, value chain transformations of fish and fishery products, which in turn resulted in changes to the dried fish producers' access to the fishery resources, infrastructure, and markets. Besides changes within the fisheries sector, there have also been changes brought on by external macro-economic

transformations – industrial policies and development, urbanisation, oil & gas exploration, tourism, and natural resource conservation programmes – which have impacted inter alia, the dried fish trade. Thirdly, the communities themselves have undergone major changes (in terms of access to human, social, economic, political, institutional, and informational resources) over the decades at both individual and collective levels and such changes are having by far the most important implications for the future of the small-scale fisheries sector as it is understood today. Finally, climate change and natural disasters – often aggravated by human actions – too have an impact upon the way fishers produced, processed, and sold their fish in all its various forms.

As radical and transformative as these changes have been on all aspects of the life and livelihoods of the small-scale fishers, including the dried fish processors and their activities, what is equally remarkable is how little some aspects of the fish processing activity have changed in tune with the times. Suppose someone was visiting a fish processing area after a break of two decades. In that case, they might be surprised to see everything as it was 20 years ago: the way that the fish are processed, the conditions of processing, the trade arrangements and the consumer profiles, and the working conditions and the gender context, the institutional support (or the lack thereof) for processing and the processors, and the occupational health and insurance coverage issues… Even the problems with blowflies and monsoon losses remain as endemic as they ever were, notwithstanding all the 'systems-based' research that aimed to control them. This apparent 'changelessness' in the face of major drastic upheavals in the sector might be optimistically construed as reflecting the stability of the dried fish value chains, but – more plausibly – it might also mean the inability of the system to adapt to change. Whether this unchanging state of affairs is a strength or a weakness may determine how the dried fish sector will fare in the coming years.

Today, the dried fish processors find themselves caught between a rock and a hard place: the businesses in which they have spent a lifetime show little hope for moving forward. The best they can hope for is that they will remain stable for at least as long as the current generation of processors are still in business; but that seems like a tall order. The declining access to resources, the challenge from iced fish, and the changing consumer preferences towards fresh fish, are quite significant in terms of their impacts on the dried fish business.

The processors are unable to make more than the barest investments to keep themselves going for the day and few processors speak with any confidence in the long-term sustainability of the activity. The current predicament facing the activity is also such that there are not many options to improve it within the limits posed by the challenges facing it. Some of the challenges faced by the women include:

- The availability of, and access to, fish has become more difficult owing to competition and concentration of landings in a few, centralised, places.
- The beaches have become contested spaces, and the space available for processing and related activities is shrinking.
- There have been few investments in infrastructure, and the quality of production allows losses and wastage to proliferate, while restricting the demand to the poorer consumers.

- The credit systems have improved but, at best, they allowed the women to stay where they are and, at worst, made them more debt-ridden.
- Their working conditions are harsh and solitary (in the absence of support from other family members and inability to employ wage labourers), the work consumes long hours, and the processors' health and safety remain issues of concern.
- The markets are distant and, while the demand is good, also characterised by wild uncertainties and fluctuations, leading to the women losing investments as frequently as making profits.
- With increasing migration of men in search of better employment opportunities, the burden on the women to contribute to the family's income is increasing: whereas earlier, being in business was a choice for (at least some of) the women, now it is a compulsion.
- There is an overall improvement in social terms, literacy, healthcare, transport and water facilities, but congestion, poor hygiene, and sanitation remain matters of concern and affect the processors personally and professionally.
- Disaster responses have become more effective, but the ability of the people to cope with the natural disasters on their own remains low and the disaster responses overlook the needs of dried fish processors.
- Family size has come down, which helped the women to take better care of their children's wellbeing, but the switch to nuclear and small families has meant a problem of labour shortage in the fish processing activities and a further disincentive for fish drying as a regular livelihood option.

In Pudimadaka, there were 65 medium-scale and 5 large-scale dried fish processors in 2013; today, their numbers have come down to 5 large families alone, while another 10-15 women are involved in purchasing and selling dried fish only. In BCV Palem, the number of fish smokers was around 20 in 2010, but the number has come down to 11 now; the earlier number included some 8 large-scale processors, now none of the current batch of processors falls into the big league. The list can go on almost indefinitely. A SWOT analysis about the dried fish businesses, undertaken along with the members of the field study team, has come up with the following points:

Strengths	Weaknesses
• Market demand – good and strong, widespread • Large consumer base of poor people (e.g., tribal communities) whose choices are limited • Longer shelf life of dried fish: no need for distress sale • Cost of fish and transport are the only main expenses. • Multispecies fisheries: round the year availability of fish. • Multiple supply sources: glut landings; fishing harbours and leftover fish in fresh fish trade: assured supplies round the year • Fishmeal offers a backup option	• Access to beaches and drying spaces reduced and contentious • Rural landings focused on high quality fish, few catches for dried fish • Increasing competition at the landing centres, markets, and other places from within and between fishery value chains • Need for ready cash investments • Poor production quality • Processing problems – losses during rainy seasons; blowfly infestation; etc. • Few opportunities for diversification of products and markets • Social resistance and lack of support for drying. • Labour-intensive; finding cheap labour a problem.

• Women-oriented businesses: better negotiating skills and access to investments. • Increasing access to private transport.	
Opportunities	Threats
• Diversification of trade to cover fresh and dried supplies to reduce risk and increase choices. • Value addition and loss reduction with low-cost improvements, better returns from reduced losses and wastage (i.e., without burden of high price for the consumers). • More bycatch moving into dried fish (instead of being made into fishmeal). • Better standards being applied to improve the quality (provided there is support to implement the standards without burdening the women). • Supermarkets and inter-state urban markets expanding; though potential opportunities for small-scale processors yet to be explored. • Tourism development as an opportunity for selling better quality dried fish/ethnic food.	• Ice and growing demand for fresh fish • Possibility of fishmeal production increasing at the expense of dried fish (?) • Future generation not interested in business • Poor levels of upper/middle class acceptance • Industrial development, urbanisation, and tourism threatening access to space for living and work. • Erosion • Climate change impacts: changing fish availability and seasonality, unseasonal/unusually heavy rains, failure of rains, floods, cyclones and other natural disasters etc.

The answer to whether dried fish business (as it has been pursued by the women down the generations) is sustainable or not cannot be categorical one way or the other. All hard evidence seems to indicate the odds stacked against its survival (not the least of the threats being the disinterest within the communities to let their next generation to get involved in it). Even if dried fish do not vanish altogether, the subsector's capacity to support the livelihoods of a large number of people (as it has hitherto done) must shrink.

On the other hand, at least two factors – that there will always be some part of the fish catches that must be processed in order to not waste them; and that there is always a good market for dried fish – would seem to counteract the dire predictions. Even more importantly, despite all their concerns and worries about the present and the future of their businesses, what comes across in the conversations with the women is their sense of humour, and an ability to take life easy and laugh at it. These women do not consider themselves as helpless victims of an unjust society, and sit silently moaning about their fate; they are active agents of their life (and that of their family members) and exude confidence that they have the resilience to survive – and more. Their exposure to the harsh world of marketing, especially one which involves having to cross the class divide with their customers on a daily basis, means that they have few illusions; nor do they expect the government (or development bodies) to sort out their problems, (though that does not stop them from asking for all sorts of help, just in case). They are aware that they are living with adversity, but they have come to terms

with it. As one woman put it, "*When did we not live on the edge to fear that we may fall now?*"

Her comment might just as well answer the question about the future survival of dried fish business. That, like a patient living a full life even as she is under threat of death from an incurable disease, dried fish business has been under a death sentence long enough to dismiss claims of its imminent death perhaps – as that of Mark Twain's – as 'a little premature' and move on. Although recent history shows how technologies that had dominated the small-scale fisheries scene hardly a generation ago – *teppa* (wooden log-catamarans), sails, nylon nets, *pedda vala* (a variety of beachseine with a longer cod end, made of cotton), salt pans, and bamboo baskets – have had to make way for new technologies and practices, dried fish seems more resilient because of the good demand that it commands in the markets and also because the processors believe that there will always be fish to be dried and sold. Streamlining the systems and ensuring appropriate support at different stages along the value chain, should keep the activity going for at least as long as the current generation lasts.

11. SOME IMMEDIATE ACTIONS SUGGESTED BY THE FISH PROCESSORS TO HELP IMPROVE THEIR CONDITIONS

The purpose of this section is to summarise the findings in relation to the final objective of the study: "To begin to identify actions to inform future policy and support processes for more robust and meaningful dried fish support systems to be in place." However, as the study progressed, it became apparent that this was not a practical option. For one, the ongoing Covid 19 pandemic and how it will manifest itself in the coming months and years upon the women processors' lives and livelihoods remains uncertain. More fundamentally, it is clear that the changes affecting the activity stem from factors beyond the dried fish value chain itself. Issues relating to, for example, better fisheries management [11] ; macro-economic policies and their impacts; changing market/consumer demands, preferences and choices; behavioural, attitudinal, and aspirational changes among the fishers themselves; and not the least, the human element in the dried fish business – such issues require a long-term, multi-dimensional, approach to addressing them and not just a few glib suggestions and recommendations.

While the need for better reflection for a long-term strategic initiative is undeniable, it is also necessary that the more immediate needs of the women be collected and consolidated for ready actions. Thus, at each fishing village covered by the study, the women processors were asked to make a few recommendations about the immediate steps required to improve their conditions. The following list provides a summary of the suggestions given by the women in no particular order of importance.

1. Better facilities at fish landing centres, fishing harbours, and markets to cover the needs of women fish traders and processors (both occupational and personal needs), with a special focus on safety and security.

[11] Fisheries management is used here in the sense of covering all activities – at sea and on land – that comprise fisheries, and not just resource conservation.

2. Insurance coverage for fisherwomen to cover fish procurement, trade, processing, and transportation areas
3. Legitimate use rights to the fish processing areas for fish drying, to be based on specific criteria to ensure only fish processors can make use of the rights
4. Better infrastructure for fish processing – washing, curing, drying, storing, and packing facilities; shelters for women to escape from the heat; drinking water facilities.
5. Forest department to ensure that the processors are not deprived of their traditional rights to the beaches and other processing areas while setting up the Green Belts.
6. Loss reduction and value addition using simple low-cost techniques, supplemented by market access arrangements
7. Need-based credit programmes to specifically target fish processors' needs holistically and sustainably.
8. Insulated iceboxes and efforts to enhance access to ice in sufficient quantity to the processors
9. Better WASH facilities (water, sanitation and hygiene) at the community level and at the fishing activity level, ensuring close coordination between the two.
10. Research to address glut landings used for drying; to reduce monsoon and blowfly losses of large quantities of dried fish.
11. Research to reduce time and losses in removing small pelagic species from the gillnets.
12. Effective regulation to control and stop capture of juveniles and smaller fish in the shrimp bycatch and by speedboats (smaller fish in the bycatch can be utilised for human consumption but are badly damaged when caught in the trawl nets).
13. Specific policies to highlight the role of women in small-scale fish processing and trade and ensuring space for them in all development policies and programmes (such as the PMMSY, a flagship programme of the Government of India which does not even mention women and small-scale fish traders/processors).
14. Support to women through training and follow-up support to explore other, more sustainable, employment options.
15. Adequate amounts of lean season assistance to all fish processors, traders, and supplementary workers to tide over the fishing ban period.
16. Educated unemployed youth in villages encouraged to take part in more corporate-style programmes for value-addition, packaging and urban marketing of dried fish products.

APPENDIX 1: LIST OF PROCESSORS INTERVIEWED FOR THE STUDY

VISAKHAPATNAM DISTRICT

SNO	NAME	AGE	EXPERIENCE IN DRIED FISH BUSINESS
PUDIMADAKA			
1	Arjilli Rajamma	62	38
2	Arjilli Ramanamma	45	15
3	Arjilli Bapanamma	46	15
4	Merugu Nookamma	58	13
5	Mailapalli Yallayyamma	35	10
6	Merugu Thotamma	60	25
7	Koviri Theekalamma	38	10
8	Arjilli Bandemma	45	18
9	Dhoni Durgamma	65	30
10	Yeripalli Polamma	45	8
11	Arjilli Thotamma	40	15
12	Merugu Masenamma	65	20
13	Arjilli China Appayyamma	65	30
14	Yajjala bandemma	43	15
15	Merugu Thotamma	30	5
16	Merugu Doddamma	60	35
17	Merugu Kondamma	53	25
18	Dhoni Masenamma	35	10
19	Merugu Kasulamma	38	12
20	Dhoni Yarramma	65	35
21	Dhoni Atchamma	42	14
22	Yeripalli Bapanamma	56	21
23	Dhoni Polamma	45	10
24	Dhoni Gantalamma	65	20
25	Merugu Atchamma	60	21
MANGAMARIPETA			
1	Vasupalli Yallamma	47	20
2	Kakakalla chittamma	50	18
3	Vasupalli pentamma	55	10
4	Vsupalli yamini	40	12
5	Pattivadi Yallayyamma	46	15
6	Bade Yallamma	55	25
7	Vasupalli Kavitha	37	13
8	Surada Guna	42	25
9	Surada Appalakonda	50	23
10	Surada Nookalaamma	45	18
11	Mailapalli yallayyamma	44	18
12	Pukkalla Peda Rajamma	48	15
13	Allipilli Danayyamma	50	20
14	Ragathi Kunchamma	65	30
15	Surada Danayyamma	66	34
16	Valla Satyavathi	38	10

17	Vasupalli Nookalamma	37	10
18	Ragathi Paridesamma	45	13
19	Vasupalli yalmaji	33	7
20	Merugu sattiyyamma	60	28
21	Mailapalli Nookalamma	42	21
22	Mailapalli yarramma	50	15
23	Kuramdasu pentamma	60	24
24	Surada devi	37	7
25	Dasari Dasulamma	37	10
VISAKHAPATNAM FISHING HARBOUR			
1	Kola laxmi	45	12
2	Vasupalli yallayyamma	47	14
3	Surada narasayamma	56	30
4	Dowlapalli yarramma	55	35
5	Mailapalli samalamma	52	25
6	Tholada paridesamma	56	27
7	Chenna nookalamma	48	24
8	Tholada ramulamma	52	28
9	Pukkalla bangaramma	54	24
10	Bevara sattamma	49	22
11	Antiboyina dhanalaxmi	48	18
12	Boddu laxmi	47	25
13	Yeripalli appayyamma	49	23
14	Kadiri gurramma	49	25
15	Yeripilli nookamma	47	22
16	Garikina yarramma	51	27
17	Chodipilli appayyamma	50	22
18	Vasupalli paridesamma	55	30
19	Palepu manga	50	25
20	Chodipilli mutyalamma	52	22
21	Pukkalla satyavathi	53	24
22	Surada ramulamma	52	25
23	Surapalli laxmamma	48	22
24	Meda yallayyamma	53	25
25	Ragathi paridesamma	53	27

SRIKAKULAM DISTRICT

PEDDA KARRIVANIPALEM, KAVITI MANDAL			
1	Uppada Bharathamma	63	35
2	Iddi Kesamma	70	40
3	Magupilli Aadilaxmi	38	10
4	Radda seyamma	50	20
5	Pappu Thavitamma	60	40
6	Karri pushavathi	42	15
7	Iddi Chayadevi	44	10
8	Bade Kanthamma	56	30
9	Gandipilli parvathi	48	15
10	Karri Parvathi	54	25

11	Karri laxmamma	50	22
12	Karri saramma	45	21
13	Karri Neelamma	50	30
14	Saguru punnamma	47	22
15	Aavala kalavathi	42	18
16	Karri savithri	65	40
17	Dasa kamamma	60	35
18	Dasa damayanthi	51	20
19	Aavala Renukamma	48	22
20	Landa Narayanamma	52	26
IDDUVANIPALEM			
1	Yeripilli Parvathi	60	40
2	Baipilli rangamma	55	30
3	Gandapilli polamma	57	30
4	Jogi sandamma	43	18
5	Karri Gunnamma	63	40
6	Yeripilli kamamma	50	20
7	Baipilli Bapanamma	45	20
8	Karri Kasamma	55	23
9	Baipilli Jogamma	38	10
10	Boddu eswaramma	40	8
11	Karri janakamma	32	7
12	Ganagalla Manikyamma	60	35
13	Karri Punnamma	55	30
14	Konedu dhanalaxmi	32	6
15	Yeripilli manikyamma	62	32
16	Serapilli atchamma	45	15
17	Karri nookamma	65	32
18	Baipilli daambavathi	53	21
19	Baipilli santhamma	53	25
20	Baipilli yasodha	48	20
GUPPIDIPETA, SANTHABOMMALI MANDAL			
1	Koda balamma	44	19
2	Surni Adilaxmi	38	12
3	Komara Appalamma	39	11
4	Kadiri Haremma	67	27
5	Kadiri kasamma	43	10
6	Kadiri paidamma	39	11
7	Chokka mallamma	65	18
8	Nalla kondamma	44	12
9	Nandupilli haremma	47	17
10	Guntu rajamma	60	21
11	Koda Laxmamma	39	15
12	Bugatta kamayyamma	70	25
13	Kadiri Rajamma	47	13
14	Guntu somulamma	37	9
15	Kadiri Atchamma	59	15
16	Koda gurramma	64	20
17	Pukkalla bapanamma	39	15

18	Chokka rajulamma	70	20
19	Pukkalla laxmamma	54	16
20	Nandupalli laxmamma	55	19

EAST GODAVARI DISTRICT

KAKINADA			
1	Danduprolu Annavaram	55	Kakinada fishing harbour
2	Mailapalli Bagirthamma	65	Subbammapeta
3	Piramalla Aadamma	60	Subbammapeta
4	Uppada Ameenabadh	65	Subbammapeta
5	Surada Papa	45	Uppada
6	Bondu Nallamma	65	Uppada
7	Pavepu Kameswari	67	BCV Palem
8	Pemmadi bhudevi	65	Pallam
9	Karri Srilaxmi	60	Pallam
10	Malladi nagaveni	45	Pallam
11	Kollu Parvathi	60	Fishing harbor,Kakinada
12	Balagam veeramma	65	Fishing harbor,Kakinada
13	Pegingi poosalamma	51	BCV Palem
14	Aradaadi Adilaxmi	65	BCV Palem
15	Sangadi Bayyamma	62	BCV Palem

APPENDIX 2: WORK ROUTINES OF SELECTED FISH TRADERS AND PROCESSORS TO INDICATE TIME INVESTMENTS IN FISH DRYING

1. Arjilli Bendamma (Dried fish producer-trader), Pudimadaka, Achyutapuram Mandal, Visakhapatnam District

ACTIVITY	Start time	End time	Time in hrs.
Day 1: Fish procurement and preparation			
Travel: Pudimadaka-Visakhapatnam fish harbour (65km) by autorickshaw for fish purchase	3:00	5:00	2
Fish procurement, packing and loading	5:00	8:00	3
Return: fishing harbour to Pudimadaka (heavy traffic)	8:00	11:00	3
Household work (cooking, water collection, washing)	11:00	13:00	2
Preparing fish for drying: removal of scales, gills, gut; washing; salting, and curing	13:00	17:00	4
Wash and rest	17:00	18:00	1
Household work (cooking, etc.)	18:00	20:00	2
Sleeping	22:00	2:00	4
Travel: Pudimadaka-Vizag fishing harbour for collection of fish	3:00	Etc.	
Day 2: Fish processing			
Domestic chores (cooking, readying children for school, groceries, water etc.	5:00	7:00	2
Removal of fish from the vats, washing, and spreading out to try	7:00	10:00	3
Fish drying: turning the fish over, keeping guard, preparing fresh batches of fish for curing/drying	10:00	17:00	7
Collection of semi-dried fish in heaps and covering with tarpaulin/plastic sheets	17:00	18:00	1
Household work	18:00	20:00	2
Day 3 & 4: Sale at weekly fish market			
Drying of fish completed (turning fish, removing damaged/broken fish, pooling catches)	8:00	12:00	4
Household work	12:00	14:00	2
Packing dried fish according to species and quality in gunny bags	14:00	18:00	4
Travel to Nakkapalli weekly dried fish market by van	1:00	3:00	2
Fish sales	3:00	6:00	3
Collection of payments, making purchases for household work	6:00	8:00	2
Travel back to Pudimadaka	8:00	10:00	2

2. Yeripilli Mutyalamma, street vendor (dried fish reseller), Pudimadaka, Achyutapuram Mandal, Visakhapatnam District

ACTIVITY	Start time	End time	Time in hrs.
Day 1: Dried fish procurement from weekly market			
Travel: Pudimadaka-Nakkapalli dried fish market	1:00	3:00	2

Dried fish procurement from wholesalers	3:00	6:00	3
Dried fish packed in gunny bags and return to Pudimadaka	7:00	10:00	3
Fish spread on platforms for re-drying	11:00	13:00	2
Wash, lunch and rest	13:00	14:00	1
Keeping guard over fish, turning them over, etc.	14:00	17:00	3
Heaping dried fish to store for the night	17:00	18:00	1
Household work (cooking, etc.)	18:00	20:00	2
Sleeping	22:00	2:00	4
Day 2: Fish re-drying continued.			
Day 3: Selling dried fish			
Travel: Pudimadaka - Chodavaram	4:00	6:00	2
Street vending in Chodavaram (with short break for lunch)	6:00	17:00	11
Return to Pudimadaka	17:00	19:00	2
Household work	20:00	21:00	1

3. Magupalli Adilakshmi (Fresh and dried fish seller), Pedda Karrivani Palem, Kaviti Mandal, Srikakulam District

ACTIVITY	Start time	End time	Time in hrs.
Household work (cooking, preparing children for school, collecting water)	6:00	8:00	2
Fresh fish purchased at the village landing centres; fish in curing vats from previous day removed and spread out to dry	8:00	11:00	3
Lunch, icing fish and packing for transport	11:00	12:00	1
Travel to interior markets (Andhra Pradesh & Odisha) by autorickshaw	12:00	14:00	2
Street vending (Fresh for the most part; small quantities of dried fish, own product)	14:00	18:00	4
Return home	18:00	20:00	2
Leftover fish prepared for curing and put in salting vats; fish left to dry recovered and stored	20:00	21:00	1

4. Pappu Thavitamma (large-scale fish processor and fishmeal producer), Pedda Karrivani Palem

ACTIVITY	Start time	End time	Time in hrs.
Day 1: Fish procurement and drying			
Fresh fish purchased at the village landing center	8:00	11:00	3
Fish washed and kept out to dry (no salting done) on old nets, mats, platforms, or directly on sand	11:00	13:00	2
Monitoring and keeping watch on the fish	13:00	17:00	4
Fish heaped to safeguard for the night	17:00	18:00	1
Day 2: Fish processing continued			
Day 3 (Saturday) & 4 (Sunday): Sale of dried fish in weekly market			

Finished product collected and packed in gunny bag	8:00	13:00	5
Travel to Humma weekly dried fish market (Sunday) by van	15:00	18:00	5
Sale of dried fish in Humma	24:00	04:00	4
Return to home	06:00	11:00	5

5. Uppada Bharathamma (Medium-scale dried fish re-seller), Pedda Karrivani Palem, Kaviti Mandal, Srikakulam District.

ACTIVITY	Start time	End time	Time in hrs.
Day 1			
Travel to Visakhapatnam fishing harbour (260km) by van for procurement of supplies in a group	16:00	22:00	6
Sleeping in the open at Vizag harbour	23:00	04:00	5
Day 2			
Purchases of dried and semi-dried fish	6:00	11:00	5
Grading purchases	11:00	13:00	2
Lunch and rest	13:00	15:00	2
Purchases resumed upon arrival of fresh batches of supplies	15:00	17:00	2
Packing dried fish and loading on van	17:00	18:00	1
Travel to Pedda Karrivani Palem	18:00	24:00	6
Wash, eat and go to bed	24:00	1:00	1
Day 3			
Sharing of fish among the women collective	9:00	10:00	1
Re-drying fish individually	10:00	17:00	7
Day 4			
Travel to interior markets in AP and Odisha	5:00	7:00	2
Street vending (with a short break for lunch)	7:00	17:00	10
Return to village	18:00	20:00	2
Wash and eat	20:00	21:00	1

6. Adadadi Adilakshmi (65 years), Fish smoker, BCV Palem, Tallarevu Mandal, East Godavari District

Waking up	3:00 AM
Freshening up	3:00-3:30
Travel to Matlapalem fish landing centre	3:30-4:00
Procurement of fish supplies	4:00-6:00
Payments; packing fish; loading into autorickshaw	6:30-7:00
Return home: BCV Palem	8:00
Washing fish	8:00-8:15
Preliminary drying of fish in the open	8:15-9:00
Bathing, breakfast and other daily tasks	9:00-9:30
Collection and cleaning the smoked fish from the previous night's operation; removal of waste from fish	9:30-11:30
Cooking lunch	11:30-12:00
Turning the drying product to ensure uniform drying; segregating small shrimp from large shrimp	12:00-14:30

Lunch	14:30-14:45
Afternoon siesta	14:45-16:00
Collection of drying shrimp/fish to arrange on the smoking platforms	16:00-17:00
Starting the fire and efforts to generate sufficient heat and smoke	17:00-17:15
Arranging fish and shrimp on the smoking platform, and looking after the smoking process at close quarters	17:30-19:30
Laying additional quantities of shrimp and fish on the smoking platform; in between, taking time to cook supper for the family.	19:30-21:00
Fresh supplies (from local estuarine tidal nets) procured and directly laid on the platforms for smoking without pre-drying.	21:00-21:30
Eating supper and watching TV	21:30-22:00
Going to bed.	22:00-22:30