CMPA Technical Report Series

01

A Livelihood-based Analysis of Palk Bay

January 2014

Implemented by

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of :

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

Indo-German Biodiversity Programme
Conservation and Sustainable Management of Coastal and Marine Protected Areas

CMPA Technical Report Series No. 01
A Livelihood-based Analysis of Palk Bay

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Published by
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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January 2014

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Photo Credit
Akshaya M. Mane

Design and Layout
Commons Collective, Bangalore
shibipeter@gmail.com

Citation
Salagrama V. 2014. *A Livelihood-based Analysis of Palk Bay*.CMPA Technical Series No. 1. Indo-German Biodiversity Programme, GIZ- India, New Delhi.

A Livelihood-based Analysis of Palk Bay

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01

Indo-German Biodiversity Programme
Conservation and Sustainable Management of Coastal and Marine Protected Areas

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List of Acronyms

AFI	Aquaculture Foundation of India
BDA	Biological Diversity Act
BHS	Biodiversity Heritage Site
CAS	Centre for Advanced Study in Marine Biology
CMFRI	Central Marine Fisheries Research Institute
CMPA	Coastal and Marine Protected Areas
CRZ	Coastal Regulation Zone
CSMCRI	Central Salt and Marine Chemical Research Institute
CSO	civil society organisation
CVCA	Critically Vulnerable Coastal Area
DOEF	Department of Environment and Forests (Government of Tamil Nadu)
DOF	Department of Fisheries (Government of Tamil Nadu)
ECR	East Coast Road
EDC	Eco-development committee
EPA	Environment Protection Act
ESA	Ecologically Sensitive Area
FAO	Food and Agriculture Organization
FIMSUL	Fisheries Management for Sustainable Livelihoods
FISHMARC	Fisheries Management Resource Centre
FRP	Fibre-Reinforced Plastic (also 'Fibreglass')
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOM	Gulf of Mannar
GOMBR	Gulf of Mannar Biosphere Reserve
GOMBRT	Gulf of Mannar Biosphere Reserve Trust
GOTN	Government of Tamil Nadu
GPS	Global Positioning System
ICM	Integrated Coastal Management
ICSF	International Collective in Support of Fishworkers
LTTE	Liberation Tigers of Tamil Eelam
MFRA	Marine Fisheries Regulation Act
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoEFCC	Ministry of Environment, Forests and Climate Change
MPA	Marine protected area
MSSRF	MS Swaminathan Research Foundation (CSO)
NCSCM	National Centre for Sustainable Coastal Management
NFDB	National Fisheries Development Board
NGO	Non-governmental organization
SHG	Self-help group
SSCP	Sethusamudram Ship Channel Project
UNDP-GEF	United Nations Development Programme – Global Environmental Facility
VHF	Very high frequency
WLPA	Wildlife Protection Act

Executive Summary

The overarching goal of the Coastal and Marine Protected Areas Project is to improve conservation and management of biodiversity in a number of existing, or eventually to be created, marine protected areas, with the aim of supporting the livelihoods of those dependent on them. A starting point for any new initiative with a conservation/ management agenda will be to assess the livelihoods context of the resource-dependent people as much as to assess the health of the ecosystems and the natural resources therein. A sustainable action plan must include sufficient activities in a way that people's relationship with the resources does not only become more positive but any negative implications of the management system on the livelihoods are adequately addressed through provision of appropriate alternatives. This study has aimed to assess the scope for enhancement and diversification of livelihoods as a means to reducing the pressure on resources, and exploring appropriate institutional mechanisms for ensuring a good balance between sustainable livelihoods and coastal/ marine resource health. Given the scope of the study, especially in the face of an issue of this magnitude, any suggestions can only be tentative, but they can provide a way forward to address the two interrelated issues in a meaningful way. The study took place during November 2013 and involved a desk review to obtain an understanding of the current knowledge about the study areas in particular and the MPAs in general, and to identify lessons learned from the past work in terms of both successes and failures. Expert interviews with individuals and institutions working on coastal resource management and conservation themes were an integral part of the study. Rapid field assessments, largely through informal interviews were undertaken in selected locations along the Palk Bay to understand the perspectives of the local communities. At the end of the field studies, the team organized

a stakeholder consultation in Ramanathapuram, which aimed to bring together all key primary stakeholders to discuss the study findings, both to validate them and to refine them further. The study finally suggests three management options, a spectrum of options ranging from leaving things as they are to undertaking and implementing a rigorous conservation regime to protect the natural resources and developing an innovative mechanism for co-management. The final section of the study discusses the implementation strategy for the Project.

Chapter 1

Introduction

Background to the Study

The overarching goal of the CMPA Project is to improve conservation and management of the biodiversity in a number of existing, or 'to-be- created-eventually' marine protected areas (MPAs) with the aim of supporting improvements both in the biodiversity and the local livelihoods of those dependent on the sustainable use of this biodiversity. The CMPA Project has three main outputs to be achieved by the end of the project:

Output - I– Participatory Management of CMPA.
Participatory management approaches for conservation of selected existing and potential CMPA are designed and introduced.

Output - II – Capacity Development.
Capacity strengthening system for supporting participatory management for CMPA is developed for selected states and at the national level.

Output - III – Information, Education and Communication.
Information, education and communication content is developed and applied for raising awareness, public relations and policy dialogues.

The project has contracted Integrated Coastal Management (ICM), a coastal development management firm based in Andhra Pradesh, to explore, assess and suggest suitable implementation strategies to be considered for the suggested sites in Karnataka and Tamil Nadu. This report presents ICM's study results for the Palk Bay area of Tamil Nadu.

Objectives of the Study

The current study is aimed at contributing to a better understanding of the livelihoods and natural resource management/conservation issues in the Palk Bay region of Tamil Nadu. The broad objectives of the study were the following:

To gather all relevant information on:

a. The composition of the population dependent on the protected areas
b. Key economic activities of local communities in the area (both primary and secondary

livelihoods and other economic activities)

c. Key stakeholders at the local-community level
d. Key departments whose activities contribute to effective and meaningful conservation and management of coastal and marine diversity, if a protected area is declared
e. Key ecological and socio-economic issues (for example with respect to conservation, livelihoods, land use patterns, development) in the area.

To provide for each site, a summary of all key stakeholders covering local and state governments, community organizations, CSOs and research and academic institutions.

To assess the possible impacts (positive and negative) on the areas under consideration for various conservation strategies based on the existing legal instruments.

To advise regarding the most suitable interventions/approaches to be adopted for

a. Improved conservation and management of coastal and marine resources.
b. Active participation of key stakeholders, which could also minimize conflict situations in the area.
c. Alleviating negative consequences on existing livelihood options in the areas.

Methodology of the Study

The underlying focus of the study has been to assess the prevailing livelihoods context in the Palk Bay and to identify, through participatory consultative mechanisms, a set of best possible interventions that cumulatively assist sustainable management and better conservation of biodiversity, while keeping in view the broader livelihood context of the coastal/marine resource-dependent communities, so as to enhance their livelihoods and management capabilities.

The emphasis on livelihoods support becomes important in view of the growing realization at all levels, based on several recent experiences, that there is an organic link between livelihoods and conservation/management, which is more pronounced in the complex socio-environmental context prevailing in many coastal areas of India. Widespread poverty, growing population pressure and lack of opportunities for diversification, together with weak or absent social security systems, mean that people must not only continue to depend on the natural resources but, given that the choice is between their own wellbeing and that of the ecosystems, fend for themselves even at the expense of the health of the ecosystems. Unfortunately, they continue to do so in spite of the existence of a plethora of legislations and acts that attempt (altogether imperfectly and often antagonistically) to control their access to resources.

A starting point, thus, for any new initiative with a conservation/management agenda will be to assess the livelihoods context of the resource-dependent people as much as to assess the health of the ecosystems and the natural resources therein. The action plan for any sustainable conservation/management initiative must include sufficient activities to cover the livelihoods context of the resource-dependent people in a way that not only will their relationship with the resources become more positive but any negative implications of the management system on the livelihoods will be adequately addressed through provision of appropriate alternatives.

This study has aimed to understand the livelihoods context of the people of the Palk Bay so as to identify the extent of their dependence on the coastal/marine resources, to assess the scope for livelihoods enhancement and diversification as a means of reducing the pressure on these resources, and to explore appropriate institutional mechanisms for ensuring a good balance between sustainable livelihoods and coastal/marine resource health. Given the scope of the study, especially in the face of an issue of this magnitude, any suggestions can only be

tentative, but they can provide a way forward to address the two interrelated issues in a meaningful way.

The study took place during November 2013 and involved the following:

A desk review to obtain an understanding of the current knowledge about the study areas in particular, and the MPAs in general, and to identify lessons learned from the past work in terms of both successes and failures. This also helped contextualize the study, as well as any potential project plans that could emerge from it, in the larger framework of coastal resource conservation/management in India.

Expert interviews with individuals and institutions working on coastal resource management and conservation themes, which involved telephonic interviews, phone- and Internet-based interactions, and emails. Besides, a number of experts were met during the field study period (the list is given in the appendix).

Rapid field assessments were undertaken by the study team in selected locations along the Palk Bay (from north to south) in order to understand and reflect on the perspectives of the Palk Bay communities. The data collection methodologies largely involved informal interviews with groups and individuals, individual case studies and field observations. A list of the communities visited and different stakeholders consulted for the study is provided in the appendix.

A stakeholder consultation was organized by the study team at Ramanathapuram at the end of the field studies. It aimed to bring together all key primary stakeholders to discuss the study findings, both to validate them and to refine them further. The Ramanathapuram consultation, held on 28 November 2013, was attended by 16 participants (from a total of 20 participants invited), who discussed the findings and provided feedback on the study. (The list of attendees included in the appendix.) It needs to be mentioned that, given the focus and preoccupations of the study, it could only aim to be qualitative, using quantitative data only where readily available; however, the broad trends it describes are quite valid and, where available and applicable, adequately supported by quantitative data. To the extent possible, elaborate details are avoided in favour of important summary conclusions, while the bibliography at the end is intended to serve as suggested reading for a more detailed understanding of the Palk Bay and its characteristics.

Structure of the Report

The report is divided into nine sections. **Section 2** provides a general overview of the Palk Bay region and the overall socio-economic context prevailing in the coastal districts adjacent to them. **Section 3** aims to put the development of fisheries in the Palk Bay region in its historical context in order to understand the various factors and processes that have contributed to the state of affairs in the bay. **Section 4** summarizes the key stakeholders in the Palk Bay and some issues related to the life and the livelihoods context of the coastal/marine resource-dependent stakeholders. **Section 5** discusses the institutional context and the legislations that are relevant in the Palk Bay area. **Section 6** discusses the issues of concern related to the natural resources of the Palk Bay and the responses of the communities. **Section 7** discusses the broad options for conservation/management in the Palk Bay region, which include the experience of the Gulf of Mannar Biosphere Reserve Trust (GOMBRT), which works in the immediate neighbourhood of the Palk Bay. Finally, **Section 8** provides some practical options for implementing a participatory, livelihoods-focused conservation and management programme in the Palk Bay under the GIZ CMPA Project. The implementation strategy is of course a bare outline of what might be done in the Palk Bay, and it is suggested that this needs more work, involving a larger number of stakeholders and requiring better clarity on the part of GIZ itself as to what is feasible from the CMPA Project's perspective.

Chapter 2

Palk Bay– A General Overview

Broadly, going by the low quantum of the available literature (both published and grey) and by the feedback obtained through expert interactions during this field study, it can be concluded that the Palk Bay has not received the attention it deserves as a unique ecosystem. Consequently, there are gaps in up-to-date information on the health of different resources, their exploitation patterns and trends over the years, in a way that the data can have a direct policy application.[1]

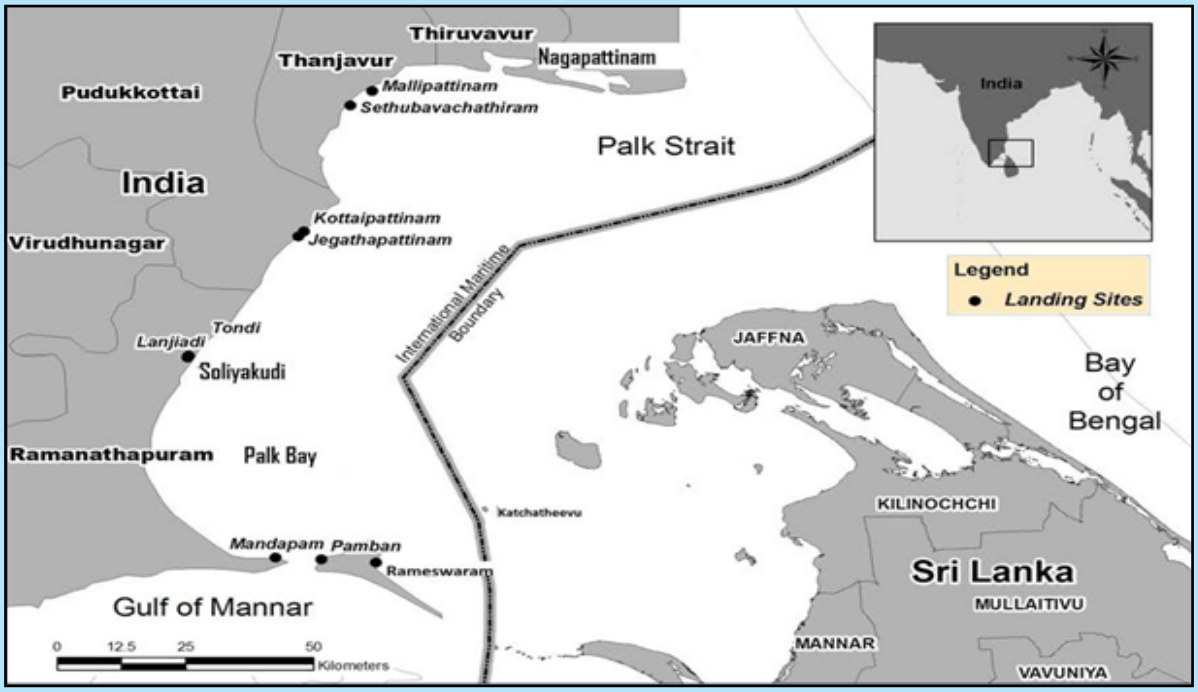
When it comes to the socio-economic and livelihoods context, the Palk Bay seems to have received even less interest, certainly less than its neighbours have on either side: the Coromandel Coast to the north and the Gulf of Mannar to the south. Both these areas have received considerable attention in the last decade for different reasons (tsunami in the former and the biosphere reserve in the latter). A few civil society organisations (CSOs) exist in the Palk Bay area (see Section 5), but their work seems too focused on specific themes and locations, and largely project-driven, thereby reducing its applicability across the wider Palk Bay area. Of late, the students of the University of Amsterdam have reported on different aspects of fisheries in the region (mainly in Ramanathapuram District), which is a good beginning, but it needs to be followed up by more robust work, and by other institutions within the region.

The paucity of data sources remains a major stumbling block in arriving at a good understanding of the ecological context of the Palk Bay and the livelihoods of the people dependent upon it. There is a clear need for more attention to be given to studying the Palk Bay holistically, in the absence of which any management intervention will remain seriously handicapped.

Physical and Biological Characteristics of Palk Bay

The Palk Bay, deriving its name from Robert Palk, a Governor of Madras Presidency in the mid-18th century, was characterized by a fisherman during interactions as a ‘shallow pond with three openings’ and this description holds good

Figure 1
Map of Palk Bay with Districts and International Boundary Line



Source: Johny Stephen et al 2013

to understand the ecological, marine biological and livelihoods related concerns that currently plague this ecosystem. But first, a summary of the key physical characteristics of the Palk Bay[2] : The bay has a coastline of around 250 kilometres[3] along the south-east coast of India, stretching from Kodiakarai (Point Calimere), in Nagapattinam District, to Dhanuskodi in Ramanathapuram[4] (Ramnad) District, covering a total of five districts in the southern state of Tamil Nadu: Nagapattinam (which has an average coastal length of 40 km inside Palk Bay region), Thiruvarur (15), Thanjavur (25), Pudukkottai (40) and Ramanathapuram (130). The width of the Palk Bay ranges from 64 to 137 km.

The critical characteristic of the Palk Bay that determines its productivity and its ability to support a wide diversity of marine resources, as well as a large number of livelihoods, is its shallowness. The Palk Bay is a very shallow, flat basin with a maximum depth of 15 m and an average depth of 9 m. The shallowness allows light penetration to the deeper parts, giving scope for ample primary productivity that in turn allows a wide variety of animals to shelter, breed and flourish. On the other hand, the shallowness is also a bane as intensive fishing operations such as trawling churn the seafloor and increase the turbidity to an extent that the demersal populations are adversely impacted, giving way to new pelagic species like oil sardines moving into the Palk Bay, as in recent years. The other implication of this feature of the Palk Bay is the specialisation of its fishing systems for shallow-water fishing, which, with a few exceptions, effectively rules out any possibility of moving out of the Palk Bay, either to the north or to the south. Being a sheltered bay, the Palk Bay is not prone to tropical storms and other natural calamities, and so the communities are generally protected.

The Palk Bay is reported to be one of the five major permanent sediment sinks of India. Small rivers draining into the Palk Bay off the Sri Lankan and Indian coasts, and longshore currents from the Bay of Bengal in the north and the Gulf of Mannar in the south, are reported to transport these sediments into the bay (Kumaraguru *et*

al 2008). The sediment is rich in organic matter due to decaying of seagrass. An average yearly deposition of sediments up to a thickness of 0.6 cm is reported, and the depositional features are identified as an occurrence of spits, shoals and progradation of an coastline.

A point to note here is the assertion of some fishermen met during the study that the southern part of the Indian side of the Palk Bay is not as profuse or as productive as the Sri Lankan side; the sandy floor of the southern Indian coast of Palk Bay, it is suggested, is less productive than the muddy waters of the Sri Lankan coast, which accounts for the relative profusion of shrimp on that side[5]. The northern part of the Palk Bay, starting from Pudukkottai, is however considered more productive, which accounts for the profusion of fishing systems– including mechanized boats – in the area.

On the eastern side, the Palk Bay is hemmed in by north-west Sri Lanka and the international border between the two countries is only 6.9 km from Dhanushkodi, 11.5 km from Rameswaram, 15.9 km from Point Calimere, 23 km from Vedaranyam and 24.5 km from Thondi (Kumaraguru *et al* 2008). As we shall discuss, this proximity has its own implications on the waxing and waning of the Indian fisheries in the Palk Bay, with significant all-round implications. Of the three openings of the Palk Bay, the north-east one opens into the Bay of Bengal at Point Calimere and the remaining two, which are located in the south, connect the bay with the highly productive Gulf of Mannar, through the Palk Straits and Adam's Bridge (or Rama Sethu), which is a series of coral reefs that stretch from Dhanuskodi to Talaimannar, in Sri Lanka.

The area on the Indian side of the international boundary is estimated to be around 6000 km^2, of which the area reserved for small-scale fishers (as per the 3 nautical mile rule, see Section 5) is about 1000 km^2, leaving some 5000 km2 or roughly 2-3 km for each of the roughly 2000 trawlers operating in the Palk Bay. The area available for fishing by small-scale boats (motorized and non-motorized) is much smaller, and limited by their inability to fish farther out into the sea. The area is shrinking further with new motorized boats entering continuously.

The northern and southern parts of the Palk Bay are considerably different in their biophysical characteristics. In the northern part, where the river Cauvery drains into the sea, there are several rivulets draining into the sea and in the process supporting a large backwater system between Muthupet and Point Calimere. The marshlands of this backwater system support mangrove forests that harbour a wide variety of birds, both native and seasonally migratory. The backwaters also act as breeding and feeding grounds for a wide variety of finfish and shell-fish. The fisheries in this zone are relatively less developed as the villages tend to be located at quite a distance from the sea and the intervening area is very swampy. The freshwater inflow from the Cauvery river has reportedly been showing a declining trend over the years, and this has consequences on the overall economic wellbeing of the area as well as, more specifically, the coastal and marine resources, including the mangroves.

The southern part of the Palk Bay, bordering Ramnad, is sandy and home to some coral reefs. The enclosed nature of the bay provides protected waters that dolphins, porpoises and turtles frequent. The coral reefs of the Palk Bay, though not as extensive as those in the Gulf of Mannar, are considered to be unique in their own way. This area is also known for extensive seaweeds and seagrass beds, made up of some 11 seagrass species. The fringing coral reefs, extending from Pamban eastwards to Devil's Point and then southward to Ohlaikuda and Rameswaram, have in abundance *Gelidium micropterum* and various species of *Gracilaria*, which are among the chief Indian agar-yielding seaweeds. The lagoons between the reefs and the shore exhibit a rich growth of *Gracilaria lichenoides* (locally known as *kanji paasi*). The reef also has in abundance *Sargassum* and *Turbinaria,* which are good sources of

algin. Further, seaweeds and seagrasses are found along the shores of Rameswaram Island (Kumaraguru *et al* 2008).

The marine mammal dugong, or sea-cow, grazes upon the seagrass in the Palk Bay and is considered an important ecological indicator of the ecosystem health of the area. The endangered *Dugong dugon* lives in waters of depth 10 m or less, not far from the shore, usually in groups limited to five to seven individuals among the seagrass beds. The seagrass *Cymodocea* is their chief diet. They are reportedly found near the Adirampattinam area in the Palk Bay, although the anecdotal evidence of dugong sightings remains very hazy – and frequently quite old.

A majority of the 302 species of marine alga reported from Tamil Nadu are said to be found in the Palk Bay. The total numbers of species and their endemic forms (in parentheses) are provided by Kumaraguru *et al* (2008) as: Foraminifera 51 (2), tintinnids 12, flora 143 (1), sponges 275 (31), coelentrates other than corals 123 (49), stony corals 128 (43), Polyzoa 100 (15), Polychaeta 75 (22), Insecta 1 (1), Crustacea 651 (159), Mollusca 733 (26), Echinodermata 274 (2), Prochordata 66 (41), fishes 580, turtles 5, birds 61, and mammals 11. Johny Stephen *et al* (2013) provide a list of the important commercial fish, crustacean and molluscan resources in the Palk Bay, which number 55 in all, including 44 fish species. The CMFRI has worked extensively on various fishery resources like silver-bellies, once a dominant resource in the bay that has since declined significantly, sardines and elasmobranchs (sharks, rays and skates) and on marine mammals including the dugong.

On the whole, an important point to note about the Palk Bay from the assessment of the physical and ecological characteristics is that this semi-enclosed ecosystem with its several fragile resources is productive enough to support largely subsistence-oriented, extensive fishing and other harvesting operations but remains extremely sensitive to major changes in the utilization patterns – which seem to be happening over the last few decades. This has serious consequences not just for the carrying capacity of the system but also for the survival of its sensitive biodiversity.

Socio-Economic Characteristics of Palk Bay and its Neighbourhood

Before discussing the Palk Bay communities, it is essential to take a quick look at the economic context of the area bordering it. Ramanathapuram and Pudukkottai, which together account for nearly 70 per cent of the coastal area of the bay, are considered the poorest districts in Tamil Nadu. Ramanathapuram, according to one study, is marginal in almost every sense except for the length of its coastline and fishing industry. In other words, the fishing industry is by far the only one that can actually employ people remuneratively. The district, as indeed much of the coastal area extending up to and beyond Pudukkottai, is characterized by its aridity, isolation and limited levels of economic development. Agriculture, which is the traditional source of employment for the population, survives on the meagre rainfall that graces the area in the absence of major river systems (it is said that the Vaigai, an important river in the area, is also the only major river in India that does not open into the sea: it goes dry much before reaching anywhere near the sea). Industrial development along the Palk Bay is very limited, which is probably what keeps the bay relatively less polluted than its neighbourhood. But at the same time, there is hardly any employment generation in the area, which forces people to move into fishing and thereby aggravate the pressure on resources.

Thanjavur, which is the other major district along the Palk Bay, is characterized by well-irrigated agriculture, largely due to the Cauvery river system. This has meant that the people in the area have a more diversified livelihood profile and less dependence upon the Palk Bay resources. But, for the people of the southern districts, the fisheries have evidently been the only option to make a living. Consequently, unlike in many other parts of India, the fisheries sector has been subjected to in-migration that is

Table 1
Trends in Fisherfolk Population in Southern Palk Bay, 2000-2010

District	Population in 2000 (DOF, 2000)	Population in 2010 (CMFRI, 2010)
Thiruvarur	10,365	9,995
Thanjavur	25,378	29,489
Pudukkottai	25,027	29,663
Ramanathapuram	117,291	193,413
Total	178,061	262,560
Percentage decadal increase		**68 %**

proportionately much higher than out-migration through the last four decades. This also explains the inability and unwillingness of the people to move out despite the resources showing evident signs of distress.

According to the CMFRI census of 2010, the number of fishing villages in the four southern districts of the Palk Bay is 160, and these villages are distributed across the districts as Tiruvarur (13), Thanjavur (31), Pudukkottai (33), and Ramanathapuram[6] (83). It is difficult to ascertain the number of fishing villages on the Palk Bay side of Nagapattinam, as some of them are located quite far from the sea and have a diversified livelihood profile, but the number cannot be more than four to five, including Kodiakkarai (Point Calimere) whose fishers, both local and migrant, fish in the open seas of the Bay of Bengal anyway. Finding the total number of people dependent on the Palk Bay is equally difficult given that several villages are located far from the sea in the north, while a number of people from the interior villages make a living as crew-members on trawlers in the central and southern parts of the coast. One estimate for the three southern districts of the Palk Bay puts this number at around 170,000, of whom 54,500 are considered to be actively engaged in fishing (Kasim & Vivekanandan, undated). That there has been an increase in the number of fishers over the last decade is clear, although the increasing trend is more on the southern side of the Palk Bay than in the north, where the available figures actually show a decline in numbers. A comparison of the total numbers of fishers in the four southern districts (including the Gulf of Mannar side of Ramanathapuram as well) shows an overall increase of 68 per cent between 2000 and 2010.

It is difficult to say whether the population growth was a natural increase within the people involved in fisheries or due to increased in-migration of people, but going by the fact that much of the increase has taken place in Ramanathapuram, one can suggest that this may have to do with in-migration of people from agriculture and other sectors. This is a cause for concern, both from a management perspective as well as from a livelihoods perspective.

Notes

1. Kumaraguru *et al.* (2008) is a useful compendium of the literature on the physical and biological aspects of the Palk Bay.
2. This introductory section is drawn from Johny Stephen *et al.* (2013), Kumaraguru *et al*. (2008) and Sathyapalan *et al.* (2008).
3. Different estimates put the number at 210, 250, 270 and 296 km.
4. Ramanathapuram (Ramnad) has a total coastline of 271 km, of which 141 km lies on the Gulf of Mannar side.
5. See also Schoeltens (2006), p.18
6. The total number of villages in Ramanathapuram is 180, but Bavinck and Karunaharan (2006) categorize 83 of them as being on the Palk Bay side.

Chapter 3

Historical Overview of Fisheries Development in Palk Bay

A complex ecosystem like the Palk Bay is home to a wide diversity of resources, which in turn attract a diversity of activities to exploit them for various purposes. Any study to assess the ecological consequences of human actions must take into account the prevalence of a wide range of activities and not just the more prominent among these. While an effort has been made in this study to focus on a range of people with different livelihood orientations, it is clear that it is the fisheries that have an overwhelming presence in the Palk Bay – both in generating livelihoods and in causing major changes to the ecosystems – while all other activities play more or less inconsequential roles. This meant that the study had to be focused mostly, though not exclusively, on the fisheries and fishing communities of the Palk Bay.

It is very likely that, in the northern zone of the Palk Bay, fishing was not exactly the booming activity that it has become since the 1970s. More likely, it was a minor activity in which a large number of poor (and socially marginalized) people indulged for subsistence earnings. The support for such a proposition comes from the continued existence of a number of simple fishing systems – better called 'lone-ranger' operations, given that most of them are undertaken by single individuals going out on their own – that include, frequently, wading in the water with bare feet and collecting fish either using simple traps or with bare hands. The shallow waters, which require a person to walk long distances before reaching a depth greater than knee-level, helped these fishers to make a small living using their own skills and very simple, almost no-cost technologies. The existence of a vibrant river-based agriculture ecosystem in Thanjavur District, together with the difficulties in reaching the sea through the mangrove swamps also meant that for most people, fishing was rarely an attractive occupation. The existence of relatively few caste groups that specialized in fisheries and the ease with which more fishing-minded groups of people from other areas managed to settle down in this area, would also support the idea that coastal fisheries were not greatly developed in the north. Things may have been different as one moved southwards from Thanjavur, and sea

fishing may have been a more active livelihood option for a large number of small-scale fishers in the rest of the Palk Bay.

1970s: Modernization Arrives in the Palk Bay

Modern fishing technologies arrived in the Palk Bay in the mid-1970s (1974 is suggested as the year when this happened), when mechanized trawlers made an entry into the area from two directions. In the south, the movement of the Christian Paravar community to Pamban Island from areas further south (Tuticorin and Kanyakumari) with the express purpose of taking advantage of mechanized trawling gave rise to a virtual flood of in-migrants, including agriculturists and pastoralists from the interior of Ramanathapuram District who entered the sector in large numbers and established the huge mechanized trawl fleet that enabled the sudden emergence of this district into the limelight as a fisheries stronghold (Schoeltens, 2006).

In the northern and central parts of the Palk Bay, mechanization arrived from the north, when the fishers from Akkaraipettai, near Nagapattinam, began their annual migration into the bay for fishing during the north-east monsoon period, which was not conducive for fishing in the Bay of Bengal. This gave rise to two strands of development that eventually merged, albeit rather uneasily: in the first instance, the migrant fishers, who found the near-virgin fishing grounds of the Palk Bay quite lucrative (and untroubled for the most part by adverse weather conditions), began to settle down all along the coast. Although the new settlers found resistance from the local communities, mainly on account of the destructive impacts of the mechanized trawling on the local small-scale fishing, the troubles were soon overcome and the new settlements became an active and vibrant part of the local economies, increasing fish catches enormously and contributing significantly to employment generation in the area.

The second strand of mechanised development in the north and central zones also closely paralleled what happened in Ramanathapuram. This involved a sizeable number of people from a non-fishing background entering the sector, both as boat owners and, even more, as fishing crew. Such a large influx of local capital and labour into the mechanized sector may have contributed to quelling the local resistance to 'alien' technologies, smoothing the way for the migrants from the north finding quick local acceptance.

All the same, the entry of mechanized trawling was initially greeted with opposition and, frequently, violent actions from the small-scale fishing communities of Palk Bay, and despite a number of measures (both legal and local) having been put in place to keep them apart, the hostilities have not entirely died down. The two important local legislations that emerged from this confrontation are the 3-4 day rule, which gives the mechanized boats the right to fish for only three days in a week (although non-mechanized boats are expected to fish on the remaining four days, they never followed it) and the restriction of fishing up to 3 nautical miles from the shore exclusively for non-mechanized boats[7] . These rules are still in force and will be discussed in Section 5.

From the above account, two points of importance need to be stressed: firstly, mechanized trawling was essentially a migrant enterprise, and to this day, it retains something of this character, which is frequently invoked by the small-scale fishers to highlight the 'alien' nature of the technology and the 'outsider' status of the boat owners and crew. It thus becomes easier to depict the 'other' as the cause of all the problems besetting the Palk Bay.

Secondly, however damaging it may have been to the traditional systems and even more to the natural resources, trawling also opened up opportunities for employment of large numbers of essentially unskilled workers in the area– this would make it a rather formidable force to regulate or control without affecting the livelihoods of a large number of people for whom trawling is possibly the only livelihood option.

1980s: Diversification into Sri Lankan Waters

The early 1980s, specifically 1983, mark a second important milestone in the modern Palk Bay fisheries when the mechanized boats increasingly switched their fishing grounds to the north-west coast of Sri Lanka, bordering the Palk Bay. It has to be noted that for a long time prior to the 1980s too, the whole of the Palk Bay was considered something of a common resource by both Indian and Sri Lankan fishers, who shared it in a spirit of mutual give-and-take, though for the Indian side it was always more 'take' than 'give'. Subsequent inter-governmental agreements, like the ceding by India of Kachchativu Island to Sri Lanka in 1976, caused immense heartburn to the Indian fishers, but the bonhomie between the fishers of the two sides remained intact.

With the beginning of the civil war in Sri Lanka in 1983, the Sri Lankan Tamil fishers were prevented from fishing in the Palk Bay, reportedly by both the Sri Lankan government and the Liberation Tigers of Tamil Eelam (LTTE) itself. This opened an opportunity for the Indian trawlers to fish in those waters unimpeded, and the relatively virgin fishing grounds of Sri Lanka, teeming with good catches of shrimp (after all, they were more productive, have been sparsely fished and had seen little trawling) became the cause of another major boom in the growth of trawlers on the Indian side. This movement of the trawlers to Sri Lanka may also be a result of growing signs of pressure or competition on the Indian side of the Palk Bay. Only the mechanized boats of Thanjavur, and partly Pudukkottai, avoided Sri Lanka because of their small size and the distances involved in reaching the fishing grounds (further hampered by the 3-4 day rule), but for the rest of the fleet, especially those from Rameswaram, fishing across the border had become a necessity.

Another unspoken reason for the growth of Indian fishing boat operations in Sri Lankan waters may well have been the highly lucrative business of smuggling daily essentials like fuel, foodstuff and other materials to the rebels. Whatever the reason, there was a fresh influx of investments into the Palk Bay to undertake mechanized trawling, which continued unchecked when the Indian peace-keeping operations were in full swing in the north of Sri Lanka from 1987.

The 1980s also saw another major development that remains significant to this day: it involved motorization of traditional wooden boats like *vallams*. Equipped with inboard engines, the newly motorized wooden boats could travel farther out than before, carry more nets and stay longer at sea. A number of wooden plank-built *vallams* were motorized during the next two decades, bringing another category into the Palk Bay fisheries (as elsewhere): the motorized boat sector, which straddles the middle ground between the non-mechanized boats and the mechanized boats. This was also the period when the material for fabricating fishing gears was changing from cotton and hemp to nylon and polyethylene. This period also saw the introduction in the Palk Bay by the FAO -sponsored Bay of Bengal programme of pair trawls using high opening bottom trawls to catch large sized rock cods, snappers, seer fishes, lethrinids, pomfrets, horse mackerel and carangids. The impact of such changes on the small-scale fisheries is, as we shall see, as revolutionary as that of the introduction of mechanized trawling, and equally serious in the long term.

A third development in the 1980s had been the arrival of coastal aquaculture, primarily for culture of prawns: tiger prawn was the main species targeted, giving way to the freshwater prawn (*Macrobrachium* spp.) Currently the sector is focused on *L. vannamei*. Unlike in the case of mechanized trawling, aquaculture never really attracted the coastal fishing communities into it and the investments into aquaculture remain entirely in the hands of non-fishing entrepreneurs, whose background frequently was in agriculture. Vast stretches of the coast (whose ownership was very obscure), sometimes right on the beaches, got transformed into aquaculture farms, and despite frequent

fluctuations, they continue to remain there today, as alien to the fishers as ever and, with their pollution of the coastal waters, even more menacing than mechanized trawling (further discussed in Section 6).

1990s: Period of Equilibrium?

The 1990s may be a period of stability if only because no major events of importance have been recorded. The continued civil war in Sri Lanka may have allowed the mechanized boats to fish away from the Indian side of the Palk Bay, resulting in fewer confrontations with the local small–scale fishers. 1997 also saw fish catches reach a peak – nationally, at the state-level and in the Palk Bay as well – which may also have been a factor contributing to the relative peace in the bay. The belated implementation of the 3-4 day rule in Ramanathapuram since 1994 however might indicate some amount of tensions between the mechanized and small-scale fishers in the district.

2000s: Tsunami of Boats

The early 2000s saw the enactment of a new regulation under the Marine Fishing Regulation Act that introduced a 45-day annual ban on fishing by mechanized boats all along the coast, including the Palk Bay. The ban continues to be implemented relatively effectively, mainly because the trawler owners themselves are in support of it, but its implications for improving the resource health in the Palk Bay remain unclear. Section 5 dwells on this, but in the meantime, it is sufficient to note that the acceptance of the ban by the fishers without demur is an indication that the pressure was beginning to show on the investments and effort in the fishing sector.

What is more important for the present discussion is the proliferation of motorized boats, made of fibre-reinforced plastic (FRP), which has largely replaced the original wooden, plank-built, *vallams* in the Palk Bay in the aftermath of the tsunami of 2004. The Palk Bay had been spared the direct effects of the tsunami due to its sheltered location, but as one CSO functionary put it, it did not entirely escape the 'after-effects' of the tsunami. In Nagapattinam and elsewhere, the rehabilitation of the fisheries sector took the form of provision of large numbers of fishing boats, which led to a surplus of boats in the area (Salagrama, 2006). Although the Palk Bay fishers had not received any boats themselves, they however had access to the surplus boats that were being sold by the original recipients at very low prices. This led to a huge increase in the numbers of FRP boats all along the Palk Bay region, which not only supplanted the traditional wooden *vallams* and *vathais* but also directly competed with the mechanized boats, both for the fishing grounds and, by virtue of using similar nets to the trawl, for the same species. It is also reported that, though it is not widely known, the motorized boats too fish in Sri Lankan waters alongside the trawlers.

The next major development in the Palk Bay fisheries has been the conclusion of the civil war in Sri Lanka, which led to (1) the Sri Lankan Navy gaining access to the northern waters and improving their patrols in the area and (2) the local Tamil Sri Lankan fishers restarting their fishing operations in the Palk Bay after nearly 3 decades, only to face stiff competition from the Indian boats. It is a paradox that many Indian fishermen consider the Sri Lankan fishers as intruders, who catch the fish that was rightfully the Indians'! Both these developments led to the Indian fishers facing severe resistance, which included being fired upon, getting their assets confiscated and being arrested for long periods. There are also instances of fishers being shot at sea. This change in access to their 'traditional' fishing grounds in Sri Lanka for Indian trawlers poses numerous problems, which have severe livelihood-related, economic and ecological implications for the Palk Bay as a whole. The problem continues to remain serious.

The Present 'Tense'

As a consequence of the various developments and changes discussed above, currently there exists a plethora of fishing systems in the Palk Bay, ranging from very basic, manual, one-person operations to relatively sophisticated modern

fish-harvesting methods (employing GPS, echo-sounders and VHF sets), with all competing with one another, struggling to survive anyhow and with very few opportunities to diversify themselves along more sustainable lines of action. As already indicated, the capacity of the Palk Bay ecosystem, limited in the first place, is under immense strain.

At the same time, and this is very important to keep in mind, fishing in the Palk Bay still seems to provide sufficiently for people to want to struggle along rather than move away to new activities or areas that are obviously even less promising. A good example may be the continuing increase in the number of motorized boats, which, according to the fishers themselves, are not doing very well but are the one option that they could latch on to with fewer reservations than any other. In other words, there is just enough to survive from fishing in the Palk Bay, which is more than what any other sector can provide at the moment.

Thus, it may well be a case of things coming around a full circle for the Palk Bay fisheries; most operations, including those of trawlers, appear to have returned to subsistence fishing, which is where the whole sector began in the 1970s. The difference is that the costs are much higher now in every way and the circle itself may be closing.

The tragedy of the Palk Bay communities lies in their inability to stay on and the inability to move on (discussed further in Section 6).

The Role of the Government in Modernization

The role of the government in the whole process of modernization and its aftermath is almost as important as that of the fishers themselves. For one thing, modernization could not have taken place without the government's active promotion of, and support for, the uptake of the technologies – mechanization, motorization, switch to FRP and aquaculture. While there have been few systematic efforts at resource conservation and management from an ecological perspective, the regulatory frameworks that have come into existence are mostly a response to the conflicts that the new technologies frequently gave rise to. Another important aspect is the government's continuing support for operation of mechanized boats with subsidized diesel and assistance programmes, whose welfare-oriented intentions might be masking the inherent unsustainability of these technologies, both economically and ecologically.

Notes

1. Effected in 1978 by the District Administrations of Pudukkottai and Thanjavur initially, followed only in 1994 by Ramanathapuram District (Ganapathy, pers.comm).

Chapter 4

Primary Stakeholders and the Livelihoods Context

The heterogeneity of people and communities in the Palk Bay is as marked as the heterogeneity of the marine resources on which they depend. As indicated, the paucity of adequate livelihoods opportunities in the hinterland as well as the (initial) promise of good fish catches has meant that there was a large level of in-migration, far outstripping any out-migration, into the Palk Bay region, especially into fisheries. The continued availability of opportunities for at least subsistence operations would mean that in-migration may continue into the future as well.

The Palk Bay thus remains a mixture of diverse peoples, who are largely at harmony with one another but who are still distinguished by their 'separateness' in terms of the following:

Place of origin. As we have seen, besides the local people ('sons of soil'), there are in-migrants from other fishing areas – Nagapattinam, Tuticorin etc – as well as from non-fishing areas within and beyond the districts. These migrants retain strong linkages and relationships with their native villages. As for the fishing crew on trawlers, they continue to reside in their native villages and come to the port on days when the boats are allowed to fish.

Caste and religious affiliations. Unlike elsewhere in coastal India, there is no dominant caste in the Palk Bay; instead, there exist a number of major and minor castes. The major castes include Ambalakarars, Kadayars, and Paravars, while the minor castes include Pillais, Padayachi Vanniyars, Thevars, Pattinavars, Servais and other scheduled castes (Johny Stephen *et al* 2013). All three major religions are represented in the Palk Bay, though the Christians are confined mostly to Ramanathapuram District. Hindus and Muslims dominate in different parts of the Palk Bay, and this is reflected in the way the fisheries are organized at different locations along the bay.

Different modes of socio-economic organization of the community. An important aspect of caste

in the Palk Bay area (as elsewhere in Tamil Nadu) is the socio-economic organization of the communities along caste lines – the caste panchayats have a major decision-making role that is denied to almost any other rule-making body, and their power to make decisions is complemented by the power to enforce them, which makes them effective. The roles and the rule systems of these panchayats are modelled upon the local ecological and socio-economic context, and so there are subtle to outstanding differences between the panchayats of different villages.

Varying levels of engagement with fisheries. Some of the fishers are strictly dependent upon fishing, while others, especially the migrants from the neighbouring areas, have a more diversified livelihood profile. In Thanjavur, fishing is a secondary occupation for the farming people, while it is the reverse in Pudukkottai and further south. The mechanized boat owners of the northern zone also invest in agriculture, business and other activities, while those in the south don't.

Aside from such categorizations, the nature of the activities within the Palk Bay area that these people are involved in would put them into separate groups. The duration of engagement of this study with the Palk Bay communities is not long enough to develop a detailed livelihoods profile for even the more important groups in the area. Therefore, only a summary list of key primary stakeholders is provided in this section.

Producers

The key stakeholders involved in various kinds of production-related activities in the Palk Bay include the following:

Mechanized boat fishers: includes boat owners (who may or may not fish themselves) and crew (who may be from local area/fishing caste or from another area/caste); all men without exception.

Motorized boat fishers: includes owners who frequently go fishing themselves and crew who generally (but not always) belong to the local fishing communities; all men without exception.

Non-motorized boat fishers: little differentiation between owners and crew as, frequently, the owners (and their close relatives) act as crew; all men, though women might also fish in the northern zone, especially in the mangrove belt. Many different categories exist under this– trap fishers working in coral reef areas, hook-and-line fishers, squid-jiggers, *alai valai* (a small seine net for reef fish) fishers.

Manual (boat-less) fishers: includes diverse range of 'lone-ranger' activities involving manual and semi-manual collection of marine resources; also includes a sizeable number of women. Examples of this category follow:

Divers for collection of shells, seaweeds, sea cucumbers and seahorses – the last two have been on the banned list of marine resources, hence their capture has significantly come down, if not stopped altogether.

Stake-net fishers operating tidal nets in the sea.

Manual shell collectors: In some villages (e.g., Vadakadu and Mankadu hamlets), women are involved in manual shell collection activities.

Beach-seiners: mainly located in Ramanathapuram District, beach-seiners have an important livelihood function as they provide employment to 50–60 people per net and, at times, ensure food security in the locality (feeding the villages in times of poor catches).

'*Kite-fishers'* in the northern zone: this is a type of drifting line fishing activity involving fairly simple equipment, operated from the beaches.

Aquaculturists: owners and crew. The owners invariably are from the more affluent, agricultural communities from elsewhere and the crew

are local people but not necessarily from the fishing communities. This is not only because of the distance that the fishers maintain from aquaculture but also because of the similarities between agriculture and aquaculture practices, which require the involvement of people from an agricultural background.

Salt pan owners and workers: Again, although salt pans are quite widely prevalent in the coastal areas of the Palk Bay, the extent to which the local communities are involved in the activity remains unclear. While some coastal communities might have short patches of land for salt pans, it is reported that most of the land is in the hands of outsiders.

Seaweed (Kappaphycus *spp*.) *producers and harvesters: Kappaphycus* spp. production has been taking root as an alternative income-generating activity in the Palk Bay region, and the practice is observed in Ramanathapuram District. The issues relating to this activity will be discussed in Section 6.

Besides the producers, there are a number of other land-based stakeholders whose lives and livelihoods are as dependent upon the Palk Bay resources as those of the producers themselves. No reliable numbers exist for these various stakeholders, but it is quite certain that they are very numerous and that their contribution to the viability of the sector, which involves servicing the supply chains, is immensely important. These include the following:

Processors

A number of people are dependent upon the processing of fish, shrimp, shells and seaweed.

For *fish*, the processing activity involves drying and salt-drying, for human and animal consumption. A large number of people, mainly women, are involved in the processing activities across all the major landing centres. Production of fishmeal for animal feed is reportedly much higher, and a more organized and better invested activity than fish-drying for human consumption.

For *shrimp* and other export-oriented resources (lobsters, squid and cuttlefish), the processing is more sophisticated and involves industrial processes. In the Palk Bay, the industrial seafood processing centres are reportedly very few and confined to the Rameswaram/Pamban area, where wild and cultured shrimp are transported from all along the bay in insulated vehicles.

Shells are mostly processed by women and crafted into ornamental products for local sale in tourist areas like Rameswaram. The study has not found any activities related to manufacturing of shell lime, but it has been reported that shells which do not make the ornamental grade are converted into shell lime or used by cement-manufacturing industries located at some distance from the Palk Bay.

There are also some *seaweed* processors/dryers and a few agar-making cottage-level industries.
There are a few shrimp hatcheries along the Palk Bay, producing shrimp larvae for culture purposes using berried shrimp caught from the wild in the bay.

Traders

The traders include:
Local fresh fish sellers (especially women carrying fish by head-loads)

Distant/urban fish sellers (only men, who collect their supplies from a number of producers– frequently by offering an interest-free 'advance' – and send them by vans to distant urban markets like Madurai, Trichy and Chennai.

Exporter companies, who target international markets. They are represented in most parts of the Palk Bay by their 'agents', who collect the landings and send them to processing factories by truck. Major landing centres like Rameswaram and Pamban are reportedly controlled by two or three major export houses.

Animal feed traders, who collect processed and semi-processed dried fish from the fishing villages for sale to distant markets for animal feed.

Seaweed traders, who procure seaweed seasonally from producers for wholesale distribution to processing factories in Madurai and Tirumangalam.

Ancillary workers. These are the people who take an active part in servicing the various production and trade-related needs of the fisheries sector. In the Palk Bay (as elsewhere) these include transporters; fuel, ice and spare parts suppliers; boat makers and repairers; engine and net repairers; basket sellers; icebox suppliers; and people involved in a host of other critical services required by the fishing industry. A majority are 'invisible' from a policy/development perspective as fisheries-based stakeholders, despite being entirely dependent on the sector and being among the poorer categories of people in the sector.

Supplementary players. These include all the people in the local economy who, though not directly related to the fishing and trading activities, provide the non-fisheries needs of the coastal communities such as groceries, clothes, carpentry, electricity and entertainment. The fact is not well recognized that they form the backbone of the coastal economy while being dependent upon it: in other words, poor fish catches imply a lack of custom for a range of non-fisheries stakeholders in the area, who thus lose as much as the fishers themselves.

An important stakeholder group in this category is the moneylenders: they are a ubiquitous presence everywhere, along the Palk Bay (as elsewhere) and, despite complaints about their usurious rates of interest, their function is a productive one as without them, the rural economies will grind to a halt.

The key points to stress about the primary stakeholders in the Palk Bay are that: (1) a majority of them are poor; (2) they remain largely overlooked from a development policy perspective, and (3) the costs of any management/conservation regime in the area are likely to be felt most heavily by these poorer stakeholders.

Socio-Economic Context in the Palk Bay

This section provides a summary of observations relating to the livelihoods context in the Palk Bay area. The overall level of development in the Palk Bay has been much less compared with even its immediate neighbourhood, which is a structural constraint that affects virtually everyone in the region. Poverty is widespread among the coastal communities, which is reflected not only in low and uncertain incomes but also in the kind of services and goods available to the people here. Absolute poverty may also prevail, given the uncertainties of income, but is not easily visible, which might be due to the existence of community organizations like the traditional panchayats and a relatively robust family structure.

Many communities, especially in the northern part of the Palk Bay, are relatively isolated from the mainstream, and their physical access to basic services and markets where the fish are sold is poorly developed. Transport in the northern half of the bay may have improved only as a result of the East Coast Road being widened in the post-tsunami period. Many fishers claimed that the ECR has meant a sea-change to both their lives and livelihoods, highlighting the importance of such basic services to the wellbeing of the people. All the same, for several villages that lie a few kilometres off the main road, the problems of access remain significant.

In several coastal villages like Mullimanai, in Ramanathapuram, the villagers travel to the main road chiefly by auto-rickshaws. However, these villagers are prevented from acquiring auto-rickshaws of their own by the dominant villages in the neighbourhood, which control the access roads and disallow the movement of any traffic except what they permit. This means that, in emergencies, the people have to wait for the transport from the next village to come to be able to get anywhere.

In the list of basic services that are sorely lacking in the Palk Bay area, access to clean drinking water remains rather high. Groundwater is

frequently saline and cannot support the local needs, as a result of which women have to walk long distances to get potable water, or buy water fetched from a distance, to meet their domestic needs. Healthcare facilities exist at a few locations along the Palk Bay, and people frequently travel to larger towns like Trichy and Madurai for treating bigger medical problems.

Joint family systems, quickly fading from many coastal communities, seem to be surviving well enough in the Palk Bay. The social organization, centred largely on the traditional panchayats and the local deities, also remains strong, which may provide a certain degree of insurance for the aged people in the communities.

The housing and general layout of the coastal villages have improved significantly in the aftermath of the tsunami, when the state government undertook construction of permanent houses for the vulnerable coastal communities. This has also improved the quality of sanitation and waste disposal in most villages. An interesting, though under-explored, sidelight on the new housing is the changes in attitudes and practices it has engendered, especially among the women. It led to moving the people of a rural artisanal background into a more mobile middle class setting, which is reflected in increasing emphasis on literacy, more investment in better living conditions and so forth.

Markets and Market Development

Given the importance of the fisheries in the region, the markets and market supply networks are surprisingly under-developed, with the northern half of the Palk Bay once again leading in this matter. The current systems of post-harvest and trade leave a lot to be desired, and this has implications not only for incomes but also for the fish harvesting methods. Where losses are high in the supply chain, the fishers tend to overfish, and where returns are low, no distinction is made between catching adults and catching juveniles.

The infrastructure has remained basic even at major fish landing centres like Rameswaram. Ice plants, storage and processing facilities and ready transport facilities are few and controlled by a small number of companies and individuals, which results in market monopolies.

Indebtedness is widespread (as everywhere else in fisheries) and takes the form of both advances from traders (supposedly interest-free, but oblige the fishers to sell all important fish to the traders at a sizeable discount for as long as the advance is retained by them), and loans obtained from moneylenders at high rates of interest. In some Ramanathapuram villages, the women highlighted how servicing their loans not only takes away a lion's share of the household income but also remains a perpetual source of insecurity. In the case of the men, this may be reflected in reckless activities like fishing in Sri Lankan waters by risking their lives, using destructive gear to catch juveniles or simply dynamiting reef populations. The study team found very few occasions where the small-scale fishers could take advantage of a formal bank loan, indicating the widespread dependence on private loans, which in turn leads to market imperfections.

Livelihood Diversification in Palk Bay

As suggested, there has been an increased emphasis on education and more children are going to schools now than previously, but apart from an inadequacy of facilities for higher learning within the Palk Bay area, the growing levels of unemployment of the educated youth are considered a major disincentive to studying beyond higher secondary levels. Girls drop out sooner. In fact, the issue of unemployed youth figures highly in the conversations with the villagers as a problem. The limited levels of education do not allow the youth to obtain reasonable employment anywhere, while their educated 'status' makes them look at fishing condescendingly.

Overall, the levels of literacy and diversification of employment opportunities vary widely between communities and different stakeholder groups. Some communities are clearly marked

by forward thinking and take advantage of new opportunities both locally and, increasingly, abroad; while some others give the appearance of being apathetic and immobile. The latter may also be a manifestation of the general hopelessness of the situation for most people.

The extent to which a community focuses on literacy is also a function of its affluence (e.g., a mechanized boat owner is more likely to send his son to Australia, as the team found in Mallipattinam in Thanjavur District, for higher studies than is a motorized boat owner or a mechanized crew member). Equally important, it appears, is the extent to which a community is attached to a particular livelihood through caste or tradition, as in the case of fishing. In general, it seems possible to suggest that a family/ community that has a diversified livelihood profile (as in the case of several north-zone communities who have a strong agricultural and business orientation) is more likely to focus on education and diversification than is a traditional fishing family, for example in Ramanathapuram.

In the communities visited during the fieldwork, the study team came across reports of youngsters who have graduated (or post-graduated) in medicine, law, engineering, biotechnology, business administration, computer applications and, in one memorable instance, English literature. Of course, many of these people moved to cities like Chennai in search of employment.

Most of the youth, whether adequately qualified or not, aspire to get a job abroad – mainly in Southeast Asia (Singapore and Malaysia) and the Middle East. Employment opportunities, frequently purchased with substantial payments to the touts, exist for unskilled labour in these countries and include servicing petrol stations and car washing, assistance in construction, and assistance in household chores. Most youths, after spending 2–3 years abroad, are reported to come back because of long working hours and meagre earnings and end up taking up fishing in the Palk Bay.

Although a few institutional efforts (largely by CSOs) focused on developing suitable alternative income-generating activities for the Palk Bay-dependent communities with a view to reducing the pressure on its resources, the results have not been encouraging and only a fraction of the people ever benefited from the programmes. While the study could not focus to any extent on the recent government employment guarantee initiatives like MGNREGA, their implications for the Palk Bay communities, either from a livelihoods perspective or from a conservation/ management perspective, appear to be minimal. Continued fresh recruitment into the Palk Bay fisheries continues unabated and so does the in-migration of people from the outside, who constitute a sizeable proportion of the crew in both mechanized and motorized fishing operations. The need for additional crew is justified by the ever-growing number of motorized crafts in the bay. In other words, despite growing levels of literacy and possible movement away from fishing by the younger generation, the overall dependence on the Palk Bay and its resources remains constant, if not increasing.

Women in Palk Bay

As with everything in the Palk Bay, the extent of involvement of women in production-related activities varies according to the communities– wide disparities exist in women's roles between different communities (and even in adjacent communities), owing to the social norms arising out of differences of caste/religion.

Where active in productive functions, women are seen to be involved in a range of activities that include fishing. The women living in the mangrove areas in Tiruvarur and Thanjavur districts go along with their husbands into the backwaters for fishing. In several villages, women are involved in 'lone-ranger' operations, which include manual collection of fish, shrimp, seaweed and chanks by hand in the shallow waters of the Palk Bay. In fact, women used to be dominant in collection of seaweed in the southern Palk Bay, but it has been reported that

increasingly the seaweed caught by beam trawls in mechanized and motorized boats is the only source of the supply.

It is on land that the women have a better defined role in fishing: they handle the post-harvest and trade activities once the catches are landed. With the arrival of distant urban trade and export trade, their importance in trade has diminished, but they continue to be major players in the local fresh fish supply chains and in the traditional processed-fish trade. At major fish landing centres like Rameswaram, Jagathapattinam and Kottaipattinam, the women play a number of ancillary roles in sorting, packing, transporting and marketing the fish landed by the trawlers.

In villages like Mullimanai, women have a refreshingly active function in managing the domestic (and fishing) economy at the household level. It is they who sell their husbands' catches to the traders, share the returns with the crew (and their husbands) and manage the household economy as well as take care of the debt servicing and savings aspects. The women are naturally more vocal and clear about their priorities.

All the same, the prevalence of widows and old women in the fish trade would seem to indicate their possible exclusion from social support mechanisms (as elsewhere in fisheries), which forces them to eke out a living from the only activity that is open to them.

In some communities where development initiatives are in progress, women are increasingly favoured in micro-credit and conservation programmes through SHGs and EDCs (only in some communities on the Gulf of Mannar side in Rameswaram area), but to what extent this has empowered them remains unclear. From all indications, the women are far more aware of the conservation and management needs of the marine/coastal environment and are willing to take an active part in better management of the resources, but to what extent the existing power structures within the communities would allow them to do so remains to be seen.

In the Palk Bay, a majority of villages have active traditional panchayats, and it is reported that the women or men cannot attend a public meeting outside the village without getting permission from the community elders; failure to do so results in public chastisement and, if it occurs frequently, in being fined or, in extreme cases, being excommunicated. Although extreme measures are avoided these days, frequently at the behest of the formal legal mechanisms, the fear of such punishments is real enough.

In summary, the women in the Palk Bay are as locked into a social, economic and cultural cul-de-sac as their counterparts elsewhere in the coastal communities, but again as in the case of the others, there are signs that things are changing for the better and the women are coming out more actively to take a role in decision-making. From a conservation/management perspective, the study has found the women to be more level-headed and practical in accepting the need for better conservation measures.

Summary: Livelihoods Context in Palk Bay Today

The livelihoods of the people dependent upon the Palk Bay resources are, like the Palk Bay itself, 'boxed-in' on all sides, and this applies at three levels:

Within fisheries. With too much competition in the bay, and with no opportunities to diversify beyond the bay owing to the distances involved, the capacity of the boats and the untested nature of new fishing grounds, the options for making a sustainable living from fishing appear to be bleak.

Beyond fisheries. The hinterland of the Palk Bay is characterized by a lack of opportunities for investment and labour (which, if anything, forces a continuous reverse migration into fishing), and so there is no scope to move out of fishing either.

Subsistence mind-set of the fishers. This is perhaps the most serious of the constraints that needs focussed attention. Although modernization of

the Palk Bay fisheries led into a capitalistic mode of production (where costs and returns needed to be balanced carefully), the prevailing mindset remains in the pre-modernization, subsistence-oriented thinking. This forces people to focus almost exclusively on the present, even at the expense of sacrificing the future in the process. Basic survival needs take precedence over economic viability; subsidies (both financial and natural resource related) become the mainstay of operations; risk-taking is actively discouraged, which leads to further degradation and destitution of both resources and livelihoods; and finally, apathy is preferred over active planning for the future. It is quite possible that this is an effect, rather than the cause, of the overall hopelessness of the situation; all the same, it starts fuelling further the inability of the fishers to do anything about addressing the problems or even thinking about them.

As this study has shown, this mind-set of course does not apply right across the entire fisheries sector, but the evidence of such thinking prevailing even among mechanized boat owners cannot be ignored either. In practical terms, what this points to is the paucity of practical answers coming from the local communities themselves to the burning problems that are threatening them more than anybody else.

Chapter 5

Institutional and Legal Context

An important issue that needs highlighting at the outset about the Palk Bay ecosystem is the widespread prevalence of legal pluralism, i.e., the existence of a number of legal (or quasi-legal) systems relating to different (sometimes overlapping) activities and processes affecting human behaviour at the societal and individual levels. The prevailing legal/institutional frameworks in the Palk Bay range from community-based '*meenavar uur panchayats*' to the government agencies, and the local societal/individual behaviour is shaped by the complex matrix of interactions and negotiations within and between these systems. The different institutions playing a role in this process would include the following:

Community-based institutions (traditional institutions (*uur-panchayats*), modern institutions (*gram panchayats*, fishermen's cooperative societies and other fishworkers, organizations, and self-help groups)

Stakeholder group-based institutions (e.g., boat owners' associations)

Government ministries and departments at the central level (e.g., MoEFCC, Aquaculture Authority, Navy and Coastguard)

Government ministries and departments at the state level (DOEF, DOF and Pollution Control Board).

Besides these, the following need to be also taken into account:

Research and academic institutions

Civil society organizations (CSOs).

Given the conditions prevailing in the Palk Bay today, it is probably necessary to include even the Sri Lankan Navy as an institution that has a role to play in the life and livelihoods of at least those fishers who habitually fish in their waters.

Community-based Institutions

Of these, the most important from a management perspective are the traditional panchayats and, among the fishworker organisations, the mechanized trawler owners' associations.

Traditional panchayats (called variously *uur-panchayats, meenavar uur panchayats* or just *panchayats*) are mostly based upon the caste to which a majority of fishers in the community belong. Headed by a set of elders, their numbers varying from village to village, the *uur panchayats* have a significant role encompassing the social, economic, cultural, ritual and familial spheres in the communities (Salagrama 2005). Their role as the interlocutors for the communities makes them viewed either as bridges or as barriers to the communities' access to the wider world.

Although they refute any management function relating to fishing, the traditional panchayats do exert significant influence–direct and indirect, positive and negative–on the fishing activities in the region in more ways than one. Thus, in the village of Maravakkadu, in Thanjavur District, the responsibilities of the traditional panchayat included, inter alia, the following:

- Declaring fishing holidays for festivals, weddings and funerals in the village
- Resolution of conflicts between boat owners of the same village and those of other villages
- Providing or enabling state support or compensation packages for old, injured or dead fishers and their families
- Collecting funds for village activities through compulsory taxation on all fishing activities and implementing bans on fishing gear or collection of certain species for conservation purposes.

Over time, the emergence of the state agencies has undermined the power of the traditional panchayats to some extent, but they continue to play a major role in the day-to-day community actions.

Overall, the striking hold that the community-level institutions have in shaping the individual/societal choices stresses the necessity of their inclusion into any prospective governance system. As mentioned, the '*meenavar uur panchayats*', though sharing some common characteristics across villages and districts, also have their own distinctive identities and responsibilities befitting their essential local function, making it impossible to homogenize them across the bay. This may prove to be a constraint to implementing any management plan that covers a larger unit of area than a community, but then it also stresses the point that the diversity characterizing the ecosystem itself demands more localized models of management.

The traditional panchayats have one attribute that most legal systems, formal or informal, aspire to, but frequently fail to obtain: the capacity to enforce their rules efficiently. However, as is frequently the case, these are powers that can work both ways. Also, there is need for caution while dealing with these institutions, notwithstanding the rather idealized pictures of the *uur panchayats* as the living epitome of the 'village republics' of yore. This is important in light of their essentially conservative, hierarchical and even regressive attitudes, which are reflected in their caste-based, gender-insensitive, arbitrary and tyrannical organizational norms. It is suggested that they can be made to think and act along more 'progressive' lines, but the roots of these systems, and the community's acceptance of them, are mired in traditions that make the systems and their work all of one piece: change a bit here or there and the system could collapse or at best transform into something else. The challenge then is to be able to work with them and make them adapt to modern practices without losing their essential rootedness in a tradition that gives them a legitimacy that no other systems seem to possess at the moment.

Among the other community-based groups, the boat owners' associations in the trawl sector are equally, if not more, powerful in collective decision making. Schoeltens (2006) provides a list of 13 boat owners' associations that worked in Ramanathapuram District alone, and Sathyapalan *et al* (2008) calculate that there are about 30 associations spread across 10 landing centres. The operational scope of these associations is said to have two dimensions, which involve dealing with internal and external

matters. The external dimension involves lobbying for the interests of the boat owners at different levels of administration, while the internal dimension involves dispute resolution amongst the member-boat owners. In places within the Palk Bay where these organizations are well organized, it has been reported that they even have the power to negotiate the scope of regulations with the DOF (Sathyapalan *et al* 2008:33). All the same, the existence of a multiple number of associations at each location reportedly leads to their failure to put up a collective front to advance their demands effectively.

The fishermen's cooperative societies and self-help groups, supported, respectively, by the government and the CSOs, are primarily seen as channels for accessing support from the outside. Apart from that, they remain largely confined to some minor activities.

Two important factors appear to constrain the fishworker organizations', as also the CSOs' ability to develop or lobby for, and implement, meaningful management programmes.

Firstly, the nature of membership, which sets the agendas for the organization to pursue, frequently prevents the leadership, though enlightened in most cases, to speak out against the problems inherent in their own practices. The organizational energies are spent mostly in externalizing the blame for resource crunches and suggesting tough management options that are aimed at some other stakeholder group while minimizing their own contribution to the process.

Secondly, the fishworkers' organizational agendas are frequently too local and pertain to the more immediate needs of the members (e.g., ensuring release of fuel subsidies or enhancing the quantum of state support to cover a larger number of people), which hardly allows scope to promote long-term agendas such as conservation and management.

Institutional Stakeholders in the Palk Bay

The formal (i.e., government-supported institutional/legislative framework) context is characterized by a plethora of organizations at different levels, ranging from the central and state levels down to the local-level administrative systems. Without getting into a detailed listing of all the institutions that are relevant, it can be safely said that there are far too many institutions that have an influence on the Palk Bay context. Mathew (2003) lists 10 central ministries as having a role in various aspects of the fisheries in the country, and this is in addition to the various state ministries and departments. This applies to the Palk Bay as well.

The Department of Fisheries (DOF) is by far the most important government body working in the Palk Bay region and most fishers' organizations are in regular contact with the department. As indicated in a previous section, the DOF can take credit for the entire process of 'modernization' and it continues to support the ailing mechanized boat industry with fuel subsidies while undertaking a range of welfare functions such as housing and lean-season assistance to address the needs of the small-scale sector. It also implements the Marine Fishing Regulation Act (MFRA), which is a major legislation that has a resource management/conservation agenda.

The foregoing paragraph highlights the fundamental dilemmas in the DOF's approach to fisheries: the three agendas of (1) economic growth (2) livelihood support and welfare and (3) management and conservation of fishery resources are laid upon one another without much effort at harmonizing these priorities. Thus, while implementing MFRA as a management tool, the DOF also continues to subsidize potentially destructive fishing by trawlers with subsidies. Within the management agendas, the DOF's attention is focused more on conflict resolution than on conservation, and the measures taken, such as the 3-4 day rule, 45-day ban and 3-nautical mile rule, are more in the

nature of ad hoc measures that do not always add up to a cohesive management strategy.

Existing legislations, where they are adequate to curtail some of the excesses of destructive and excessive fishing, are hampered by poor implementation and community apathy. It is only where the community takes the lead in forcing the government to impose the regulations that they get to be implemented with any amount of vigour.

Finally, the DOF largely lags behind in developing the basic tools for effective management, which include collection of fish catch statistics, monitoring fishing effort and resource health and linking research with practice. This restricts its ability to make meaningful interventions. In the absence of robust research data on issues such as diversification of effort, its proposed attempts to offer buyback of the excess fleet capacity or to promote deep-sea fishing could potentially lead to worsening of the existing situation. Similarly, the recently launched World Bank-supported programme for supplying communications equipment to the fishers at subsidised rates has been suggested as overlooking the potential implications of the equipment on increasing fishing effort and the pressure on the resources.

The Department of Environment and Forests (DOEF) has a much less significant presence in the Palk Bay than in the neighbouring Gulf of Mannar. Its role in the Palk Bay appears to be confined to implementing some bans on collection of sea cucumbers and seahorses. According to the fishers, the implementation of the bans is marked by the exclusion of the local communities from the use of the resource completely, to the great detriment of the poorer stakeholders in villages like Mullimanai, who had depended on sea cucumbers all their life and who have very few alternatives to diversify into.
The National Fisheries Development Board (NFDB) is a government agency chartered in 2006 with the specific aim of supporting the development of the fisheries sector in India. It has been supporting seaweed culture in the Palk Bay, and it supports the Department of Fisheries and its allied activities in undertaking a number of programmes relating to infrastructure development, market supply chain improvement, and capacity building of groups and individuals through training and financial support. Although its current portfolio does not have a major focus on conservation and management issues, the NFDB must be included into any initiatives; both because it has the funding resources necessary to support the conservation activities at the required magnitude and because, if not properly channelled, its ongoing activities, such as support for seaweed cultivation, could potentially run counter to the conservation aims for the Palk Bay.

The Navy and the Coast Guard, as well as the newly created Marine Police, come into the picture in the Palk Bay for two reasons: to implement the conservation laws and to address the cross-border fishing issues.

An important stakeholder in the decision-making process at the district level that deserves special attention, especially from a management/ conservation perspective, is the office of the District Collector in each district along the Palk Bay. Although not directly involved in conservation, the District Collector is the head of the administration in each district and hence is in a unique position to implement integrated programmes aimed at management by bringing together the conservation and livelihood agendas on the one hand and the various line departments concerned with those two themes on the other. Being located close to the villages and with sufficient executive powers to implement programmes effectively and efficiently, the District Collectors are an ideal counterpart for any management initiative. The District Collectors also command a good deal of respect among the communities and can use that to leverage community support for furthering a more explicit management/conservation agenda. In fact, the 3-4 day rule and the 3-nautical mile rule are reported to have been implemented by the District Collectors on the

basis of representations made by the concerned fishing groups. The fact that these rules have continued to be obeyed now for nearly 35 years clearly indicates that the power of the District Collector combined with popular will might well be the way forward for any management initiative in the Palk Bay.

Research and Academic Institutions

Some of the important research and academic institutions whose work directly or indirectly covering the Palk Bay area are *The Central Marine Fisheries Research Institute (CMFRI)*, based at Mandapam Camp in Ramanathapuram District; *The Central Salt and Marine Chemical Research Institute (CSMCRI)*, also based at Mandapam in Ramanathapuram District; *The Central Institute of Brackishwater Aquaculture*, based at Chennai; *The Marine Biological Research Division of Alagappa University* at Thondi in Ramanathapuram District; *Centre for Advanced Study in Marine Biology (CAS), Annamalai University,* Porto Nuovo, Cuddalore District; *Marine Biology Department at the Madurai Kamaraj University,* Madurai; *Oceanography Department* at *the Bharathidasan University*, Trichy; *The Suganthi Devadason Marine Biological Research Institute*, based at Tuticorin.

According to Krishnan and Narayanakumar (2013), there are two institutions working on seaweed-related issues in the Palk Bay: (1) *The Seaweed Research and Utilization Association* (Mandapam), which was established in 1970, has been engaged in seaweed-related research activities such as organizing an annual symposium on algae-related topics, and it publishes a journal, *Seaweed Research and Utilization*. (2) *The Krishnamurthy Institute of Algology,* was established by a group of Indian researchers who felt the need for an institution devoted to research and development on algal studies. It conducts studies on the morphology, taxonomy, life history and basic chemistry of Algae. It also conducts periodical seminars and symposia on alga-related subjects and has been publishing a journal, *Indian Hydrobiology.*

While the numbers, and frequently the work, of the research institutions remain impressive, there exist several gaps in terms of coverage of important issues of concern from a policy perspective, of harmonizing the work being done by different institutions, and of a certain kind of secretiveness that does not allow a free flow of information and ideas. Also important to note is the wide disparity of opinions on issues such as *Kappaphycus* culture, where the debates appear to be more about selling a viewpoint rather than attempting to understand the issue dispassionately and scientifically.

On the socio-economic front, the study hasn't managed to find many research and academic institutions working in the Palk Bay. There might be some research programmes focusing on these issues, but if so, the results are not easily accessible in the public domain[8]. The one academic institution that can be said to be working on the socio-economic aspects of the Palk Bay (albeit in a peremptory manner) is the University of Amsterdam.

Civil Society Organizations (CSOs)

The study has come across some CSO initiatives in the Palk Bay area, but taken holistically, the extent of coverage by the CSOs is not comparable with, say, Nagapattinam or Kanyakumari. Most CSO activities are focussed on micro-credit and other conventional community development initiatives, but the extent of engagement with coastal resource conservation and management is confined to a few CSOs, some of which are listed in the following:

Dhan Foundation. Reportedly working on livelihoods and conservation issues in selected villages all along the Palk Bay.

MS Swaminathan Research Foundation. Focussed mainly on conservation of mangroves, MSSRF also promoted some livelihoods-related interventions in Pudukkottai and Thanjavur districts.

OMCAR. Working in Thanjavur District, this CSO focuses on creating environmental awareness using a variety of extension strategies and materials.

PAD. Undertaking conservation and livelihood support programmes in Ramanathapuram District.

FISHMARC (*Fisheries Management Resource Centre*). Based in Ramanathapuram District, FISHMARC is by far the most engaged CSO in the region, working on a range of critical issues– both conservation and management–affecting the Palk Bay fisheries, which range from Sri Lankan issues and trawler buyback to co-management and livelihood support initiatives. With a strong intellectual and practical base in fisheries, the CSO supports a number of national and international initiatives for responsible management of fisheries resources in and around Palk Bay and acts as a general think-tank for potential interventions in the area.

The Aquaculture Foundation of India (AFI). The AFI is an NGO based in Chennai. It plays an active role in the promotion of seaweed farming in the southern districts of Tamil Nadu (Krishnan & Narayana Kumar 2013). The AFI identifies the most suitable SHGs for further involvement with government agencies and financial institutes. With support from Aquagri and the government departments, the AFI also imparts training and provides support to SHG participants for obtaining government subsidies and finance from financial institutes. It also works in collaboration with colleges and universities to increase the scale of seaweed farming.

Important Laws Governing Coastal and Marine Resources

As Mathew (2003) notes, "The most significant drawback in the legal system for marine fisheries in [Indian] territorial waters is that, in spite of resources being overfished, there are no entry restriction into marine fisheries, nor are there any programmes to retire fishing fleet, especially old fishing vessels, or to take effective and deterrent legal action against fishing vessels that violate regulations. Also, there are no legal mechanisms to address inter-state movement of fishing vessels or problems arising from such movement." This sums up the situation adequately for the Palk Bay, as elsewhere.

At the outset, it needs to be mentioned that the extent to which conservation laws and management measures have an impact on the livelihoods of the Palk Bay communities is far less compared with those in the neighbouring Gulf of Mannar (GOM) region. Unlike the coastal communities of GOM, who are very vociferous in their assessment of the legal regulations on their activities, the responses of the Palk Bay communities are more muted. This is obviously because only a small portion of the people are dependent upon the banned resources like seaweeds, seahorses and sea cucumbers, although the impact of the ban on these people has indeed been severe.

The main legislations that have relevance to the Palk Bay include the following:

The Tamil Nadu Marine Fisheries Regulation Act, 1983, aimed at regulating fishing vessels in the 12-mile territorial sea mainly to protect the interests of the traditional fishermen. Thus, the primary objective of the act has been to maintain law and order at sea. The 3-nautical mile rule (which says that no mechanized fishing boat shall be operated for fishing within 3 nautical miles from the shore), which applies throughout the Palk Bay is taken from the MFRA. There are several other provisions in the act that also aim to control and regulate destructive fishing activities, but these remain largely ignored.

Subsequently, the annual ban of 45 days (from April 15 to May 29 every year) too has been implemented using provisions of this act. This measure was aimed at conservation and regeneration of fish stocks, and is well accepted by the mechanized boat owners (who reportedly are seeking a second ban on fishing in a year), but its non-coverage of small-scale boats (motorized and non-motorized) may be hampering whatever effectiveness such a measure could have had.

The DOF in the Palk Bay also implements what is called a 3–4 day rule. This came about to avert the frequent conflicts between artisanal and mechanized boats targeting the same species

within the same fishing territory. As indicated, the District Collectors of Thanjavur and Pudukkottai took the lead in setting up the system whereby the trawlers and the small-scale boats are allowed to fish on alternate days with the former fishing for 3 days in a week while the latter would fish for 4 days (although the artisanal fishers never really obeyed it, considering it to be applicable only to the mechanized boats). The system operates on the basis of tokens issued by the DOF and seems to be accepted well by the trawlers. To the extent that the mechanized boats are not allowed to fish for 4 days in a week, this has good conservation implications.

The Wildlife (Protection) Act, 1972, amended in 2002 and 2006, provides the legislative framework for the establishment of national parks and sanctuaries. In the Palk Bay context, the WLPA provides for protection of marine species such as turtles, seahorses, sea cucumbers, various corals, selected molluscan species, marine mammals (especially the dugong), sharks and one perch.

The Environment (Protection) Act, 1986, provides for the protection and improvement of the environment. The Coastal Regulation Zone Notification, 1991 & 2011, issued under the provisions of this act, outlines a zoning scheme to regulate development in a defined coastal strip. Its relevance to the Palk Bay area probably lies in its provisions for controlling the coastal aquaculture, which remains largely unregulated. However, there is no evidence of the EPA or the CR2 being used for controlling or regulating the location of aqua-farms very close to the sea or discharging untreated water straight into the sea. Although the Aquaculture Authority of India is supposed to license and regulate coastal aquaculture farms, there is no evidence of such provisions being implemented with any degree of vigour.

The Biological Diversity Act 2002 (No. 18 of 2003) is meant "to provide for conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto." Although no sites have yet been designated under the biodiversity heritage category, there appears to be much scope for using the BDA Act for conservation of sensitive resources in the Palk Bay.

Concerning the people's responses to the existing legal framework, the study has found perceptions among most primary stakeholders that indicate that the implementation of existing legal provisions is tardy and that, where implemented, the laws tend to curtail existing livelihoods and not take due cognisance of the needs and compulsions of the stakeholders, especially the poor.

To sum up, the interactions with the stakeholders give rise to a number of concerns about the legislative context in the Palk Bay, which can be summarized as follows:

Conflicting agendas. E.g., DOF providing subsidies and welfare support while also tasked with conservation/management–no proper integration of objectives

Vertical linkages frequently obscure. E.g., weak harmonisation of policies between Centre-State levels

Horizontal linkages very weak. E.g. weak harmonization of policies between different line departments and the DOF being a marginal player in the Forest Department agendas

Lack of representation in conservation/ management decisions for critical institutional stakeholders. E.g., *meenavar uur panchayats*, boat owners' associations. All legislations come to the people as fait accompli, frequently without advance notice.

Notes

1. The CMFRI Socio Economic Extension Technology Transfer Division has reportedly done some work on the socio-economics of the fishing and fishing crafts of Tamil Nadu.

Chapter 6

Crisis in Palk Bay Fisheries and the Responses to It

Current Status of Resources

As indicated, the non-availability of robust research data on different Palk Bay resources makes it difficult to assess their health in a quantifiable manner. There is however no doubt that the Palk Bay resources are under considerable stress, and the evidence comes from the growing need felt by the Palk Bay-dependent communities to make adaptations to earn a living in the face of a declining resource base. The following is an attempt to summarize the stakeholders' perceptions obtained during the fieldwork about the resource health.

Fisheries. Fishes are but, of course, the most important natural resource in the Palk Bay. Comparison of fish catches in the region over the last decade (Kasim & Vivekanandan, undated) shows an increase in total landings, except in Pudukkottai. The continued increase in the total catch is attributed to fishing down the food web, i.e., apex predators being fished out, thereby allowing the prey species (economically less important) to proliferate and contribute towards a minor fishery of higher magnitude. The increase in catch reportedly comes from oil sardines and lesser sardines, which, together with silver bellies, account for nearly half the total catch. Oil sardines have emerged as a major category, indicating that the traditional species, mainly demersal species, are slowly giving way to new species. While data are not available for the Palk Bay, the CMFRI's estimate that 60 per cent of the commercially important varieties are overfished in Tamil Nadu, while another 20 per cent are being fished the optimal level (Kasim & Vivekanandan, undated) seems to hold good in the case of the Palk Bay as well. More significantly, whatever the statistics may say, most of the research papers on the fishery biology and stock assessment of different fishery resources in the Palk Bay indicate that they are overfished (Dr Kasim, pers comm.).

The most outstanding is the case of silver bellies, which were once such a dominant species that their abundance led the DOF to set up a fishmeal plant to utilize them adequately in the late 1970s or early 1980s in the region. The plan has since folded up owing to a significant decrease in silver belly landings.

At the community level, there is unanimity of opinion in every village visited by the study team that fish catches, especially of the commercially important species, are declining. Even after discounting the usual exaggerations, it is quite clear that fishing is increasingly an uncertain proposition, and this is reflected mostly in terms of reduced incomes, which in turn affect the quality of life at the household level.

Mangroves. Mangroves are mainly found in the north zone of the Palk Bay. There have been several attempts by the DOEF and by CSOs like MSSRF to undertake afforestation programmes in the mangroves to address their rapid decline. However, there are reports of increasing levels of siltation, erosion and swamping on the seaward side, which are attributed to decreasing levels of freshwater flows from the river Cauvery into the mangrove ecosystems. The lagoons inside the mangroves are reportedly shrinking and becoming shallower. The river mouths are silting up, and several coastal mangroves are swamped in saline water round the year. According to OMCAR, a CSO working in Thanjavur District, the mangroves are not in a healthy shape, and things are likely to get worse in the coming years.

Seagrasses. Intensive trawling operations in the nearshore waters, which are complemented by equally destructive nets like the '*thallumadi*' (mini-trawl) in the small-scale sector, are reported to affect the seagrass growth, thereby reducing the value of these waters as a feeding ground and nursery for various endangered species. According to the CMFRI (Chennai), the seagrass beds themselves are relatively intact, and it will take only a concerted effort to curtail destructive fishing in the area to get the seagrass to recover again.

Coral reefs. Coral reefs have a limited distribution in the Palk Bay, although some of the corals in the bay are considered to be unique. They are supposed to be sensitive to even minor changes in the ambient environmental conditions, and such changes resulted in a large section of corals in the Palk Bay being killed in 1998 and again in 2002. It has been suggested that increased tourist activity in Rameswaram Island, resulting in higher levels of pollution of the sea, as well as trawling and beach seining in shallow waters of the reef, is detrimental to the coral reefs. The tsunami of 2004 is reported to have reduced the live coral cover of 26.7 per cent in the Palk Bay to 19.2 per cent, while according to the Marine Biological Research Centre of Alagappa University, climate change has had some impact upon the corals, which has resulted in their being exposed.

Chank Resources. Collection of chanks by hand has come down significantly in the Ramanathapuram area (which is the only place in the Palk Bay where chank is available for collection), and the influence of the few people who continue to collect shells on the resources is said to be minimal. However, the trawlers are reported to catch a sizeable number of chanks as bycatch, which is a matter for concern. The impacts of other factors like pollution on the chank populations in areas like Rameswaram, though considered significant, are not known.

Seahorses and Sea Cucumbers. There has been a decline in the collection of these two banned species although trawl catches are said to include a small proportion of these species as by-catch. Overall, there is a perception that whatever is being caught now, the catches of these species will further come down as the activity ceases to have an economic connotation.

Dugongs. The dugong is considered an 'indicator' species to assess the health of the Palk Bay ecosystem, although it has been difficult to find anyone who actually does assessments of its wellbeing. The evidence is patchy at best about its prevalence in the Palk Bay, and confined to anecdotal references by fishers who claim to have seen a dugong once or twice in the last decade or more.

Fishers' Responses to the Crisis: Blame the 'Other'

When discussing the issue of the declining resource base of the Palk Bay, it is customary

to hear the fishers falling back on some typical responses that seem to have been almost learned by rote:

"It is the government's responsibility to do something about the problem."

"We have no alternatives, and must continue doing this irrespective of whatever happens."

"If we don't take the fish, someone else will."

"The sea can provide endlessly if only 'x' is stopped".

More significantly, one is confronted in the Palk Bay by a serious epidemic of blaming the 'other'! Everyone seems to find a favourite culprit for the state of affairs, so everyone blames others while firmly refusing to take even minimal responsibility for the crisis themselves. Also, notwithstanding their frequently professed faith in the sea to provide enough for all eventually, a clear impression that emerges, especially among the trawler owners, is that, given a viable alternative, people would move out of fishing altogether. The fishers in the motorized sector, a majority of them caste-fishers, do not see moving out as an option at all, and even justify further increases in the motorized fleet size (while complaining all the time about the declining per capita availability of fish catches), but this could be mere bravado in the face of daunting challenges that they cannot clearly address with their own means.

In the meantime, in order to cope with the declining catches and increasing competition, a number of adaptations are being put in place by the fishers themselves or, more frequently, by the relevant government bodies who acted on the demands of the fishers for such regulations. For convenience, the fishers' responses and the crisis can be categorized into two streams: those with positive management or conservation implications and those with negative management/conservation implications.

Positive Responses

The reported ban by the traditional panchayats on certain destructive fishing practices followed by the motorized boats in some north zone communities.

The self-imposed ban by some mechanized boat owners' associations in northern Ramanathapuram District, which restrict the mechanized boats from moving into the 3-nautical mile zone at the risk of attracting sizeable fines and even more severe punishments for repeated violations.

3-4 day rule and 3-nautical mile rule: These are essentially meant to reduce conflicts between mechanized and small-scale sectors and may also contribute to reducing the fishing intensity in the bay by reducing the number of days that a trawler can fish, and its access to the nearshore waters. However, the rules lack a strong enforcement system or a punishment serious enough to be taken seriously, and so they tend to get broken wherever possible.

The 45-day annual fishing ban is observed rigorously by the mechanised trawlers, but its effectiveness as a resource conservation mechanism may be compromised by the fact that the small-scale sector, including the motorized boats, is exempted from fishing during the ban period.

However, such measures lack an appropriate and systemic management framework to hang on to, and thus they remain local, piecemeal and sparsely implemented. The critical point is that these rules came about as a result of the fishers' own demand for such controls, which suggests that they could take a more active role in rule making and enforcement, if only they are convinced to do so and are allowed a bigger say in the decision-making processes.

By far the most far-reaching response to the crisis has been the insistence of many fishers, especially women, to get their children educated in order to gain a living outside the fisheries. A number of younger people are moving out in search of alternative employment within

the country and abroad, and this is a positive trend in so far as it reduces the pressure on the fisheries both now and in the future. The current indications are that this trend is likely to grow stronger in the coming years as more youngsters will be leaving the villages looking for new employment opportunities.

An important, but less understood, phenomenon pertaining to mechanized fishing is the gradual decrease in the number of fishing days. The overall number of mechanized trawlers has come down significantly over the years, from over 3000 in the year 2000 to 1700 in recent times. But these numbers could be misleading because not all boats in the fleet go out on any given day. In fact, an estimate by Schoeltens (2006) indicated that the average number of days that a mechanized trawler went fishing in a year amounted to 88, with up to a quarter of the boats on average avoiding fishing even on days that they were allowed to do so as per the 3-4 day rule. The demand for the mechanized boat owners to have another seasonal ban on fishing is reported to be based on this state of affairs: an official ban allows some state support for subsistence while a self-imposed ban doesn't.

Negative Adaptations: Tragedy of the Commons

The excessive capacity in Palk Bay has burdened the resources and the area, leading to a classic 'tragedy of the commons'. This has in turn led to fishing down the food chain. Open access fisheries do not give the fishers any incentives for conservation – they actually get punished for it. The following are some of the key causes, as well as the consequences, of the crisis in the Palk Bay.

Destructive fishing. Everybody's favourite culprit when it comes to destructive fishing is obviously the mechanized sector, but the mechanized fleet owners blame the state of affairs on pollution and climate change. In some cases, the mechanized boat owners accept their contribution to the problem, but point out (justifiably) that the motorized boats are not exempt from destructive fishing and overfishing themselves. Finally, they also take recourse in the circular argument that suggests (also justifiably) that the conditions in fishing are such that there is simply no alternative for trawlers except to do what they have been doing to the ecosystem.

Be that as it may, it has to be admitted that the many methods of Palk Bay fishing, mechanized, motorized and non-motorized, seem to involve some or many components of destructive fishing, which is best illustrated by the reported landings of large quantities of juveniles in all these systems (including beach-seines). As discussed, the mechanized trawl nets have their complement in the motorized sector in the form of mini-trawls (*tallu madi, arivalai*). According to one fisherman leader from Muthukuda, in Pudukkottai District, nearly 200 of the 250 motorized boats in his village used mini-trawls, each of which reportedly caught about half as much as a mechanized trawler. Though officially banned, dynamite fishing is reported to be in practised in some villages near Thondi, a visible illustration of this being a number of people who'd lost their hands or legs (occasionally even lives) in the process of throwing lighted dynamite into the sea.

Overfishing. Less discussed than destructive fishing, overfishing is as serious, if not more, as destructive gear to the health of the Palk Bay resources. In this case, there is no denying that the small-scale fisheries contribute their own substantial share to the problem. Motorized boats have simply mushroomed over the last decade, whereas the number of mechanized boats has shown a declining trend, currently hovering around 1900, while that of motorized boats has grown from 82 in 2000 to 1995 by 2005. By the fishers' own admission, the numbers must have increased significantly since then.

Besides patently destructive nets like mini-trawls, the size and numbers of even seemingly innocuous nets on the motorized boats have increased exponentially. In many cases, it is impossible to characterize a net as targeting

pelagic fish or demersal fish because it catches both by virtue of being so deep as to extend from the surface to the bottom of the sea. That they are allowed to fish within the 3-nautical mile zone and are exempted from the 3-4 day rule might also mean that overfishing is taking place in the inshore waters.

Competition and conflicts. Competition and its corollary, conflicts, have been an endemic feature of Palk Bay fisheries ever since the mechanized boats made their entry into the bay in the early 1970s. However, the intensity and the frequency of the competition and the conflicts have increased manifold over recent years.

Mechanized boats routinely encroach into the waters within 3 nautical miles of the coast and not only compete with the small-scale operations for fish but also overrun their boats and nets, causing serious damage. The contention of the mechanized boat owners is that they are fishing on days allotted to them, when in theory, the small-scale boats are not supposed to be fishing anyway. However, the fact that they are fishing where they have no right to causes much resentment and frequent skirmishes. It is a frequent occurrence that a mechanized boat is caught by small-scale fishers and held to ransom until some compensation is paid by the concerned boat owners towards the damage to boats and nets.

The motorized boats increasingly fish well beyond the 3-nautical mile zone, effectively and efficiently competing with the mechanized boats for fishing. Although there are no reported instances of conflicts at sea as a result, the mechanized boat owners resent this as an intrusion, especially as (it is reported) the incursion of the motorized boats into Sri Lankan waters does not give rise to the same kind of antagonistic responses from the local fishers as that by mechanized fishers.

The conflicts are not confined to those between the mechanized and motorized sectors. There are intra-group rivalries too. The motorized boat owners complain about the hostile response they receive when they attempt to go to another motorised boat landing centre within the bay for fishing. This practice of shifting base within the bay to take advantage of good catches, once widely prevalent and based upon kinship and the principle of reciprocity, is no longer tolerated. Similarly, the mechanized boat owners complain that they are no longer welcome to operate their boats from their once-native villages in Nagapattinam district. The Rameswaram boats receive hostile responses from the local mechanized boat owners when they try to fish in the northern part of the Palk Bay.

When the new activity of *Kappaphycus* culture began in the southernmost village of Olaikuda, it immediately gave rise to conflicts with the local motorized fishers, who complained about the culture beds affecting their movements. It required the village panchayat to intervene and divide the entire beach into individual plots of about 5 yards' width each, but with no restriction on the length to which the individual rights extend into the sea. Whatever the implications and validity of such arrangements may be, the example illustrates the fact that there are far too many claimants competing with each other for the coastal resources.

Dependence on diesel subsidy. An important indicator of the viability of a fishery may be the extent to which it is dependent upon hand-outs in the form of subsidies. Using this indicator, it becomes quite possible to accept the contention of the mechanized boat owners that theirs are literally hand-to-mouth operations.

The Government of Tamil Nadu provides a 1000 litres of sales tax-free diesel per month for mechanized boats, which implies a price reduction of some INR 10 per litre for the first 1000 litres. Given that the total requirement of diesel per month of a mechanized boat is about 2500 litres, the subsidised diesel hardly pays for half the fishing days in a month, requiring the owners to buy the additional fuel in open market. In a fishing operation where each fishing trip

reportedly costs around INR 25,000–35,000, it can be assumed, even after making discounts for possible exaggeration, that a total subsidy of around INR 10,000 per month should not really matter to the operators. The strange thing is that it does and quite significantly too. It is said that many boat owners try to spread their cheap fuel to last longer by reducing the fishing time or skipping fishing altogether on days when they are not sure of getting good catches. Some owners who have more than two trawlers choose to keep one of them idle while using its ration of subsidized fuel to run the other through the month. There are even cases of some boat owners who do not go to sea at all, contenting themselves with the small surplus generated by selling their 1000 litres for a slightly higher price. These, certainly, are not indicators of a flourishing economy by any stretch of the imagination. There are mechanized boat owners who asserted that the diesel subsidy is what keeps at least a part of the fleet in business.

This gives rise to a more disturbing question: Is it possible that the diesel subsidy (and other hand-outs like cash-and-kind support during the ban period) is allowing excessive capacity to survive in a system that has lost its economic viability? A more economistic argument might suggest withdrawing the subsidy so the inefficiencies in the system get weeded out by a natural process until the system becomes viable once again. This brings us to the question of how to achieve this without causing immense hardships to the boat owners and, even more seriously, to the crew. One argument has it that a majority of the boat owners and a sizeable proportion of the crew are not from within the fishing communities anyway and so it might be possible for them to go back to where they came from, but this does not seem valid either, given that the conditions in agriculture are even worse than in mechanized fishing.

Dependence on Sri Lankan resources. From an opportunity to exploit what was an under-exploited resource, fishing in Sri Lankan waters has now become a virtual necessity for several mechanized fishers. The risks are immense and include loss of property, freedom and even life, yet the fishers keep going there. The numbers of boats that regularly go into Sri Lanka to fish remain a matter of debate – some insist that the actual numbers are very small while others suggest that cutting off access to Sri Lanka would mean the collapse of all mechanised operations in the southern Palk Bay – but what is clear is that Sri Lanka offers some respite to the heavily fished waters of the Indian side of the Palk Bay and restricting this movement would make things go from bad to worse.

Many fishers suggest making the Palk Bay a joint resource to be shared equally by India and Sri Lanka, but apart from the impracticality of the suggestion on national security grounds, there is little that Sri Lanka can gain from such an arrangement as its own waters are still relatively under-exploited, and it will take them considerable time to rebuild their fleets to be able to match their Indian counterparts.

Adaptations with Ambiguous Outcomes

This section looks at specifically two suggestions that have been making the rounds as potential solutions to address the problems of overfishing in the Palk Bay.

Buyback option. The first of these is the idea of the government buying back about half the trawlers in the Palk Bay by paying a suitable remuneration. The idea has been in the air since around 2005, leading subsequently to a few studies about its feasibility (see Sathyapalan *et al.* 2008) and, although this requires to be verified further, whether some kind of a suggestion to this effect was made to the boat owners from the government's side. Whether it was suggested or not, what is clear is that most boat owners have found it to be a solution to all their problems, and this idea was raised repeatedly during the field study as being a way out of the current imbroglio in the Bay. Apart from the owners' rather exaggerated notions of valuing their boats, which is to be expected, the study finds at least two matters of concern about the idea, relating to where the moneys realized would be reinvested by the boat owners.

For one thing, given the broadly open-access nature of the sector and the institutional weaknesses in implementing even the existing legal provisions, the extent to which the boat owners could be stopped from reinvesting in mechanized boats (or, to be more practical, in motorized boats) in another family member's name or in another area altogether remains doubtful. As we have seen, motorized boats are as damaging to the resources as the mechanized ones and are, further, not subject to the regulations that the latter are forced to follow. Therefore, a re-routing of the investments from mechanized to motorized is not much of a choice from either the ecological perspective or the economic perspective.

Next, for many, if not most boat owners, investing in the 'deep-sea' boats with the buy-back revenues appears to be one big option. The deep-sea vessels, they consider, will allow them to go beyond the Palk Bay and fish as far as the Andaman Sea for tuna, sharks and other pelagic resources. While this sounds good, it also remains a largely untested hypothesis, especially in the Palk Bay context, where not one boat appears to have attempted such an enterprise so far[9]. As the experience of Sri Lankan fishers from Negombo, Galle and other parts of the West Coast shows, the deep-sea resources may not prove to be as profuse as they are made out to be, and in such an eventuality, the problem of finding new fishing grounds may bring the boats back into the Palk Bay itself, only, they'll be bigger, more expensive to run and more efficient too.

In the meantime, whatever be the status of the buy-back option as a practical reality, the idea itself seems to have gotten into people's minds in a big way, which not only acts as an excuse to avoid thinking of other options for improving the situation, but may actually force even those willing to try other options (e.g., selling the boats) to stay on in the hope of getting a better deal from the government.

***Kappaphycus* cultivation in the Palk Bay**

Cultivation of the seaweed *Kappaphycus* has taken root in the Palk Bay with the initiative taken by PepsiCo in 2000 wherein it entered into buyback arrangements with women's groups in return for technical and financial support. The Central Salt and Marine Chemical Research Institute (CSMCRI) took the lead in training and promoting seaweed culture in the area. Subsequently, the Aquaculture Foundation of India spearheaded an extensive training programme on *Kappaphycus* culture in the Palk Bay. Gradually, as the number of producers increased along the coastal areas of Palk Bay, so did the number of procurement companies. Nowadays, there is a big demand for *Kappaphycus* from several companies based in southern Tamil Nadu, and the local producer groups have come to grips with the technology to be able to produce it in good quantities on their own.

A recent study conducted by the CMFRI (Krishnan & Narayanakumar, 2013) concludes that *Kappaphycus* culture is a socially and economically sustainable livelihood option for the fishing communities. The NFDB is supporting *Kappaphycus* cultivation through (1) training and demonstration and (2) establishment of processing units, besides providing financial assistance for the construction of seaweed-processing plants. The Tamil Nadu Department of Fisheries also trains fishers in *Kappaphycus* farming, and the trained fishers receive a government subsidy under the Joint Liability Group scheme. There is a strong feeling that *Kappaphycus* cultivation should be taken up on a large scale by many other communities in the Palk Bay, and, given the sizeable economic returns, it may be a worthwhile initiative to channel people away from fishing into culture.

However, there is a controversy about *Kappaphycus* as it is considered an alien and invasive species in some quarters. According to this view, *Kappaphycus* has the tendency to smother the coral reefs, thereby causing severe damage to the overall ecosystem. In its support, scientists at the CMFRI and CSMCRI discount the idea that it is an alien species, pointing out that it is a native of the Andaman Sea, which has

contiguous waters with the Palk Bay, and so if there was any possibility of its being invasive, the species could have invaded long ago by natural means. They also point out the continued coexistence of coral reefs and *Kappaphycus* beds in the Andaman Sea as evidence that the species does not harm the coral reefs . All the same, the Department of Environment and Forests (DOEF) banned the culture of *Kappaphycus* on the Gulf of Mannar side, but the ban does not apply to the Palk Bay side. So some communities have been actively engaged in *Kappaphycus* culture operations. It is reported (Dr. M. Ganesan, CSMCRI, pers.comm.) that the Chennai-based National Centre for Sustainable Coastal Management (NCSCM) is taking up a fresh study to assess the potential impacts of *Kappaphycus* cultivation in the Palk Bay. Meanwhile, it is a matter of concern that the idea has already percolated to the community level and several villages have started cultivating it extensively.

Apart from the specific environmental implications of the activity, the *Kappaphycus* story also illustrates an important contradiction at the policy-institutional level that occurs on two planes: on the one plane, the Department of Forests takes the view that the activity is hazardous and must be controlled, while the Department of Fisheries actually promotes the activity with training and subsidies. On another plane, the two premier national research institutes, the CMFRI and CSMCRI, staunchly defend the activity as ecologically sustainable and advise further promotion of *Kappaphycus* cultivation, which differs completely with the stand taken by the Department of Forests, which is a policy implementing body.

Aggravating Factors

While a number of problems discussed above in the Palk Bay context have an obvious 'local' origin, there also exists some evidence that factors beyond the local too are contributing to them in significant, if unknown, ways.

Pollution. The first of these is land-based pollution. Compared with most other parts of the Indian coast, the Palk Bay is remarkably less polluted, owing to the lack of industrial development in the hinterland. Even agriculture is a minor activity as one travels south along the Palk Bay, which reduces the scope of agricultural runoff reaching the sea. Other factors like urbanization too remain rather low key. Although tourist towns like Rameswaram are said to give rise to some pollution in the form of urban sewage, it is not widespread along the bay. Still, pollution cannot be ruled out altogether, especially in the shallow waters of the Palk Bay, where even a minor discharge of effluents could have significant impacts on the sensitive resources and habitats.

Coastal aquaculture is a major activity all along the coast, and most fishers suggest that the discharge of untreated effluents from the aqua-farms directly into the sea is the cause of much pollution in the bay. It leads to deterioration of live seagrasses. The putrefaction of the dead seagrasses, both in the sea and washed ashore, is said to lead to depletion of oxygen and increased levels of carbon dioxide and hydrogen sulfide. This in turn reportedly drives away the fish and other invertebrate larvae as well and kills the sedentary organisms on the seabed and other habitats, causing further fouling and pollution of the coastal and marine waters. Sudden discharges of untreated aquaculture effluents are reported by the fishers to lead to massive fish kills in the nearshore areas, skin rashes and other infections for the fishers wading in the water for fishing, and increased turbidity.

Climate change. Climate change is said to have an impact upon the coral reefs of the Palk Bay (Dr. Karikalan, pers. comm.). For the fishers, the changes in seasonality and wind patterns are an important indicator of climate change. An interesting example was given in Ramakrishnapuram, near Rameshwaram, of climate change possibly leading to changing water currents that in turn shift the direction of Adam's Bridge to turn southwards. The implication of this shift is that the small pelagic fish that used to come straight to the beaches

of this village in the Palk Bay and got caught in beach-seines are now taking a long detour around the shifting Adam's Bridge, which allows them to be caught by other villagers long before they reach this village. The catch of beach-seines in this village has reportedly declined. Although a few other indicators like changing water currents and the species mix in the bay have also been mentioned, it is not clear to what extent these can be attributed to climate change or some localized phenomena. For the moment, it is sufficient to say that the effects of climate change cannot be ruled out in any management/conservation initiative (Salagrama 2012).

Reduced freshwater inflows. The reduction in freshwater inflows from the Cauvery river system as well as the various minor rivers along the bay in recent times is said to have reduced the productivity of the Palk Bay ecosystem, besides adversely affecting the sensitive mangrove ecosystems in the north, which are the breeding and nursery grounds for a number of commercially valuable fish and shrimp species (Dr. Balaji, pers. comm.).

Sethusamudram Ship Channel Project (SSCP)
The SSCP, 167 km long, 300 m wide and 12 m deep, is expected to pass right through the Palk Bay into the Gulf of Mannar (by dredging through Adam's Bridge) in order to provide a continuous navigable route around India without circumnavigating Sri Lanka. Currently stalled due to litigation, the project had made some progress in the Palk Bay and, once the legal formalities are cleared, will pass right along the rest of the way into the Gulf of Mannar. Once operational, the SSCP may have significant implications for the Palk Bay ecosystem, its resources and the local livelihoods, especially fishing.

Notes

1. The deep sea resource potential of Indian waters is estimated at 2.5 lakh tonnes, and when divided among all the maritime states, Tamil Nadu's share comes to about 50,000 mt per annum. This would require that unless there is a cap on the number of deep sea boats, there is a likelihood of excess fishing effort in the deep sea context too. But the extent to which such controls are even being envisaged, and can be implemented effectively, remains doubtful.
2. According to experts, in the Philippines, where *Kappaphycus* is considered a native species, there are no reports of smothering of the extensive coral reefs in the area by the seaweed.
3. The documents referred to here include Hunnam and Ravisankaran (2008), ICSF (2009), Rajagopalan (2008), and Van Schalk (2006).
4. Although eco-tourism has been mentioned as a promising activity for the fishers to diversify into, anyone who has visited the Palk Bay area would see that apart from the Rameswaram part of the Bay, there is hardly any scope for attracting tourists to the area, and so unless some really innovative ways to attract tourists are conceived, it is best not to waste any resources upon this option.6. The total number of villages in Ramanathapuram is 180, but Bavinck and Karunaharan (2006) categorize 83 of them as being on the Palk Bay side.

Chapter 7

Management Options

There is clear evidence that the Palk Bay ecosystem and all its resources are under considerable pressure from human interactions and current levels/patterns of exploitation. The people's dependence upon the Palk Bay has increasingly turned into a last resort to earn a livelihood, owing to an absence of appropriate alternatives to diversify within or without fisheries, and this gets compounded by widespread poverty, which fosters conservatism and fatalism. There are simply far too many people chasing too few fish, and the measures for doing so invoke a 'tragedy of commons' scenario, where fishing down the food chain, catching enormous quantities of juveniles and using illegal or destructive methods in sensitive areas are all practised in the face of the need to survive.

The existing legal and institutional mechanisms, though probably adequate in some cases to address the crisis if implemented well, are unable to do so. The non-inclusion of the primary stakeholders and their organizations into decision-making processes contributes to their alienation and viewing the policies and legislations as the government's business.

Aside from the occasional 'bumper' harvests, it is hard to see any group of stakeholders in the Palk Bay really making a reasonable surplus from their activities – insecurity and indebtedness are rampant in the sector. The human actions that give rise to concerns about the ecosystem health are varied, and their actions are spread all over the bay and covering all resources, highlighting the need for better management all over the Palk Bay rather than a conservation agenda focussed on specific areas and resources.

There exists a widespread feeling among all stakeholders that things cannot go on this way forever; but the answers to this problem remain elusive owing to the unwillingness of the people to take responsibility for their own actions and accept their own contribution to the crisis. On the positive side, there are some indications, albeit too piecemeal, that show the willingness of the communities to take tougher actions, provided the necessary political and

administrative support can be garnered for the purpose.

Against this background, this section discusses the possible management options for the Palk Bay, of which three can be suggested:

- Leave things as they are
- Undertake and implement a rigorous conservation regime.
- Develop systems for co-management mechanisms.

Option 1. Leave Things Be!

It is quite clear that the mechanized trawling fleet, which is considered the prime culprit in the current state of affairs in the Palk Bay, is facing the burden of ever-declining returns coupled with ever-growing costs and risks (from both sides – Sri Lankan and Indian – of the bay). This is resulting in sizeable idle capacity in the system and a consequent withdrawal from fishing altogether. That the number of trawlers has almost halved in the last decade indicates a natural process of attrition in the system, leading to a reduction in the numbers of boats, people and investments.

Alongside, there is also the growing trend amongst the younger generation to move away from fishing altogether, and they have been partially successful so far in finding suitable alternatives, and so this can be expected to increase further in coming years.

Allowing this natural process, with probably a little bit of tweaking by reducing the quantum and coverage of diesel subsidies, the trawlers might well reach a more balanced level eventually. This hypothesis however does not take into account a few serious issues.

Firstly, a lack of opportunities elsewhere will mean that a sizeable number of people will continue to remain in the sector (probably working on motorized boats) or face destitution. Many people who are in fishing lack either the advantage of age or of the necessary resources to become educated or to shift to new jobs. Without appropriate alternatives being put in place, the attrition process could result in higher levels of unemployment, poverty and further alienation of the people and lead to increased movement into criminalized/hazardous occupations.

Secondly, the reduction in numbers of mechanized boats by itself is unlikely to solve the problem – the magnitude of small-scale fishing (especially motorized boats) which keeps increasing (both numbers and intensity), will need to be curtailed as well, and this seems a far greater problem if only because it is not considered as such by the fishers, apart from the lack of appropriate legislations to make this happen.

Finally, going by past experience, the process of the decline in the numbers of mechanized boats could reverse almost overnight when a new opportunity presents itself or with even a small indication of the revival of good fish stocks in the bay, bringing the whole thing back to square one.

Conclusion: The responsibility of reducing the fishing pressure and other pressures on the natural resources of the Palk Bay cannot be left to the mercy of natural processes and the coastal communities.

Option 2. Undertake and Implement a Rigorous Conservation Regime

Where the existing frameworks of management are unable to ensure responsible practices for sustainable utilization of resources, a justification exists for more stringent measures for conservation of resources that would attempt to control human actions to the maximum limit for the sensitive ecosystems, habitats and species to survive and strengthen themselves. The Palk Bay communities have the example of the Gulf of Mannar Biosphere Reserve (GOMBR) to assess and draw lessons from for this option.

First off, it has to be clarified that the Palk Bay covers too large an area and supports far too many people to allow making it into one big protected area in the accepted sense of the

word. It is also too centrally located (with an international dimension thrown in for good measure) for hardcore conservation activities to be implemented uniformly across the whole area. There are in the Palk Bay some sensitive habitats and resources (seagrass beds, coral reefs, mangroves, sea cucumbers, seahorses, dugongs, etc.) that need protecting, but a 'wholesale' approach to address their conservation is very unlikely to yield positive results: the diversity of ecosystems within the Palk Bay demands a less centralized approach that avoids the usual one-size-fits-all strategy.

Next, looking at the GOMBR itself, which has been in existence in the Gulf of Mannar area since 1989 (although the national park had been notified in 1980 itself under the Wildlife Protection Act, WLPA of the Government of Tamil Nadu), using secondary data sources in the public domain, one can draw some conclusions of relevance to the Palk Bay region also.

To begin with, what was apparent from the community interactions was the sense of alienation felt by the people from the GOMBR conservation activities. Aside from its being looked upon as a government initiative, the fact that it included provisions for curtailing several of their activities – provisions, one might add, that were implemented very seriously and with serious consequences for the coastal people – meant that there was much antagonism towards the idea.

Overall, the community buy-in into the conservation and management activities has remained very peripheral; if anything, there is an increased level of distrust among communities about any initiatives dealing with conservation and management. This has potential consequences for any future project aiming at sustainable conservation and management not only within the area but in its neighbourhood as well.

The setting up of a Gulf of Mannar Biosphere Reserve Trust (GOMBRT), which aimed to address the livelihood/welfare implications of the conservation programme, both by strengthening livelihoods in support of conservation and by providing livelihood alternatives, has led to many initiatives at the community level, but apart from awareness-raising among the communities and supporting some micro-credit revolving fund programmes, the livelihood component of the trust seems not to have managed to come up with many successful models for replication.

The ban on collection of resources such as seaweeds, which was essentially an activity of the poor, mainly women, was considered to have upset their livelihoods quite significantly, while more serious damages to the ecosystems, with the ubiquitous trawlers once again being held up as an example, were allowed to continue unimpeded. Even more seriously, the GOMBR had no control over land-based activities contributing to pollution of the ocean waters, and thereby affecting the health of the ecosystem seriously. Such issues were not addressed at all, even as untreated urban and industrial pollutants from towns like Tuticorin (Thoothukudi) continued to be poured into the seas.

Owing to the inability to control such factors, it is reported that there is little evidence that the health of the GOM ecosystem, or the sensitive resources residing therein, has improved over the last 25 years of conservation effort. In other words, neither the natural resources nor the people depending on them have benefitted from the command-and-control regime in place for a quarter of a century in the area.

Furthermore, at the institutional level, the GOMBRT system, which was expected to take forward an ecosystem-approach to coastal/marine conservation by linking into (and coordinating) the various line departments relevant to the Gulf of Mannar area, did not seem to have managed to become self-sustaining by the time the support from UNDP-GEF ended two years ago. Lacking the financial resources or the legal status of an 'authority' to take control of the GOMBR in the participatory model originally envisaged for it, the GOMBRT remains heavily dependent

upon the GOTN for its survival and continued functioning. The efforts to integrate the different line departments and research institutions into a holistic institutional framework of action too remain unfulfilled.

On the positive side, the GOMBRT has shown how enhanced awareness among communities, coupled with socially relevant programmes like micro-credit, could bring about long-term changes for the better. In other words, the success of these two programmes could be taken to mean the importance of (1) inclusion of people in decision-making through raising their awareness about the issues to be resolved and (2) livelihood support as an integral component of conservation/management agendas.

The GOMBR experience also highlights a more fundamental issue: the challenge of finding sustainable solutions to a complex idea like conservation and management. Apart from everything else, doubts continue to persist as to the extent to which GOMBRT could reduce the dependence of the communities on coastal/ marine resources.

Conclusion: The command-and-control approach (even if complemented by a carrot-and-stick strategy) may not work, especially in the more complex and diverse situation prevailing in the Palk Bay.

Option 3. Develop Innovative Mechanisms for Co-Management

With coastal communities on the one hand and the institutional conservation mechanisms on the other being unable to address the conservation/ management issues on their own, a case can be made for bringing the two together into a joint management programme for sustainable conservation of resources. This arrangement of 'co-management' has the advantage of allowing all key stakeholders to have a say in the decision-making processes and ensures that their own interests are adequately safeguarded while at the same time appropriately adapted or modified or even abandoned in favour of more sustainable management practices. By bringing the socio-economic context into the environmental context and by marrying the community controls with the legitimacy of the government, the co-management model seeks to address the twin objectives of environmental sustainability and livelihood support in a mutually reinforcing manner.

For the government too, the advantages of co-management are considerable. At the most basic level, by transferring the responsibility of managing local resources to the local communities, the costs of policing are saved. The objectives of the conservation programmes will be achieved with no antagonism from the communities. Finally, the decentralization of roles and responsibilities for managing local resources through local means is a basic democratic ideal anyway.

There are already some initiatives to this effect currently under way in the Palk Bay region. The World Bank-FAO-Government of Tamil Nadu initiative of Fisheries Management for Sustainable Livelihoods (FIMSUL) has, in its now-concluded first phase, attempted to encapsulate the complexity of the fisheries into a co-management model for sustainable fisheries utilization and conservation. It is reported that the project is likely to have a more pro-active second phase in the near future (Muralidharan, pers. comm.)

Another initiative along the same lines, and actually contributing to, and flowing out of the FIMSUL project was the work being done by the Rameswarm based CSO, FISHMARC. As far as could be ascertained, the three major activities of this initiative that could have relevance for the Palk Bay relate to: addressing the cross-border fishing by mechanized trawlers of the Palk Bay; setting up community-based co-management mechanisms in selected districts of the Palk Bay in conjunction with the Department of Fisheries; and negotiating, and supporting initiatives, to reduce the number of surplus trawlers in the Palk Bay. FISHMARC has laid the groundwork for

some pilot-scale co-management initiatives to be tested in the Palk Bay context, and this may be a good learning experience for any future management initiative. Although not directly involved in any ground-level activities, the team of students led by Dr. Maarten Bavinck from the University of Amsterdam have been undertaking a number of studies, some of them focusing on the concept of legal pluralism and how it works in the Tamil Nadu context.

Having said that, it has to be mentioned that these initiatives have yet to move beyond the thinking/planning stage to the actual implementation stage. Apart from the usual constraints relating to the resources needed to launch a major initiative like this, a bigger challenge lies in finding a realistic framework of intervention that accommodates diverse stakeholders and viewpoints into a mutually comfortable plan of action.

Chapter 8

Strategy for Project Implementation

Broaden the Scope of the CMPA Project Output

The GIZ CMPA programme has three main outputs:

Output 1. Participatory management of CMPA

Output 2. Capacity development for supporting participatory management of CMPA at various levels

Output 3. Information, education and communication for awareness raising and policy dialogue

On the basis of the description provided in this study of the overall conditions in the Palk Bay, it is necessary that:

Firstly, the order of the outputs be turned upside down. For the participatory management system to be established and become functional in its true spirit, it is necessary that the requisite awareness raising and capacity building be undertaken first. Experience shows that setting up a system first and trying to develop the necessary infrastructure and rules for its effective functioning is a case of putting the cart before the horse. It is necessary to start by identifying (1) which resources need to be conserved (2) who the stakeholders are (3) what their 'stakes' may be concerning the said resource and (4) how equity and sustainability can be incorporated into the decision-making process. All this can be achieved only through considerable groundwork in the form of awareness-raising and capacity-building for all concerned parties (and not just the primary stakeholders), which need to be done prior to establishing a new management system.

Secondly, going by the emphatic need for incorporating livelihood issues into any management system in order to make it work, it is necessary that the capacity-building component (Output 2) be expanded in scope to include livelihoods support in the form of enhancement of existing livelihoods along with more ecologically sustainable ways and diversification into alternative systems. Without a direct

contribution to livelihoods enhancement and diversification in the project remit, community buy-in into the proposed management system will very likely remain only peripheral.

Also important under this output is the consideration that capacity building is not the same as *training,* as understood in most development programmes. It needs to be stressed that capacity-building is much more than just transferring knowledge; it also requires empowering the stakeholders for them to be able to take to new ways of doing and experiencing things. Especially in the case of a co-management-oriented CMPA mechanism, the primary stakeholders' inability to put their views forcefully enough into the discussions comes from an inherent power imbalance in the relations between the government stakeholders and the people. The capacity-building component here needs to break the hierarchical relations that prevail among people from different categories of life. This once again highlights the need for enhancing the scope of this output to cover a broader range of issues (biological, technical, social, economic and institutional) of relevance to the coastal communities.

Finally, while recognizing that awareness-raising is a very important strand of work for the project to invest in, it is necessary to highlight the need to keep two important considerations in mind in this respect:

One, awareness-generation is a two-way process (or, in a multi-stakeholder context, it is a multi-way process), where everybody must accept the need to learn from everybody else. The systems and processes that influence the day-to-day actions of the coastal communities are almost as alien to the intervention agencies as the scientific justifications for undertaking rigorous conservation programmes are to the community stakeholders.

Two, awareness-generation at the community level is not just about why they should conserve the resources. It is common experience that the communities have a far better, and more first hand, understanding of how resources are being over-exploited and why this is not a good trend. What is lacking here is not so much the 'why' of conservation as the 'how' of it, i.e., how conservation could be achieved with limited impacts upon the livelihoods. In a case where one's personal wellbeing is hanging in the balance with that of the natural resources, it is almost irrational to expect the latter to take priority over the former. Without being supported by some successful options to pursue for improved (or at least consistent) incomes, simply raising the awareness of the communities on the resource conservation aspects will amount to little.

Suggestions for GIZ to Consider

Focus on pilot-scale interventions for developing management models for replication. The implementation strategy suggested here involves working in selected locations within the Palk Bay area in order to implement pilot-scale interventions to establish and refine a set of co-management models for conservation of resources that can be replicated across the Palk Bay (and beyond) by the partner organizations.

Work in specific representative locations rather than the entire Palk Bay. Ideally, the entire Palk Bay must be considered for intervention as one whole ecosystem; however, it is also quite diverse, and it will be impossible for any time-bound project with limited resources to attempt to cover the whole area and expect meaningful outcomes. The project must confine itself to certain representative locations rather than attempting to cover the entire Palk Bay, which is logistically not only difficult but also means spreading the resources too thinly, while the need is for focused interventions aimed at refining models for sustainable management of the resources. The time needed to develop and refine appropriate management models for replication, as well as the project's own timeframes, also requires that the project focus on specific locations.

As to the specific locations to work in, three major districts are suggested–Thanjavur, Pudukkottai and Ramanathapuram–where, on the basis of availability of resources, two to four villages in each district may be considered for project activities. The exposure that the fishers of the southern Palk Bay have to the GOMBR experience, which has not been very positive, may reduce their enthusiasm for a new conservation programme, however well-meaning it might be. It may be more productive to start with a clean slate, and so, in Ramanathapuram,the project may focus on the northern side of the district contiguous with Pudukkottai, rather than the Mandapam–Rameswaram belt. This area offers good opportunities to undertake some meaningful interventions due to the prevalence of:

- Sensitive habitats and nurseries (mangroves, lagoons, seagrass beds, coral reefs); endangered species like sea cucumbers, seahorses and dugongs
- Destructive fishing activities by mechanized and non-mechanized sectors, which compete for resources in the same areas
- A wide range of small-scale fisheries-based livelihoods, essentially of poor people
- Existence of good examples of '*meenavar uur panchayats*'
- All villages are connected by the East Coast Road, permitting easy access at all times.

District Collectors as the nodal person of the project steering group. As Bavinck (2001:34) notes, "a legal system should be understood as consisting of a set of rules as well as the authority, or the organizing entity, responsible for its formulation and implementation." In other words, it is not enough to have a rule system; it should be backed by the requisite authority to enforce its will. The absence of such an authority is reported to be a major weakness for the GOMBRT.

It is suggested that, in each district, the project attempt to work with the District Collectors as the nodal persons for the project activities. As the chief executive of the district, a Collector can provide legitimacy and lend the necessary authority to the co-management mechanism. The importance of the District Collectors to a project of this nature also lies in the fact that they are in charge of all line departments within the district, thus ensuring their participation as equals in the process (another area where the GOMBRT could not succeed as a result of it being viewed essentially as a Forest Department initiative). The District Collectors are also located close to the communities to ensure regular monitoring and interactions.

Build in provisions for self-sustainability into the co-management initiatives from the beginning. It is of prime importance that the co-management systems be self-reliant for funds from the early stages if they are to avoid becoming reliant on external funding for survival once the project ends, or they run the risk of being hijacked into supporting the funding agency's agendas–or fold up altogether. Initially, the CMPA Project might consider setting up a seed capital fund in each village, ideally managed by setting up a self-help group mechanism and complemented by contributions from the various stakeholder groups and organizations in a mutually agreed pattern. The community's contribution will necessarily have to start low but gradually increase during the project life so that, together with the seed capital fund, it will be able to pay all the costs of managing the project coordination committees and their activities.

A Strategy for Implementing CMPA Project in Palk Bay

The suggested implementation strategy involves working in a small number of representative locations in the three districts of the Palk Bay, to focus on pilot-scale interventions for developing co-management models for eventual replication.

Output 1: Awareness generation

To achieve this conservation agenda, the starting point will be a vigorous programme of awareness-generation among all stakeholders with the following three important objectives.

- To convince the community stakeholders to take responsibility for their own actions contributing to resource depletion and demonstrate through use of practical examples, ways by which avoiding such actions need not be at the risk of losing their livelihood security
- To develop a better appreciation among the institutional stakeholders (such as the DOEF) of the ability of the coastal communities to undertake effective management and conservation of resources, using practical examples (such as the existence of traditional panchayats) to develop mutual trust and rapport
- To ensure a better fit between the local and the global, i.e., ensuring that the global experiences are adequately adapted to suit the local context while also exploring how the local experience could be globalized for wider validity and replicability.

Activities under this component might include:

- Assessing participatorily the extent of dependence of the communities on the natural resources and the existing capacity for self-regulation; undertake brainstorming exercises amongst the communities to explore their contribution to the state of affairs in the Palk Bay.
- Assessing the current livelihoods enhancement and diversification strategies from a conservation perspective in order to discuss with communities how to support the good ones and discount the bad ones.
- Undertaking a documentation of the traditional governance systems and the reasons for their effectiveness in order to provide the institutional stakeholders with a picture of an alternative rule-making and implementing system.
- Undertaking an assessment of the feasibility of improving the current legislations to enhance the role and power of the local communities (and government bodies) in decision-making processes.

Output 2: Capacity building

The awareness-generation activity will be complemented by capacity-building programmes that aim to build the confidence of the stakeholders and their trust in the project, which will be necessary for them to take part fully in the conservation and management programmes. These will have two components:

A. To empower all stakeholders to take part in a co-management system as equals

- Develop a strategy paper for capacity-building for different categories of stakeholders, both coastal communities and institutional stakeholders, to create a level playing field for all in the co-management process.
- Facilitate regular and informal interactions between community and institutional stakeholders for building trust and rapport; allow each side to explore the other's viewpoints and perspectives.
- Ensure the incorporation of the effective aspects of community governance systems into the co-management framework.

B. Capacity building for livelihood enhancement and diversification

- Undertake an assessment of the supply chains from the livelihoods and conservation perspectives, focussing on both the seaward side (inefficient and polluting engines, juvenile-catching, fishing gear) and the landward side (covering markets, credit and indebtedness, infrastructure, transport and preservation facilities).
- Explore possibilities of reducing costs and enhancing returns through better harvesting and loss-reduction strategies, with a clear focus on their implications for conservation and management priorities.
- Develop a system of incentives for better management practices.
- Explore opportunities for linking rural livelihood support programmes like MGNREGA with conservation programmes like mangrove restoration and de-silting of lakes and river-mouths.

- Explore the potential for mariculture, for which the Palk Bay is considered an ideal location due to its shallow, but nutrient-rich, waters and the absence of strong currents and winds.
- Explore the potential for setting up artificial reefs, which are considered to reduce destructive fishing like trawling while enhancing the productivity of the waters, besides providing sanctuaries for breeding fish.
- Identify opportunities for ornamental fish culture and the technical and economic feasibility of promoting it as a cottage industry in the coastal villages.
- For diversification out of the Palk Bay, undertake a study of the options explored in the coastal communities to move out of the sector and assess their viability for large-scale migration of people (see Salagrama & Koriya 2007).
- Where gaps exist in the ongoing migratory streams, identify and suggest measures for improving them so as to make the natural process of migration proceed smoothly.

Output 3: Co-management system for CMPA

Once the preparatory phase of awareness-generation and capacity-building has been completed, co-management systems will be established. Activities under this component will include:

- Setting up of a project management unit for the Palk Bay region to undertake the preliminary spadework, preparing the institutional and community stakeholders to take part in the project activities and provide necessary technical, advisory and financial support.
- Establishing a project steering committee in each district (with mechanisms for coordination between the three district committees), to be headed by the District Collector, and include district-level officers of all relevant line departments – forests, fisheries, pollution control boards, rural development; local research institutions and representatives of major NGOs and community organizations
- Identifying project locations in each district by the steering committee, on the basis of the representativeness of the location and the interest of the local people in taking part in the management and conservation programmes.
- Establishing a village-level project implementation committee that acts as a bridge between different stakeholder groups in the village, consisting of one representative each of the major stakeholder groups (nominated by their respective groups) alongside NGO representatives and the relevant government staff at the sub-district level.
- Supporting the project implementation committee, with expert assistance, to undertake socio-economic baseline surveys in each village, keeping the focus on the poverty, gender and other characteristics of vulnerability and marginalization.
- Supporting the project implementation committee, with expert assistance, to undertake an assessment of the current status of the coastal and marine resources in the area and the factors affecting the health of the resources.
- Supporting the project implementation committee, with expert assistance, to prepare village-level management and conservation plans, drawing upon existing and new legislations, with SMART indicators for evaluating the performance of the management system.
- Undertaking participatory development of mechanisms for compliance – incentives and punishments
- Approving village-level management and conservation plans by the Project Steering Committee in order to give them legitimacy and the required authority for implementation.
- Implementing and monitoring changes in

practices and the health of sensitive habitats and biodiversity, and appropriate measures for course correction from time to time.

- Monitoring the implications of the conservation/management programmes on the livelihoods and the incomes of the small-scale fishers and other Palk Bay-dependent households, and suggest meaningful actions for livelihood enhancement and diversification for the adversely affected people.

The end-of-project scenario will be that there will be a number of experiences from the targeted communities, which will allow the project to consolidate a set of management models and guidelines to help replicate the process throughout the Palk Bay area. For a 3-year project, this is the best outcome that can be expected.

Role for GIZ

The GIZ project has to play a critical role in supporting the different activities not only financially but also intellectually and physically, at every stage. For this, the project needs to set up a Project Management Unit in the Palk Bay region and equip it with the necessary resources to take forward the management and conservation agendas participatorily.

Box 1
Summary of Management Options for Palk Bay

Key resources to be conserved and managed:

- Fishery resources: includes all fish and shellfish being harvested from the bay
- Sensitive habitats/ecosystems: mangroves, seagrass beds, coral reefs
- Fragile biodiversity: seahorse, sea cucumbers, dugong

Key management/conservation actions:

- Curtail destructive fishing: trawling in nearshore and sensitive areas; ban on small-mesh nets and other potentially dangerous fishing methods
- Curtail overfishing: put a cap on the number of boats and restrict fresh entry; implement a rotation system based on tokens so only half the existing fleet (in all sectors) can go fishing on a given day;
- Ban/restrict fishing in sensitive habitats: ensure compliance with no-fishing zone regulations
- Promote ecologically sustainable fishing methods: hook-and-line fishing, large mesh gillnetting, offshore fishing

Suggested mechanism for enforcing management/conservation activities

- Co-management involving all key stakeholders, the relevant government bodies and research and civil society organizations
- Consensual implementation of conservation/management programmes with adequate provisions for penalties for violation and incentives for good behaviour

Legal options for enforcement of regulations:

Three kinds of legal options exist:

1. Existing legislations such as the MFRA and CRZ Act to address destructive fishing gears and pollution by coastal aquaculture farms
2. For conservation of sensitive species and habitats, there are a few legal provisions that allow community participation in the process:

    a. Biological Diversity Act, BDA (2002) and Rules (2004) may help to designate a sensitive and important coastal/ marine conservation area as a Biodiversity Heritage Site (BHS); the BDA recognizes the rights of the community to sustainable use of the resources and also gives the local communities the freedom to choose the appropriate conservation rules and to implement them.

    b. The Wildlife (Protection) Act of 1972 (WLPA), as amended in 2002 and 2006, has participatory and livelihood provisions, though these are seldom implemented; there is a need for their inclusion prior to implementing this.

    c. The sensitive coastal and marine areas can also be declared as ecologically sensitive areas (ESAs) under the Environment (Protection) Act, 1986, which allows for the participation of the local communities in the designation and management of these areas.

    d. Under the Coastal Regulation Zone Notification, 2010, there is also a provision for declaring Critically Vulnerable Coastal Areas (CVCAs) although the guidelines are not ready so far.

3. The third set of legislations is the customary laws, which are decided upon by the local traditional panchayats and can be used to implement some management measures specifically applicable to the local community context.

It is possible that none of the existing legislations may be able to address some of the conservation concerns, and this may require setting up some new, locally-applicable, rules. This is where the District Collector's role becomes important as s/he will need to find a creative way to provide some kind of legal basis for these acts.

Authority for implementing conservation/management programmes

Aimed to be achieved through the involvement of District Collectors as heads of the project steering committees, as well as the inclusion of all district-level heads of relevant departments.

Monitoring and evaluation

Using baseline estimates of the extent and quality of the various resources sought to be conserved and better managed through the project initiatives, indicators will be developed for periodical monitoring of the project achievements and course correction as necessary. Alongside, monitoring of changes in fishing practices, the socio-economic context in the communities too will be undertaken to assess the negative implications of the conservation regime and to undertake support activities as required.

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Annexure 1
Itinerary of Activities and People Met During the Field Study for this Report, 18-28 November 2013

Date	Place	People met, institutions/ communities visited
18 Nov 2013	Chennai	• ICSF: secondary data review; interactions with Ms Ramya Rajagopalan, Mr. Venugopalan • NCSCM: Interaction with Dr. Ramachandra Bhatta • Dr. Rathindranath Roy, formerly Communications Expert, FAO-Bay of Bengal Programme
19 Nov 2013	Chennai	• BOBP-IGO: Dr. Y. S. Yadava • CMFRI: Dr Vinod, Scientist-in-charge and Dr Vijayakumaran, Coastal Ecosystems Expert • Secondary data review on Palk Bay
20 Nov 2013	Chennai	• NCSCM: Dr. Deepak Samuel; Dr. Ramachandra Bhatta • ICSF: Interactions with Dr. Venugopalan, Ms Sumana, Ms Ramya Rajagopalan • Dr. H. M. Kasim, Ex-Principal Scientist, CMFRI
21 Nov 2013	Rameswaram	• Meeting with Mr. Sahayaraj and Mr. Ganapathy, FISHMARC • Mr. Selvakku, Ex-MSSRF GOMBR Project • Rameshwaram mechanized fish landing centre for meeting with mechanized boat owners, crew (local and non-local), fish traders (and commission agents), transporters and leaders of societies • Visit to Ramakrishnapuram village: meeting with beach-seine fishers, artisanal fishers (motorized and non-motorized), ornamental product makers (women), leaders of Fishermen Coop Society • Visit to Olaikkuda: fishermen – chank collectors, *Kappaphycus* culture; community-elders
22 Nov 2013	Mandapam	• CMFRI: Dr. Gopakumar, Scientist-in-charge • CSMCRI: Dr. M. Ganesan, Senior Scientist; Dr. Subir K. Mandal, Scientist • Mr. Marirajan, Chief Executive, PAD NGO
	Ramanathapuram	• Mr. Amit Asthana, CCF and Director, GOMBRT • Mr. Kaleswara Murthy, EDO • Mr. Ambazhagan, Marine Biologist, Technical Expert, GOMBRT • Travel to Pattukottai, Tanjore District
23 Nov 2013	Adhiramapattinam	• Mr. S. Subramanian, Leader – Traditional Fishermen Association, Tanjore
	Maravakkadu Thambikottai	• Mr. Ramaiyan, *Meenavar uur panchayat* member & Fisheries Cooperative president • Tube fishers • Leaders and tube-fishers
	Eripurakkarai	• Mr. Ravichandran, ex-Talaivar and Mr. Sankar, current Talaivar, *Meenavar uur panchayat* • Motorized boat fishers' group • Mr. Murugesan, Fishermen Coop Society President • Mr. Govindarajan, Fisherwomen's Coop Society President • Motorized boat fishers' group
	Mallipattinam	• Mr. Thajuddin, State Secretary, Tamil Nadu Mechanized Boat Welfare Association • Mr. Kamal Basha, Aquaculturist, Mallipattinam
24 Nov 2013	Vallavan Pattinam	• Mr. Sini Kuppu, President, Fishermen Coop Society • Motorized boat fishers' group • Hook-and-line fishermen group: Mr. Pitchai Kali
	Kattumavidi	• Mr. Nathan, seaweed trader • Motorized boat fishers' group • Mr. Gandhi, village elder (Talaivar)
	Ammapattinam	• Dr. V. Balaji, Chief Executive – OMCAR Foundation
25 Nov 2013	Kottaipattinam	• Mr. Abdul Hamid, Member and Co-President, Mechanized Boat Owners' Association • Mr. Sarkarai Naina Mohamad, village elder • Members of mechanized boat owners' association
	Jagathapattinam	• Mr. Kuttiandi, President, and members of mechanized boat owners association

Annexure 1 (*Cont.*)

Date	Place	People met, institutions/ communities visited
	Thondi	Dr. Karikalan, Assistant Professor, Marine Geology, Alagappa University-Thondi Campus
	Sozhiakudi	Mr. Gopi, President, mechanized boat owners' association
26 Nov 2013	Ramanathapuram	• Mr. Pal Samy, Ramnad Fishworkers' Trade Union & associates
	Uchipuli-Dargahvala-sai	• Mr. Kuppusami, Beach Seine Owner, Head-Meenavar Uur Panchayat, Society member • Beache-seine owners and crew
	Mullimanai	• Mr. Ramesh, Fishermen's Coop Society President and fishers • Fisherwomen group
	Tiruppalaikudi	• Mr. Fazrul Haq, Vice President, Fishermen Coop Society, South Tiruppalaikudi and members
27 Nov 2013	Ramanathapuram	• Consolidation of study results
28 Nov 2013	Ramanathapuram	• Stakeholder consultation to discuss and validate study findings 1. Ms Sripriya, Mullimanai 2. Ms Suguna Rani, Mullimanai 3. Ms J Bama, Mullimanai 4. Ms Ilaveni, Mullimanai 5. Mr. Kasilingam, Thirupalakudi 6. Mr. Panchavarnam, Muthukuda, Pudukkottai 7. Mr. Ganapathy, Mandapam, Ramnad 8. Mr. Thangaraj, Morpanai, Ramnad 9. Mr. Karuppasamy, TRRM, Ramnad 10. Mr. Sethu, Mullimanai 11. Mr. Muthiah, Bharathi Nagar, Mayakulam, Ramnad 12. Mr. Paul Samy, Ramnad 13. Mr. Balu, Kanchirangudi, Ramnad 14. Mr. Dasan, Tangachimadam, Ramnad 15. Mr. Selvakku, Researcher, Madurai 16. Dr. H. M.Kasim, Study Associate

About the Study

A Livelihood-based Analysis of Palk Bay is premised on the thought that any conservation or management agenda should aim to assess the livelihood context of the resource -dependent people as well as the health of the ecosystems and the natural resources therein. This study delves into the scope for livelihoods enhancement and diversification as a means of reducing the pressure on resources and explores appropriate institutional mechanisms for ensuring a good balance between sustainable livelihoods and coastal/marine resource health. The study suggests management options and discusses an implementation strategy for the GIZ CMPA Project.

The CMPA Project

The Project "Conservation and Sustainable Management of Coastal and Marine Protected Areas" (CMPA) is a project of Indo-German technical cooperation. It is funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and implemented by the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India, and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of BMUB.

Established to support the achievement of the Aichi targets of the Convention on Biological Diversity, the project's overall goal is to contribute to conservation and sustainable use of biodiversity in selected areas along the coast of India. Taking into consideration the economic importance of the coastal zone for large segments of the population, the project's approach is people-centered, thus ensuring the support for conservation by those depending on coastal ecosystems.

CMPA Technical Report Series

07

Long-term Monitoring and Community-based Conservation of Olive Ridley Turtles in Odisha

September 2014

Implemented by

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On behalf of :

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

Indo-German Biodiversity Programme
Conservation and Sustainable Management of Coastal and Marine Protected Areas