

# POLICY BRIEF

## FROM THEORY TO PRACTICE- SUSTAINABLE MARINE FISHERY PERSPECTIVES FOR ANDAMAN AND NICOBAR ISLANDS

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### PROLOGUE

The critical role of fisheries and aquaculture to the global food security is unarguable, however, is not without challenges in future. Marine fisheries sector employs millions of fishers directly and indirectly in to fishing and its associated activities providing food security, livelihood and employment. However, there is a globally rising threat on decline of fish stocks due to overfishing and unsustainable fishing practices. Strikingly, Andaman and Nicobar Islands being a biodiversity hotspot located in Bay of Bengal are known for its abundant marine fishery resources, yet largely underutilized particularly the oceanic fishery sector. There is also an urgent need to understand the burgeoning fishing pressure on pelagic and demersal resources due to their heavier

demand for local as well as tourist populace. Issues such as poor data, infrastructure, skilled fishers, manpower and ineffective trade links are also seriously affecting the marine fisheries sector. There is an alarming need to understand these issues impacting the sector and developing effective management strategies and the way forward to tackle and resolve the issues. In the light of above mentioned issues and debate, this policy brief is attempted in collaboration with scientific and development departments as an inclusive management guide for effective governance of marine fisheries sector. We strongly believe that the policy brief could play a greater role in effective governance and management of marine capture fishery sector in the Islands.

Director ICAR-CIARI & the authors



## Key Messages

1. Marine fisheries sector in Asia employs millions of fishers, contributing largely to livelihood, food security and entrepreneurship development.
2. India is one of the important marine fishing nations, engaging millions of fishers directly and indirectly in fishery related activities for livelihood and employment.
3. Andaman and Nicobar Islands, India is a group of 572 Islands located in Bay of Bengal, being a biodiversity hotspot with unique cultural setting and strategic location.
4. Marine capture fisheries are one of the important sectors contributing to food security of the islanders and tourists population.
5. The annual harvestable marine fishery potential was estimated at 1.48 lakh tonnes, whereas the present harvest is 39284 tonnes in 2017-18.
6. Overriding issues such as skilled fishermen, infrastructure, logistics, market connectivity and data reliability are seriously affecting the sector growth.
7. Reliable data on fish landings in time series and crucial data concerning marine fisheries needs to be streamlined towards effective fisheries management.
8. The trade-off in ideas between policy makers, administrators, scientists and other stakeholders are crucial for participatory governance.
9. The concept of Assess- Regulate- Utilize could be more an effective guiding principle for sustainable marine fisheries in the Islands.
10. The laser focus should be on data management in fisheries which would support evidence based developmental plans.

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## Contributing Institutions

- 1) ICAR- Central Island Agricultural Research Institute, Port Blair, ANI
- 2) Department of Fisheries, Andaman and Nicobar Administration
- 3) Atal Centre for Ocean Science and Technology for Islands, Port Blair, ANI
- 4) ICAR-Central Institute of Brackishwater Aquaculture, Chennai

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**Tuna  
landings at  
Junglight  
landing  
centre**

# INTRODUCTION

**A**ndaman and Nicobar Islands, India is group of 572 islands located in Bay of Bengal situated strategically in close proximity with South East Asian countries. The aggregate coastline of the islands is 1912 kms with an Exclusive Economic Zone (EEZ) of 0.6 million sq.km. and continental shelf of 35,000 sq.km. (ANDFISH 2005; Roy et al 2009). Marine fishery forms a major livelihood and employment activity in the islands. The harvestable marine fishery potential of 1.48 lakh tonnes with oceanic fisheries forming a major

potential (60,000 tonnes), pelagic (56,000 tonnes) and demersal (32,000 tonnes). There are limited mechanized fishing activities on going whereas major fishery is contributed by country crafts and motorized boats particularly targeting pelagic and demersal resources whereas oceanic resources remains highly unexploited. The catches are majorly contributed by Andaman group of Islands, whereas the contribution of Nicobar group of Islands are much lower since the islands are primarily inhabited by tribal fishermen fishing mainly for their subsistence need.

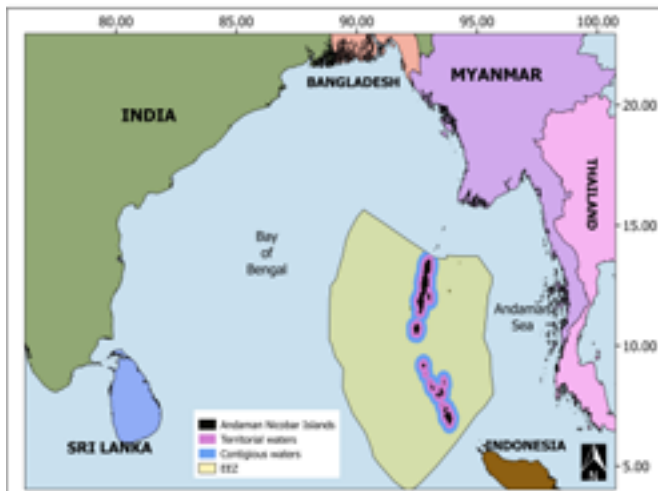


Fig 1. Map of Andaman and Nicobar Islands showing Territorial waters, Contiguous waters and Exclusive Economic Zone

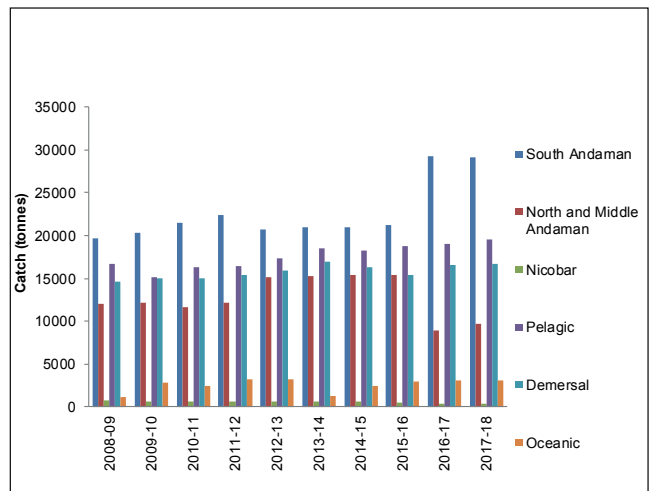


Fig 2. Marine fish landings from different districts and sectors over the past decade (Source: Department of Fisheries, Andaman and Nicobar Administration)

Table 1. Marine fisheries potential and current harvests

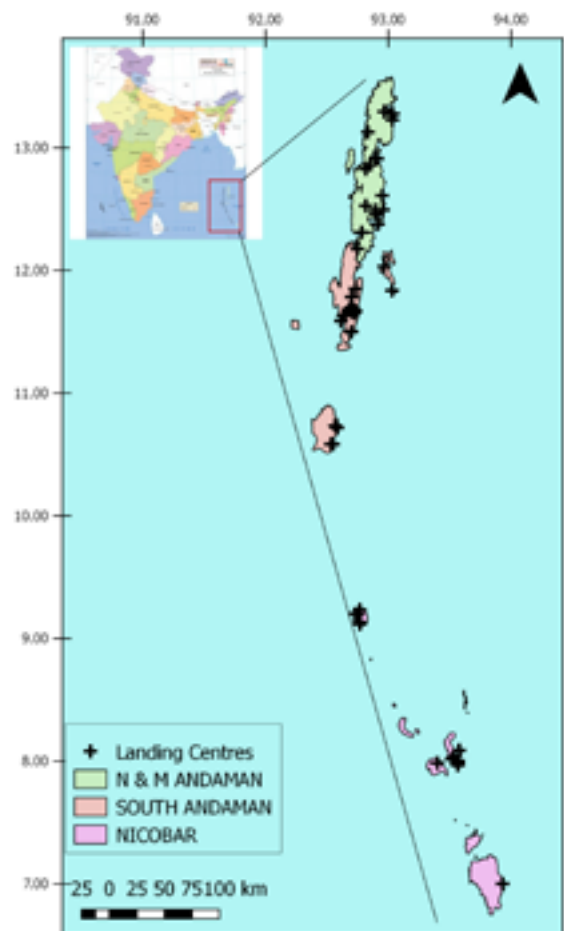
Group	Potential (tonnes)	Harvest as of 2017-18 in tonnes	Potential harnessed as on 2017-18 data (%)
Demersal	32000	16371	51%
Pelagic	56000	19478	34.7%
Oceanic	60000	3075	5.1%
Total	148000	39284	26.54%

(Source Anrose et al 2009; Roy et al 2009; Department of Fisheries, ANI Administration)

## MAJOR CHALLENGES IDENTIFIED

- Fishing pressure on pelagic and demersal fisheries.
- Expansion of oceanic fisheries sector.
- Harnessing the abundant tuna fishery resources.
- Lack of systematic fishery data collection tools and mechanism, coordinating various parts of the islands to get consolidated fishery data.
- Brewing sector conflicts and ways to resolve.
- Insufficient logistical facilities and infrastructure.
- Poaching and loss of valuable marine fauna.
- Enforcing effective Monitoring, Control and Surveillance (MCS) mechanisms.
- Climate change and increasing natural hazards.
- Effective policy and roadmap for sector development.

Lack of a policy directive and guiding principles remains a major hurdle towards planning and management. Challenges and issues faced in the marine fisheries sector were mainly due to the lack of a pragmatic policy guide and definitive roadmap. Lack of realistic and reliable fishery data is impacting the developmental plan of the sector as unrealistic fishery data could lead to misleading projections and associated development activities. The sparsely located landing centres (Fig. 3- landing points used from Department of Fisheries, Unpublished data) and the difficulties in obtaining the fishery data remains key issue. The fishery expansion that were currently planned based on the available data could be unrealistic that needs an effective revalidation and estimation using standard methodologies. Fishery monitoring and control remains arduous task however is inevitable. There is a need for proper MCS (Monitoring, Control and Surveillance) mechanisms towards harnessing the fisheries resources in a sustainable manner. Though subtle till date, conflicts within and between the stakeholders are on rise and might expand severely in near future. Increasing fishing pressure coupled with weak enforcement and management could aggravate the conflicts in near future. The heavier dependency on the pelagic and demersal fisheries sector leading towards more competition and unsustainable fishing practices. The incidences of marine poachers though decreased in recent years yet remains a long term issue that need amicable solution. Fisheries expansions are mostly hindered because of the insufficient logistical and inadequate infrastructure which seriously affects the prospects of the sector development. Considering some of the issues that need serious attention, there are also various impending tasks that needs to be addressed in an effective way for sustainable marine fisheries sector.





# CRITIQUE OF CHALLENGES AND POSSIBLE SOLUTIONS

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1. Strengthen the oceanic fisheries sector: Developing the oceanic fisheries sector could be seen as an alternative way to reduce the pressure on coastal fishery resources due to customary and illegal fishing activities (ANDFISH 2005; Kirubasankar et al 2013; Kiruba-sankar et al 2019). As tuna fishery resources are more abundant in deep seas, efforts should be directed towards harnessing the tuna resources for social and economic growth. Deep sea fisheries management is arduous and hence to be expanded judiciously. Ensure a proper Monitoring, Control and Surveillance (MCS) mechanism. Administrative policies and reformations should simplify procedures to undertake the deep sea fishing activity however following the prescribed norms set including proper MCS and AIS (Automated Identification System) to monitor their activities.
2. Improvise infrastructure and logistical support: Better infrastructure and logistics for fish harvest and post-harvest could be advantageous for rapid processing and transportation. As fish commodities are perishable in nature, there is imminent need to establish comprehensive logistical support to address the issue. Cold chains, storages, landing centres, modern fish markets, transport facilities, export linkages, inter island fish transports etc could be more supportive to the island fishers. Newer policies, administrative reforms and innovative decisions could support the development.
3. Conserve the interests of small scale fishermen: The issues governing artisanal fisheries sector are often less highlighted in the developmental aspects considering their contribution to the fish production sector. However, it should be prudent to understand that livelihood of small scale fishers are more important than trade driven fisheries. Development decisions envisioned should ensure the conservation of traditional customary rights of the artisanal fishermen and should not also generate any possible conflict with the fishers operating mechanized and motorized crafts. Any possible conflicts affecting the customary fishing activities of small scale fishers should be taken with stronger sanctions against offenders. The trade-offs of semi industrial and industrial fishing vessels in to the zones demarcated for country crafts should be a strictly punishable offence.
4. Ecosystem based fisheries management: Coral reefs and mangrove ecosystems support a huge diversity of fishes in the Islands (Rajan et al 2013). However these ecosystems were under constant threat and more severe impacts were reported in the past from the islands (Krishnan et al 2010; 2011; Roy and Krishnan 2005) which could impact the fishery associated with these ecosystems. Small scale fishers fishing in country crafts usually inhabit these ecosystems for their subsistence fishing activities. Such impacts on these ecosystems usually affect their daily fishing activities to certain extent such as decreasing fish catches reported by Roy and Krishnan (2005). Anthropogenic activities also contribute in the impact of these ecosystems. The rising tourism activities particularly centred on these fragile ecosystems needs more monitoring and regulations to sustain the fish production from these ecosystems. Mangrove ecosystems also act as protective barrier against coastal disasters (Kiruba-Sankar et al 2018) and hence it is of immense importance to conserve these ecosystems that supports livelihood and food security to the islanders through fishery related activities. Monitoring and management of ecosystems that supports fisheries could definitely ensure sustainable catches from these ecosystems in future.
5. Improvising the link between science and policy: More focus should be provided on establishing a mechanism or knowledge sharing platform which could engage the stakeholders towards a meaningful discussion and decision. The role playing suggested for effective fisheries development are given in Table 2.

Table 2. Role playing suggested for effective marine fisheries management in the Islands

<p>Administrators or Managers (Government)</p>	<p>Envision or adopt the development plan (national or island specific); determine the relevancy according to the actual need of Island; adopt or reject or modify the proposed plan to Island conditions (involve stakeholders and scientists); develop objectives; determine a timeframe and decide the involvement level of role players; form scientific and management teams; assign specific duties or objectives to scientists towards achieving the target; collect, gather, and interpret the data existent with scientists; interact frequently for opinions from stakeholders; take field lessons through feedbacks; conduct management meetings as on when desired; receive critical suggestions; keep works in tune with the environmental and ecological considerations ; learn and adjust with the conditions.</p>
<p>Scientists</p>	<p>Take the objectives or targets set; convey the risks, uncertainty and variability involved with the proposed works to administrators; encourage governance and prepare decision and knowledge frameworks: take the assistance of stakeholders at field level at every possible stages; design methodology for collection of field data; validate the data reliability with fishermen; incorporate their field experiences and traditional indigenous knowledge; identify their issues; sensitize the administrators on the field issues faced by fishermen; support towards the needs and causes of fishermen to administrators; take rational stand in providing suggestions to administration or fishermen; provide manpower trainings and develop knowledge sharing programmes for healthy relationship; advocate best management practices in fisheries; assess the ecological and environmental impact of the works.</p>
<p>Stakeholders or resource users</p>	<p>Involve in the developmental programmes; criticize rationally; provide reliable data or information as on when required; take unanimous stand on decisions as resource users; approach the administrators to address grievances as on when required; maintain strong relation with scientists on updating the recent information or development in fisheries; follow the scientific advices; avoid unsustainable practices; understand sustainability concepts; conserve and protect the ecosystem against threats; resolve the conflicts unambiguously.</p>



Asian Seabass,  
*Lates calcarifer*

6. Managing fishery conflicts: Conflicts mainly arise due to the open access nature of sea waters being a common property where users are competing for similar or different types of resources. Conflicts remain a subtle issue, although there are more incidences identified in the recent past (fishermen - fishermen, fishermen- administrators and fishermen-middlemen). Administration should effectively manage the conflicts through a common platform in close collaboration with fishermen and the stakeholders including government agencies. Some of the conflicts that were identified in the marine fisheries sector are,
- Fishermen vs Administration over trespassing in protected or reserved waters.
  - Fishermen vs Administration over the intentional or accidental catch of scheduled or protected species as knowledge of artisanal fishermen could also be a limiting factor in differentiating the species.
  - Artisanal Fishermen vs Semi industrial trawlers over the issue of trawlers operating in inshore reef areas which damage the reef ecosystems and also catching smaller juvenile and unintentional species which are of interest for artisanal fishermen.
  - Fishermen vs Fishermen- Use of ring nets

hauls all size group of fishes in a particular location- bringing such huge quantity of fishes to the market affects the bargaining prices of actual small scale fishermen depending on those fisheries.

- Fishermen vs Fishermen- over the exchange of fishing vessels within 12 nautical mile zone divided into Zone A and Zone B specifying only a particular class of fishing vessel to be operated in particular zone.
- Fishermen vs Middlemen- bargaining capacity over the fish prices, market prices are controlled by middlemen which affects the harmony leading to conflicts.

These conflicts though not pervasive till date, however, could potentially impact the marine fisheries sector in future. Developmental programmes should carefully integrate those concerns and should find effective solutions to manage the conflicts.

7. Enforce hefty sanctions: It is more reasonable to believe that if governance is robust, the chances of unusual incidences would be lower. Unsustainable fishing practices are affecting the sustainability of the sea, causing depletion of the resources and degradation of the habitats. Poaching and illegal fishing activities encountered in the islands shows no



signs of decline (Kiruba-Sankar et al 2019). More comprehensive actions such as forfeit of licenses, stronger sanctions, hefty fines, boat seizures could be a management approach against the unsustainable fishing practices. Using of illegal fishing gears, encroachment in non-designated waters, fishing migrations to areas reserved for artisanal fishing boats should be curbed through stronger sanctions.

8. Regulate the coastal fisheries: As there are only few takers for oceanic fisheries till date, the trend of increasing pressure might impact the long term sustainability of coastal fisheries in future. Hence, more regulations and efforts are to be diverted towards the sustainable management of coastal fishery resources. Develop comprehensive monitoring and assessment protocols for coastal fisheries to understand the actual fishing pressure through collection of necessary fishing data.
9. Manage the fishery data: Lack of the basic fishing data in time series might be misleading towards planning and management of the fishery resources. Hence,

there should be more directed efforts to strengthen the fishery data collection from parts of the Islands using stratified sampling methods followed and adopted by ICAR-CMFRI, Kochi. The field staffs engaged in the data collection should be trained on basic taxonomy and collection methodologies for effective utilization of manpower to gather the fishery data.

Assess- Regulate-Utilize (Triad approach): The approach being a concept modified from Hanna and Smith (1993) is recommended towards evidence based research and development in the marine fishery sector of the Islands. Logically, the fishery management approaches recommended begin with assessment of the fishery, followed by regulations implied on the fish harvest and finally utilization of the fishery resources. All these steps are interlinked with one depending on another. The three point approach is recommended as guiding principle for policy makers in decision making as follows,



Reef fish landings at Wandoor landing centre

Assess the resources  
 ↔  
 Enforce regulations  
 ↔  
 Harvest sustainably

TRIAD APPROACH  
 RECOMMENDED  
 FOR FISHERY  
 MANAGEMENT IN THE  
 ISLANDS

## A DETAILED FRAMEWORK WITH RECOMMENDED STEPS FOR MARINE FISHERY MANAGEMENT

### Step 1

Standardize methodologies for fishery data collection using stratified methods

Strengthen skilled manpower to achieve the task on data collection and report

Enforce scientific management committees, task forces, to monitor and validate the results

If required modify and adapt Step 1

Identify the issues in the sampling and monitoring methodology

If satisfied then,

Recommend and enact appropriate fishery management principles based on outcomes of step 1

### Step 2

Develop/ revise policy and roadmap; develop guiding principles and performance indicators based on step 1

If there is need to revise and reform then proceed to step 2

Strengthen regional, national and international collaborations based on needs for expanding fisheries

Ensure a proper Monitoring, Control and Surveillance (MCS) to tackle illegal fishing activities

Prioritize the fishery having scope for expansion and the fisheries that needs control

Revalidate the fisheries at regular intervals; Learn and adjust with the situations, modify plans accordingly

### Step 3

Promote fisher awareness and encourage interactions between stakeholders

Sensitize responsible fishing practices and code of conduct concepts as guided by FAO

Step 1 and Step 2

Towards sustainable marine fishery and participatory management

# POLICY

## RECOMMENDATIONS

- Enforce standard fishery data collection mechanism through institutional support and administrative assistance from parts of the Islands.
- Ensure catch audit process at landing centres, enforce scientific and management teams to achieve the task. Develop fishery management teams (2-3) involving scientists, administrators and stakeholders. Avoid forming teams only for specific requirements which will lead to discontinuity of efforts and ideas.
- Ensure a proper Monitoring, Control, and Surveillance (MCS) in all phases of fisheries expansion.
- Notify the fish groups under intense fishing pressure and apply input and output controls.
- Expand the oceanic fisheries sector with national and international collaborations. Develop active trade links for backward and forward support.
- Focus on Ecosystem based fisheries management considering the fragile ecosystems such as coral reefs, mangroves, sea grasses which supports coastal fishing activities and livelihood.
- Develop an operative module and platform for interaction between the administrators, scientists and fishers to increase mutual understanding. Generate awareness to fishermen covering aspects on data sharing, resource conservation, scheduled species, ghost fishing, marine pollution, minimum legal sizes, by catch impacts etc. Priority services for fishermen and stakeholders who share valuable information and data pertaining to fishery management. Recognition of fishers who abide fishing laws.
- Develop model fishermen training and learning centres at each district and sensitize the concepts of responsible, sustainable and advanced fishing practices.
- Enforce hygienic fish handling practices at fish landing centres. Ensure proper utilization of fish wastes and by catches.



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