



Research Article

ENDEARING MARINE FISHERIES REGULATIONS–A STUDY IN TIRUNELVELI DISTRICT AT GULF OF MANNAR, TAMIL NADU

KANAGA V.^{1*}, RAJAKUMAR M.², SUJATHKUMAR N.V.³, JAWAHAR P.⁴, SENTHILADEBAN R.⁵ AND BRITA NICY A.⁶

^{1,2,3}Department of Fisheries Economics, Extension and Statistics, Fisheries College and Research Institute, Thoothukudi, 628008, Tamil Nadu Fisheries University, Nagapattinam, 611001, Tamil Nadu

⁴Department of Fisheries Biology and Resources Management, Fisheries College and Research Institute, Thoothukudi, 628008, Tamil Nadu Fisheries University, Nagapattinam, 611001, Tamil Nadu

⁵Tamil Nadu Fisheries University Academy, Nagapattinam, 611001, Tamil Nadu

⁶Department of Fish Processing Technology, Fisheries College and Research Institute, Thoothukudi, 628008, Tamil Nadu Fisheries University, Nagapattinam, 611001, Tamil Nadu

*Corresponding Author: Email-kanagav1990@gmail.com

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Abstract- Marine capture fishing plays a pivotal role in fish production, export, nutritional security and livelihoods of people. Still, it has issues like marine resources depletion due to resource degradation, pollution and lack of sustainable marine fishery resource management and these problems are also prevalent in the Gulf of Mannar (GoM) coast. Central and State governments have implemented many policies to maintain marine fishery resources at a sustainable level of which, the most effective of such regulatory measures were found out for sustainability. Therefore, the present study was carried out in the coastal villages of Tirunelveli district, Tamil Nadu. Data were collected from the policy implementer *i.e.*, administrator, stake holders *i.e.*, fishermen and the policy makers *i.e.* administrator and policy makers concerned based on their perception of effectiveness of fisheries policies on marine resources management. Information on eleven marine fisheries regulations policies for sustainable marine fishery resources management were considered and analyzed in this study. Result revealed that among the eleven bans on catching the endangered and threatened species, prohibiting the use of fishing gear with a mesh size of 10mm (knot to knot), declaration of marine national park and biosphere reserve and prohibition to operate pair trawling and purse seining in sea are more effective to maintain the resources at sustainable level in Gulf of Mannar coast.

Keywords- Marine fisheries, regulations, policy effectiveness.

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Introduction

Marine fisheries are important natural resources in India contributing livelihood security, nutritional defense and export earnings. Moreover, Tamil Nadu has the second longest coastline in the country with a coastal length of 1,076 km along the 13 coastal districts. The marine fisher population in Tamil Nadu is 9.85 lakh, living in 608 fishing villages [1]. Also, different coastal zones are categorized into Coromandal coast, Palk bay, Gulf of Mannar and west coast in Arabian Sea. Among the four coastal zones GoM coast is an important coastal zone due to the presence of marine national park. It has a huge area (364.9 Km) which starts from Pamban to Kanniyakumari. GoM coast covers three districts namely Ramanathapuram, Thoothukudi and Tirunelveli. Marine fisheries, in general, have an issue of loss of resources diversity which could be attributed to anthropogenic activities, global warming and natural calamities. An anthropogenic activity includes habitat destruction due to operation of destructive fishing gear, over-exploitation of living resources and pollutions [2]. Same issues were reported in GoM coast. Managing the resources at a sustainable level through suitable regulations was found to be necessary in marine fisheries sector. Therefore, conservation of biodiversity in Tamil Nadu coast can be achieved by implementing fishery regulation, of which effective regulation was found out from this study. Moreover, in the GoM coast exhibit three craft categories of fishermen depends on

marine fishery resources for their livelihood such as mechanized, motorized and non-motorised, of which motorized and non-motorized sector fishermen are highly depends on near shore area marine fishery resources. Hence, the socioeconomic status motorized and non-motorised fishermen are directly affected by depletion of marine fishery resources along near shore because of the diminishing level of near shore resources was significant when compared to deep sea resources [3]. Therefore, the present study was concentrated among stakeholders, administrator and policy makers with the objective of identifying successful marine fishery regulations in GoM, Tamil Nadu.

Materials and Methods

Among the three districts in GoM coast (Ramanathapuram, Tirunelveli and Thoothukudi) fishermen of Tirunelveli district completely depend on motorized and non-motorized fishing crafts hence formed respondents group for the study. The marine fishing profile shows that 1051 registered motorized fishing crafts and 24,639 fisher folk populations in the study area of which 7,513 occupations depends on marine fisheries resources. This explains that a large number of fishermen families depend on motorized fishing crafts for their livelihood. Total sample size of the study was 100, which were represented by fishermen (50 Nos) and Administrator and policy makers (50 Nos). Simple random technique was

used for sampling. Structured questionnaire was used to collect information from the fishermen by field survey. Online survey method was followed from administrator and administrator and policy makers. Opinion of respondents were tabulated and analysed by Likert scaling techniques developed by Rensis Likert (1932) [4] and typical Likert scale was used for respondents to rate the degree to which they agree or disagree with a statement.

Concepts in marine fisheries

Concepts needed to be understood while discussing the result of the study are given below.

- ❖ The **Total Allowable Catch (TAC)**: it is a catch limit set for a particular fishery, generally for a year or a fishing season. TACs are usually expressed in tonnes of live-weight equivalent but are sometimes set in terms of numbers of fish reported by review of fisheries in OECD Countries [12].
- ❖ **Individual Transferable Quota (ITQs)**: Allowable catch for individual fishermen. It's also known as "Individual Fishing Quotas" (IFQ) which is a conservation measure in marine fisheries to manage the resources at sustainable level [5]. **Red list** has threatened species which is compiled and declared by the International Union for Conservation of Nature (IUCN) based on the conservation status of species. Banned to catch threatened marine species for protecting natural marine fishery resources. IUCN organization had published the red list of threatened species, to protect the natural resources. Threatened marine natural resources are also protected under the red list. *Dugong dugong*, the gangetic dolphin (Schedule I, Part I A), green sea turtle, hawksbill turtle, leathery turtle, loggerhead turtle, oliveback turtle (Schedule I, Part II), whale shark, sea horse, giant grouper, saw fish (Schedule I, Part II A), reef building coral, black coral, organ pipe coral, fire coral (Schedule I, Part IV A), *Conus malneedwardsi*, *Nautilus pompilius*, *Tridacna maxima* (Schedule I Part IV B), sea cucumber (Schedule I, Part IV C), sperm whale (Schedule II Part I & II), sponges (Schedule III) are protected under IUCN red list [6].
- ❖ **Fishing ban for mechanized crafts**: Seasonal fishing ban was imposed every year since 2001 which was increased to 61 day fishing ban from April 15th to June 14th in the East Coast region in the year 2017 (Marine policy note, Government of Tamil Nadu 2017-18).
- ❖ **Marine Protected Area (MPA)**: It is defined as 'any area of intertidal or subtidal terrain, together with its overlaying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment [4]. Marine National Park and biosphere reserve are coming under the MPA [7].

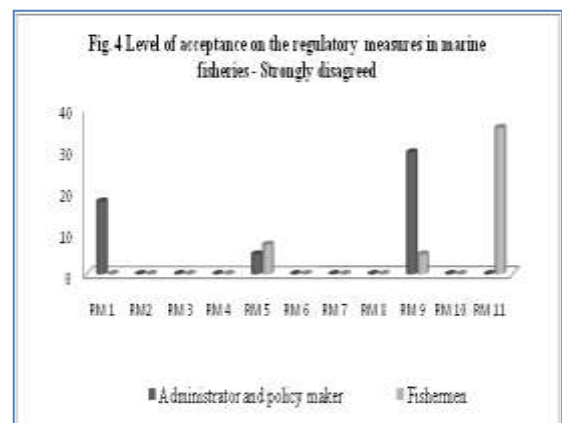
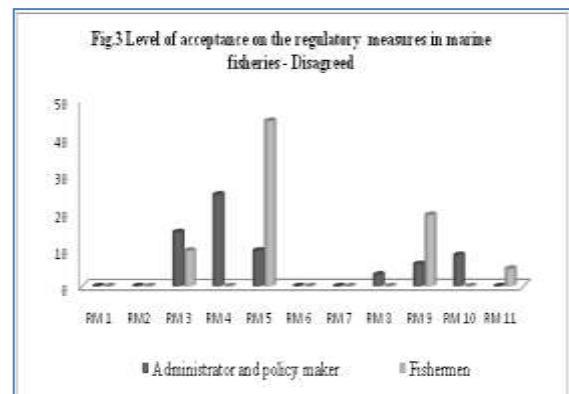
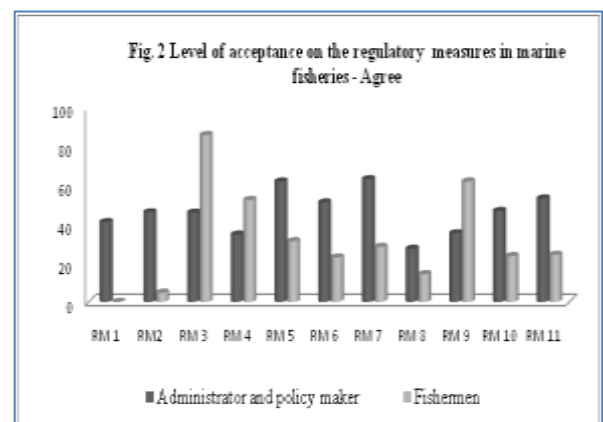
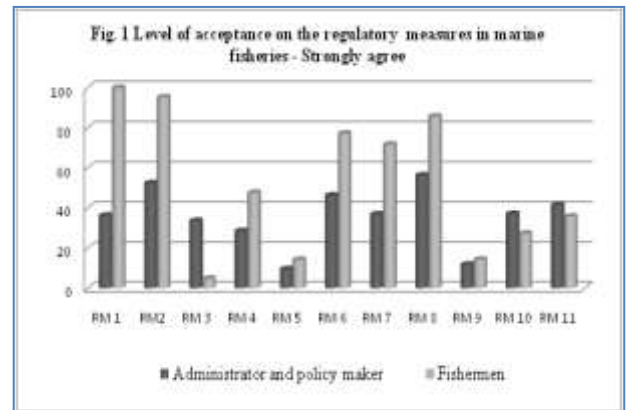
Results and Discussion

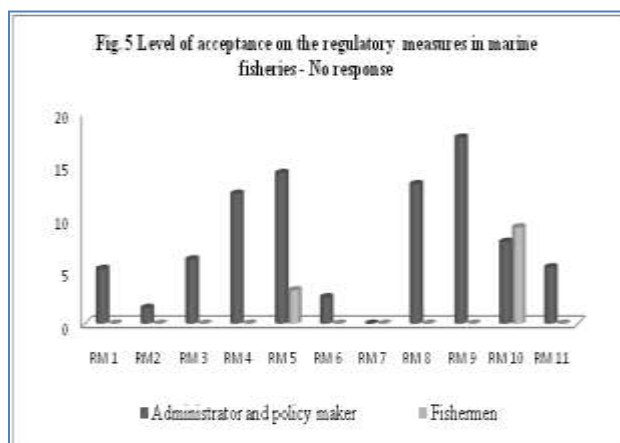
Regulations for the conservation of marine fisheries

Many regulations are in vogue in marine fisheries to conserve natural marine resources to maintain sustainable level. Coastal Regulation Zone Act 1991, Wildlife (protection) Act 1972, Tamil Nadu Marine Fisheries Regulation Act 1983 (Act No. 8 of 1983, TMFRA) provide regulation, restriction and prohibition of fishing by various categories of fishing vessels. The regulatory measures formulated under the above Acts and Regulations, to emphasis on prohibition of exploitation of resources by destructive gears, explosives and poison, restriction of number of fishing boats, restriction of number of fishing gears which exploit juveniles in the backwaters, estuaries and shallow inshore waters, mesh size regulation, minimum legal length for capture, seasonal ban on fishing. Those regulations really help to manage the marine resources at sustainable level which were analyzed and discussed below.

About 77 % of administrator and policy makers and all the fishermen agreed or strongly agreed that 61 days seasonal fishing ban for mechanized fishing crafts has increased fish catch but 17.5% of administrator and policy makers disagreed or strongly disagreed to the statement which explains fishermen also had awareness about the fishing ban [Fig-1,2,3&4]. It is reported that fishing ban has been found very effective and fruitful in the context of successful spawning of Hilsa and production of *Jatka* in the major spawning grounds [14]. More than 98 %

of administrator and policy makers and all the fishermen agreed or strongly agreed that prohibition to use fishing gear with a mesh size of 10mm (knot to knot) is necessary to prevent juvenile catch for conserving the marine fishery resources.





Administrator and policy makers (79.48 %) and fishermen (90.47%) agreed or strongly agreed that registration is necessary for all fishing vessels and license for fishermen but 14.43% of administrator and policy makers and 9.52% of fishermen disagreed or strongly disagreed to this statement which explains that this regulation is more efficient to maintain the resources at sustainable level. Also, the

regulation helps to control the capacity of fishing craft and pressure in sea. Infantina (2016) [8] reported that existence of excess fleet capacity poses serious problem to fisheries management and it results in poor economic performance, inefficiency and biological overfishing. About 63% of administrator and policy makers and all the fishermen agreed or strongly agreed about the restriction to operate bottom trawling within three nautical miles from the shore but 24.50% of administrator and policy makers disagreed or strongly disagreed to the statement which recommended that fishermen also support the regulation and the regulation assist to reduce the resources degradation in near shore area.

Almost 71% of administrator and policy makers and 45.47% of fishermen agreed or strongly agreed that fishing restricted within 100 meters below a river mouth but 14.28 % of administrator and policy makers and 51.36% of fishermen disagreed or strongly disagreed to the statement and the regulation was facilitated to manage marine resources at sustainable level. Nearly 97% of administrator and policy makers and all the fishermen agreed or strongly agreed the declaration of marine national park and biosphere reserve in Gulf of Mannar to conserve the resources which revealed that fishermen were also aware about protection measures of the resources.

Table-1 Overall opinion on exiting marine fisheries regulations in Tamil Nadu

S. No	Regulatory measures	Level of acceptance (%)				
		SA	A	DA	SDA	NR
RM 1	Seasonal fishing ban for mechanized crafts (61 days)	68.10	20.52	0	8.77	2.6
RM 2	Prohibition of fishing gears with a mesh size of 10mm (knot to knot)	73.84	25.40	0	0	0.75
RM 3	Registration of all fishing vessels, and license required for fishing	19.19	65.78	11.97	0	3.04
RM 4	Restriction of bottom trawling operations within three nautical miles from the shore	38.09	43.5	12.25	0	6.16
RM 5	Fishing within 100 metres below a river mouth is restricted	11.89	46.55	26.88	5.94	8.73
RM 6	Declaration of marine national park and biosphere reserve in Gulf of Mannar	61.75	36.99	0	0	1.25
RM 7	Fishing ban on endangered and threatened species	54.28	45.71	0	0	0
RM 8	Prohibition of pair trawling and purse seine	71.01	20.82	1.54	0	6.62
RM 9	Daily tokens to mechanized vessels, to venture into the sea.	13.02	48.59	12.46	17.09	8.82
RM 10	Non-mechanised fishing vessel should operate within three nautical miles shall go for hook and line fishing and boat seine	32.2	55.18	4.17	0	8.45
RM 11	Non-mechanised fishing vessel shall not use his gill net in the channel earmarked as the passage for mechanised fishing vessel	38.63	38.68	2.33	0	20.35

All the administrator and policy makers and fishermen agreed or strongly agreed the ban to catch the endangered and threatened species, which exposed that fishermen know the value of marine fishery resources. Close to 83% of administrator and policy makers and all the fishermen agreed or strongly agreed to prohibit the use of pair trawling and purse seining but 3.09 % of administrator and policy makers disagreed or strongly disagreed to this statement which shows that fishermen are aware about sustainable fishing practices. Moreover, the regulation assists to diminish the resource degradation. About 47% of administrator and policy makers and 76.19 % fishermen agreed or strongly agreed on the daily tokens being issued to mechanized vessels, to venture into sea but 35.51% of administrator and policy makers and 23.81% of fishermen disagreed or strongly disagreed to the statement. Infantina, *et al.*, (2016) [8] reported that the regulations support to reduce the conflicts between craft categories fishermen to share the resource. In addition, 83.9% of administrator and policy makers and 50.86% fishermen agreed or strongly agreed that non-mechanized fishing vessel should operate within three nautical miles by using hook and line fishing and boat seine but 8.34% of administrator and policy makers disagreed or strongly disagreed to the statement. Restriction to use gill net in the channel earmarked as the passage for mechanized fishing vessel by the owner of a non-mechanized fishing vessel are agreed or strongly agreed by 94.65% of administrator and policy makers and 59.97 % of fishermen but 40.03 % of fishermen reported that disagreed or strongly disagreed about the statement. Moreover 100%, 99.24%, 98.74% and 91.83% of administrator and policy makers and fishermen strongly agreed or agreed the ban to catch the endangered and threatened species, the strict prohibition of fishing gear with a mesh size of 10mm (knot to knot), declaration of marine national park and biosphere reserve in Gulf of Mannar and prohibition to operate pair trawling and purse seining in sea, respectively. Implementation of fishing ban in two terms were strongly recommended by

administrator and policy makers (64.70%) and fishermen (95.24%) which explain that fishing ban may be implemented in two splits, since fishes spawn during rainy time as reported by fishermen from their experience [Table-2]. Infantina *et al* (2017) [9] reported that the ban could be in two terms, particularly in May and December because during the monsoon period, the fishing activity is all most suspended due to the rough weather conditions. Executing uniform fishing ban period across south-east and south-west coast of India was suggested by all of fishermen (100%) and administrator and policy makers (58.81). Nearly 72 % of administrator and policy makers and 96.59% of fishermen proposed the ban to operate trawl net for fishing which explains that fishermen were also aware of the negative impact of trawl net fishing in sea. Turtles, seabirds, marine mammals and other animals are all captured and discarded by bottom trawls, Morgan, *et al.*, 2003 [10]. Thomas *et al.*, 2016 [11] also reported that an average 360 km² area of sea floor was trawled and disturbed per year and seven species from IUCN red list categories including turtles were caught in the nets which compel the banning of the use of bottom trawl net to protect the resources from degradation.

Redefining the engine HP for mechanized fishing craft was recommended by the administrator and policy makers (63.54) and fishermen (90.48) and which may assist in reducing the resource degradation. About 52 % of administrator and policy makers and 92.31% of fishermen suggested that Fixing Total Allowable Catch (TAC) in marine capture fishing might facilitate manage the resources at sustainable level. About 59 % of administrator and policy makers and 90.48% of fishermen supported that implementation of Individual Transferable Quota (ITQ) may control over exploitation of marine resource. TAC and ITQ reduce fishing mortality and helps in rebuilding the stocks in marine fisheries [5]. Close to 67% of administrator and policy makers and 14.28% of fishermen recommended that conducting awareness programme about responsible fishing could encourage community based management of marine resources. Administrator and policy

Table-2 Suggested fisheries regulations to manage marine fishery resources at sustainable level

S. No	Statements	Administrator / policy makers	Fishermen	Overall
1	Fishing ban implementation in two split	64.7	95.24	79.97
2	Uniform fishing ban period across south-east and south-west coast of India	58.81	100	79.40
3	Ban to use bottom trawl net in marine fishing	72.12	96.59	84.36
4	Redefining the engine HP for fishing craft	63.54	90.48	77.01
5	Fixing Total Allowable Catch (TAC)	52.6	52.6	92.31
6	Individual Transferable Quotas (ITQ) for fishermen	58.69	90.48	74.58
7	Conduct awareness programme about responsible fishing	67.04	14.28	40.66
8	Regular monitoring of fishing net and crafts used by fisherman	54.29	44.12	49.20

makers (54.29%) and fishermen (44.12%) said that regular monitoring of fishing net and crafts used by fisherman has to be done. Additionally, it can prevent the use of banned gear. Among the recommended fishing regulations, the fishing ban implementation in two split (79.40%), uniform fishing ban period across south-east and south-west coast of India (79.97%) and ban to use bottom trawl net in marine fishing, (84.35 %) are strongly suggested by the fishermen and administrator and policy makers to maintain resources at sustainable level.

Conclusion

The present study revealed that among the existing eleven marine fisheries regulations in Tamil Nadu, ban to catch the endangered and threatened species, prohibiting the use of fishing gear with a mesh size of 10mm (knot to knot), declaration of marine national park and biosphere reserve in Gulf of Mannar and prohibition to operate pair trawling and purse seining in sea are more effective to maintain the resources at sustainable level in Gulf of Mannar coast. The present study revealed that among the recommended fishing regulations, fishing ban may be implemented in two splits. It could be concluded that uniform fishing ban period across south-east and south-west coast of India and ban to use bottom trawl net in marine fishing are strongly suggested by the fishermen and administrator and policy makers. Hence, the suggested regulations would be considered for implementation before revisiting the marine fishery regulation measures.

Application of research: To study the efficiency of marine fishery regulative measures helps to formulate and moderate the regulations for the sustainable management. Hence the research was conducted to find out the effectiveness of the regulative measures. The study found that regulative measures are influencing the resources management.

Research Category: Resource management

Abbreviations: GoM-Gulf of Mannar; TAC - Total Allowable Catch; ITQ - Individual Transferable Quota; IUCN - International Union for Conservation of Nature; MPA - Marine Protected Area; CRZ-Coastal Regulation zone; TMFRA - Tamil Nadu Marine Fisheries Regulation Act

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