

Transaction cost of implementation of seasonal fishing ban in selected maritime states of India

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Marine fisheries management is important to ensure sustainable harvest of the fishery resources. In India, the management of fisheries is governed by rules and regulations formulated under the Indian Fisheries Act, 1897. The development of marine fisheries in the territorial waters extending up to 12 nautical miles from the shore is under the jurisdiction of the maritime states who have formulated rules and regulations for management of the resources which by and large prohibit use of destructive gears, explosives and poison for fishing. Among regulatory measures formulated for management of marine fisheries in India, the seasonal fishing ban (SFB) is the one measure that is diligently followed. A closed season of 45 to 75 days for mechanised fishing vessels under the Marine Fishing Regulation Act of the various maritime states is observed. Earlier there was no uniformity of ban period, but following interventions by the Ministry of Agriculture, Government of India, since 1998, the ban was made uniform for states and union territories on the west coast (June 15 - July 31) and east coast (April 15 - May 31). Since 2015, the ban period was extended to 60 days for both the coasts *i.e.*, from April 15 to June 14 (east coast) and from June 1 to July 31 (west coast).

The implementation of any management or regulatory measures is always associated with a cost. In environmental economics, this cost of management is referred to as transaction cost which is a significant component of the valuation of any ecosystem services since it decides the benefit of the enforcement of any regulatory measure. In this

study the transaction cost of implementation of the SFB was estimated in selected maritime states of India (Tamil Nadu, Andhra Pradesh, Kerala, Karnataka and Gujarat) profiled in Table 1.

Transaction cost primarily involves,

- (i) Search and information costs - This includes cost of educating the stakeholders, getting information and related costs
- (ii) Bargaining and decision costs - This includes cost of arriving at a particular decision or programme for implementation of fishing ban
- (iii) Policing and enforcement costs - This includes cost of enforcing a particular decision or program. Eg., the SFB.

In this study, the cost incurred by the government to implement the SFB is arrived at by computing the cost incurred in notification of the SFB, conducting awareness campaigns, inspections by the Fisheries Development Officials, and other expenses associated with the enforcement of the ban individually and adding them. The transaction cost is divided into major heads namely information cost, enforcement cost and compensation cost. The information cost relates to the expenses incurred in the information exchange on the ban to the masses either through audio or visual media like Radio, Newspaper, TV, print Notices/ Others including awareness campaigns. The enforcement costs include the expenses computed for enforcing the ban across the coast by way of involving officials in the enforcement from the Department of

Table 1. Marine fishery profile of the selected maritime states

State	Coast line (km)	Average annual landngs 2011-2013 (in tonnes)	Share of major resources (in %) in total fish landings	Number of marine fishing villages	Number of marine fish landing centres	Number of boats Mecha-nised#	Moto-rised#	Non-mecha-nised#	Fisher folk popula-tion (in lakh)*
Andhra Pradesh	974	2,81,688 (10%)	PL-56 DM-29 CR-13	555	353	3167	10737	17837	6.05
Tamil Nadu	1076	6,54,569 (19%)	PL-61 DM-29 CR- 6ML-4	573	407	10692	24942	10436	8.02
Kerala	590	7,51,223 (25%)	PL-73 DM-14 CR-6 ML-7	222	187	4722	11175	5884	6.10
Karnataka	300	4,34,063 (12%)	PL-64 DM-24 CR-5 ML-7	144	96	3643	7518	2862	1.67
Gujarat	1600	7,20,591 (20%)	PL-36 DM-35 CR-21 ML-8	247	121	18278	8238	1884	3.96

Note: Figures in brackets indicate the average share of the respective states in India's marine fish landings
PL-Pelagic resources; DM-Demersal resources; CR-Crustacean resources; ML-Molluscan resources

*National Marine Fisheries census, CMFRI, 2010

Mechanised sector: Use engine power for cruise and fishing; Motorised sector: Use engine power for cruise and fishing done manually; Non-mechanised sector: Generally use manual labour for cruise and fishing

Fisheries (DOF), police force and the Coast Guard patrol. Also cost is computed for the hiring charges of the patrol boat and its Petrol and oil (POL) expenses. The Compensation Cost includes incentives and compensation paid during the ban which includes free rations and cash allowance paid to the fishers in lump sum or with sharing from the central and state government during the ban period. But it is to be noted that compensation cost is not a part of transaction cost. The data for estimation of the transaction cost was collected from the State Fisheries Department (DoF) of the selected states using the pre-tested questionnaire. The statewide estimated transaction cost of implementation of SFB is presented below.

Kerala : The estimated total transaction cost in 2014 was ₹ 248.14 lakhs out of which the information costs accounted for a major share of ₹ 210 lakhs (84.63%) followed by the enforcement cost, ₹ 38.14 lakhs (15.37%). The awareness about SFB is created through various channels of communication like personal, electronic, print media and also through small publications. The expenses incurred to advertise in media, publication of notices and awareness campaigns were computed as information

costs. Besides the above transaction cost, the government also gives compensation to the fishermen during the fishing ban period that includes cash allowance and free rations. The total compensation cost was ₹ 5,802.38 lakhs out of which the free ration cost ₹ 1,392.38 lakhs and cash allowance was ₹ 4,410 lakh which formed 24% and 76% of the total compensation cost respectively.

Table 1. Estimated transaction cost in Kerala

Components of transaction cost	Amount (in ₹ Lakhs)	% share to total
Information Cost	210.00	84.63
Enforcement cost		
Salary of government staff	13.63	5.49
Patrolling	21.71	8.75
Fuel	2.80	1.13
Total enforcement cost	38.14	15.37
Total transaction cost	248.14	100.00

Andhra Pradesh : The total transaction cost worked out to ₹ 172.52 lakhs out of which the enforcement costs accounted for a major share of ₹168.58 lakhs (97.71%) followed by the information cost, ₹ 3.95 lakhs (2.29%). The awareness about SFB is created through various channels of communication like personal, electronic and print media.

Table 3. Estimated transaction cost in Andhra Pradesh

Components of transaction cost	Amount (in ₹ Lakhs)	% share to total
Information Cost	3.95*	2.29
Enforcement cost		
Salary - DoF	141.88	
Salary - Police officials	26.71	
Total enforcement cost	168.58	97.71

*This cost was incurred by Reliance Foundation on their own. Reliance India Limited initiated a programme to connect farmers and fishermen as a part of their expansion programme. Since this exercise aimed at creating awareness about SFB, the cost incurred by them is taken as information cost (as a proxy to the expenses incurred by the Government of AP).

Tamil Nadu: SFB is implemented for a period of 45 days from the 15th April to the 29th May of every year along the entire East coast of the state starting from Thiruvallur to Kanyakumari District and from the 15th June to the 29th July of every year along the west coast portion of the state in the Kanyakumari District from Kanyakumari to Neerodi Village limit. The government of Tamil Nadu does not make any public announcements through media regarding the enforcement of SFB. However instructions are given to authorized officers through official channels and notices are issued in newspapers as Press Release where no cost is involved

The enforcement is done with the help of the Department of Fisheries officials which includes Joint Director, Deputy Director, Assistant Director, Fisheries Inspectors, Fisheries Officers and Coast Guards. Patrolling is carried out in Kanyakumari District using fishing boats of local fishermen with 2 patrolling trips with 2 boats per week for 6 weeks during east coast (*i.e.* 4 x 6 = 24 boat trips) and west coast ban periods. There are no hiring charges for patrolling boat but 200 litres per boat per trip was provided for all the 48 trips which require of 9600 litres diesel valued at ₹ 1.50 lakh during 2013-14. However, the enforcement cost of overall patrolling worked out to be 11.49 lakhs for the 100 odd coast guards involved in implementing the SFB. In 2014, the compensation paid to the 1,49,855 fishermen families was ₹ 30,01,59,565 which included the allowance of ₹ 2,000 per family.

Karnataka: Announcements regarding the ban are made through newspapers as news item and hence no cost is involved. No officials are specifically engaged for enforcement of closed fishing season. The Fisheries Department staff in the fishing harbours/fish landing centres are responsible for enforcement of fishing ban without any additional cost. Patrolling during SFB is done by coast guard and enforcement cost of patrolling worked out to 10.92 lakhs for the 75 odd Coast Guard staff involved. Compensation was paid to 43,000 fishermen under centrally sponsored "Saving cum Relief Scheme where ₹ 900 was contributed by the beneficiary and ₹ 900 each by state and central governments. The total compensation paid was ₹11.61 crores.

Gujarat: The enforcement is taken care by the Coast Guard as a part of their duty. Fishermen comply with the ban in total and no separate costs of enforcement are incurred. There is no specific compensation cost except that given through the centrally sponsored scheme of Government of India during this period. The enforcement cost of patrolling worked out to 17.24 lakhs for about 100 Coast Guard staff who spent their time in implementing the SFB enforcement cost.

Table 4. Estimated transaction costs of implementing SFB in the selected maritime states

State	Transaction cost (₹ In lakhs)
Andhra Pradesh	168.58
Tamil Nadu	12.99**
Kerala	248.14
Karnataka	10.92**
Gujarat	17.24**
Total	457.87

Note * landing centre level estimate

** In these states, enforcement of SFB is being taken care by the Coast Guard, whose salary is apportioned as costs of enforcement

The estimated total transaction cost of implementing the SFB in the selected maritime states thus worked out to ₹ 457.87 lakhs (Table 4). This cost will be used to estimate the net benefit due to the implementation of SFB by deducting from

the economic benefit accruing due to the incremental growth of fish during the ban period. The transaction cost thus estimated will help to derive the net social benefit due to the implementation of the SFB in the selected maritime states. The final result will be helpful in arriving at management decisions like continuation of the SFB to modify the management measures to improve the implementation process.

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