
FORV SAGAR SAMPADA
ACTIVITIES AND ACHIEVEMENTS
1985 - 1989
GOVERNMENT OF INDIA
DEPARTMENT OF OCEAN DEVELOPMENT

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the **first Workshop on Scientific Results of**
**the Fishery and Oceanographic Research Vessel**
***SAGAR SAMPADA***
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Front cover : A good fish collection predominantly the Bull's eye *Priacanthus* sp.

Back cover : A collection of Spider crab from deepsea.

# FORV *SAGAR SAMPADA*

## ACTIVITIES AND ACHIEVEMENTS
## 1985 - 1989

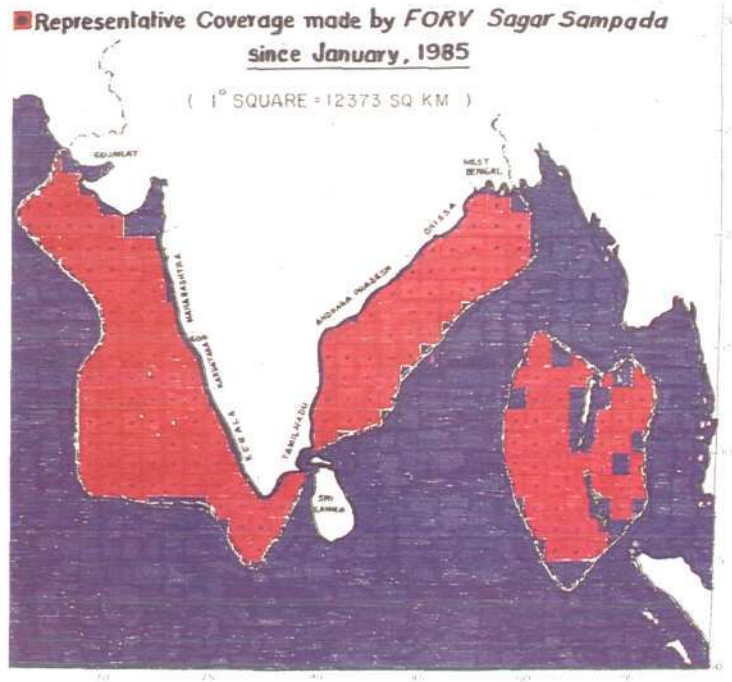
The multipurpose **Fishery and Oceanographic Research Vessel SAGAR SAMPADA** was constructed at the Dannebrog Shipyard Ltd., Denmark under the Danish assistance programme to India. It has been delivered to the Department of Ocean Development, Government of India on 6th November 1984. The Danish International Development Agency (DANIDA) provided the aid for the scientific equipments.

### Major Research Objectives

FORV *Sagar Sampada* has been designed for fisheries and oceanographic research in the Exclusive Economic Zone of India and the contiguous high seas. The vessel is ice-strengthened to give support to India's Antarctic scientific programmes for working as far south as 60°S latitude. FORV *Sagar Sampada* complements ORV *Sagar Kanya* which is equipped for geoscientific, meteorological, physical and chemical oceanographic work, by fulfilling the needs of onboard research on marine living organisms and their environment.

FORV *SAGAR SAMPADA*

**Marine Fisheries Resources Research** is the principal function of the vessel. It is well equipped for locating fish resources, assessing the extent of their distribution and quantifying the fish stocks in the column waters and on sea bottom through effective use of different fishing gears such as bottom trawl, pelagic and midwater trawls and long-line with the aid of modern underwater acoustics and electronic data processing systems. The data acquired through these integrated




Area covered in the Indian EEZ by FORV *Sagar Sampada*

methods are of high degree of reliability in estimating the commercial fish stocks and those which are underexploited, non-conventional and new to the fishery. Besides, the vessel carries out directed research on spawning populations/grounds and on young fish, which are essential for fishery predictions, conservation and management of resources.

**Oceanographic Research** which forms an integral part of marine fisheries research, is the second programme of operation of the vessel. The physical, chemical and biological factors of the sea which influence and control the quality and levels of primary, secondary and tertiary production, life-history of fishes and special features such as upwelling, convergence, Deep Scattering Layer and marine pollution are being investigated. Such wide ranging studies have been made possible in the vessel through automatic data acquisition system, water sampling and analysis of different parameters through sophisticated instruments.

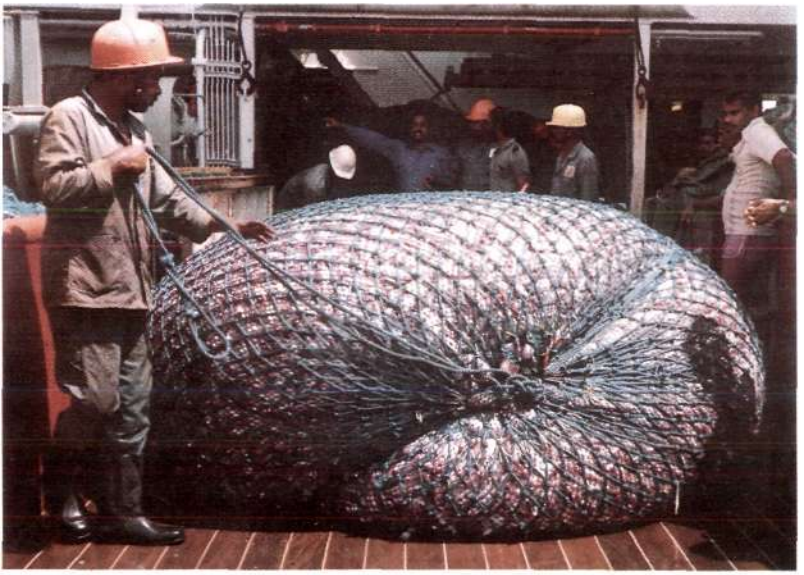
**Meteorological Research** forming part of oceanographic research, is carried out in the vessel to understand the weather phenomena over the Indian Ocean and the subcontinent, particularly the monsoons and tropical cyclones.

The **Central Marine Fisheries Research Institute** under the Indian Council of Agricultural Research is carrying out the responsibility of planning, coordination and implementation of the scientific programmes of the vessel.

The vessel is manned by the Shipping Corporation of India.

**Designing** suitable fishing gear for the commercial exploitation of both conventional and non-conventional varieties of fishes, crustaceans and cephalopods carried out by the **Central Institute of Fisheries Technology** and

Fish catch is being taken on the deck



Opening the cod end and unloading the catch

experimenting during FORV *Sagar Sampada* programmes, is yet another important objective.

Similarly **product development** with special reference to resources caught by *Sagar Sampada*, especially the non-conventional varieties of fishes and other marine life is also one of the significant activities of the CIFT.

Scientists at work in the wet fish laboratory

## Activities

Till recently trawling operations were mostly undertaken within 50 m depth range in the coastal waters using comparatively smaller research/exploratory survey vessels except for observations made by a few of the larger vessels of the Fishery Survey of India and the Integrated Fisheries Project of the Government of India. Based on these results the fishing industry also concentrated their efforts in this narrow coastal belt mainly for the exploitation of shrimp, which fetches high export value.

The observations made by *Sagar Sampada* beyond 50 m depth threw light on the immense potentiality of the deeper waters. Initially, from 1985 to 1987 the vessel undertook an extensive survey of the Exclusive Economic Zone around the sub-continent with fixed stations for hydrography, plankton and fishing. These studies have thrown light on the large fluctuationas noticed in the occurrence and abundance of selected deep water fishes and crustaceans. In order to understand the seasonal fluctuations, it was felt that the vessel should concentrate in specific areas for one year period. From 1988 onwards the vessel explored specific areas throughout the year at frequent intervals to study the seasonal fluctuations of selected living resources which were found in abundance.

For the above purpose the EEZ of the country was divided into six zones namely the Northeast, the Southeast, the Northwest, the Southwest, Lakshadweep and Andaman & Nicobar waters. Taking into consideration the national priorities, the Andaman & Nicobar waters and the Lakshadweep area are intensively studied during 1988-89.

By the middle of 1992 it is envisaged to conduct and complete the systematic exploration in the EEZ of the country and it is expected to locate and chart new or virgin grounds.

A good catch of Threadfin bream from the southwest coast of India

A few perches from the Wadge bank area

## Achievements

During the past four years the vessel could conduct bottom trawling operations (representative coverage) in 80% of a total of 2 million sq.km of EEZ. The surveys could identify 12 major varieties of fishes abundant in the deeper waters.

Perches from Andaman waters

Trawling operations carried out by the vessel in different fishing grounds employing different kinds of trawling gears expending a total of more than 300 effective trawling hours revealed the distribution and relative abundance of the following major fish resources which are available in sufficient quantities for commercial exploitation in the respective fishing grounds beyond a depth of 50 m.

## Exploited resources offering scope for increased production

**Threadfin bream** (*Nemipterus* sp.) : Average CPUE was between 0.65 and 3.5 tonnes per hour of trawling. Comparatively rich grounds were located off Kerala (June, July), off Karnataka (July), Wadge Bank (July, August) and off Gujarat (September–November) upto a maximum depth of 100 m.

**Ribbonfish** (*Trichiurus* sp.) : Average catch rate varied between 0.9 and 1.9 tonnes per hour of trawling. Rich grounds were located mainly off Gujarat (September-November) upto a maximum depth of 68 m.

**Lizardfish** (*Saurida* sp.) : Average CPUE varied between 0.25 and 0.95 tonnes per hour of trawling. Comparatively rich grounds were located mainly off Kerala Coast (June) upto a maximum depth of 63 m.

**Barracuda** (*Sphyraena* sp.) : Average CPUE varied between 0.3 and 4.67 t per hour of trawling. Comparatively rich grounds were located in the Wadge Bank (June-August) and off Maharashtra Coast (September, October) upto a maximum depth of 70 m.

**Catfish** (*Tachysurus* sp.) : Mean catch rate was 2.4 t per hour of trawling. Comparatively rich grounds were located mainly off Kerala Coast upto a maximum depth of 50 m.

**Indian mackerel** (*Rastrelliger kanagurta*) : Average CPUE varied between 1.47 and 2.85 t per hour of trawling. Comparatively rich grounds were located mainly off Orissa Coast at a depth of 70 m during October.

**Deepsea lobster** (*Puerulus sewelli*) : Average CPUE varied between 0.1 and 0.25 t per hour of trawling. Comparatively rich grounds were located mainly in the Quilon Bank off the Kerala Coast at depths between 130 and 770 m (December, January).

## Under exploited deep water and oceanic resources

**Bull's eye** (*Priacanthus* sp.) : Average CPUE was between 0.8 and 4.9 t per hour of trawling. Comparatively rich grounds were located in the Wadge Bank (August), off Goa (September) and off Andhra Pradesh (September) upto a maximum depth of 120 m.

**Driftfish** (*Psenes indicus*) : Average CPUE was 7.5 t per hour of trawling. Comparatively rich grounds were located mainly along Northeast coast at depths between 62 and 68 m in February.

**Scad** (*Decapterus russelli*) : Average CPUE of 6 t per hour of trawling was recorded. Comparatively rich grounds were located mainly along Northeast coast at depths between 60 and 70 m in February.

Indian mackerel and Horse mackerel from the northeast coast of India

**Deepsea prawns** (*Pontocaris* sp., *Parapendalus* sp., *Aristaeus* sp.) : Average CPUE was 0.62 t per hour of trawling. Comparatively rich grounds were located mainly in the Quilon Bank off Kerala Coast at depths between 130 and 770 m (December-February).

Lizardfish from the southwest coast of India

**Cuttlefish** (*Sepia* sp.) : Mean catch rate was 1 t per hour of trawling. Comparatively rich grounds were located off Karnataka Coast at a depth of about 200 m (November).

The observations made by FORV *Sagar Sampada* threw light on the immense potentiality of the deeper and oceanic waters beyond 50 m depth especially the abundance of fishable concentrations of under exploited deep water resources such as Bull's eye, Driftfish, Scad and Deepsea prawns. The studies also revealed the existence of fishable concentrations of resources such as Threadfin bream, Ribbonfish, Lizardfish, Barracuda, Catfish and the Indian mackerel in deeper waters beyond 50 m.

The observations also confirmed the availability of fairly rich grounds for deepsea lobster in the Quilon Bank off Kerala Coast at depths between 130 and 770 m during December, January and also for Cuttlefish off Karnataka at a depth of about 200 m during November.

Based on the above results which give the relative abundance of specific deep water fishery resources in time and space, the fishing industry could venture into far seas by introducing suitable crafts and gear for a rational commercial exploitation of these resources.

## Development of fishing gear

While attempting to design suitable indigenous fishing gears for the commercial exploitation of the deepsea demersal resources of the Indian EEZ, the vessel introduced the concept of high speed demersal trawling, still in the developmental stages elswhere, as the basis of future developmental activities. The Central Institute of Fisheries Technology designed, fabricated and tested a

series of three high speed demersal trawls *viz.* CIFT High Speed Demersal Trawl No. I, No. II and No. III with distinctive features. The performance of the gears was encouraging and record catches of 10 t, 8 t and 12 t/hour respectively for CIFT HSDT I, II and III were obtained from the Wadge Bank and Quilon Bank.

Ribbonfish from the northwest coast of India

Cuttlefish

Between June 1986 and February 1988 the CIFT HSDT series have caught 142.77 t of fish in 132 hours of trawling resulting in an average catch of 1.1 t/hour. However the pre-commercial feasibility studies of the HSDT series, landed 111 t in 52 hours with an overall average of 2.1 t/hour.

The record catches were made possible due to the relatively high speed of trawling (3.5 and 4.5 knots/hour). Side by side with the field trials of the HSDT series, combination wireropes were tested in the actual field operations by rigging the high speed trawls. This has lead to the development of a standard combination wirerope comparable with imported wireropes. The commercial production has been already taken up by M/S. Usha Martin Industries, Calcutta paving the way for import substitution.

Where all the imported bobbin trawls failed, the one developed at CIFT has proved a great success in the trial fishing conducted in December 1987 along the rocky Wadge Bank area of the southwest coast, with a maximum catch of 1.75 t/hour consisting of rock cods and perches.

Considering the cost factor, when each imported demersal trawl of *Sagar Sampada* costs nearly Rs. 1.25 to 1.5 lakhs, the cost of one HSDT developed by CIFT is between Rs. 50,000 and Rs. 60,000.

*Symplectoteuthis oulaniensis*

## Development on Post-harvest Technology

Suitable methods and technologies are being studied for the proper preservation onboard and onshore laboratories of these 12 varieties of fishes caught during the cruises of FORV *Sagar Sampada*, by CIFT and on perfection of these techniques will help the industry to adopt the preservation techniques before they are marketed.

Freezing characteristics of several deepsea species like *Priacanthus* sp., *Pseneopsis* sp., *Elacate* sp., Rock cod, oceanic squid and cuttlefish were studied and the frozen shelf-life of different species were estimated as follows:

| | |
|---|---|
| *Pseneopsis* sp. | 32 weeks |
| *Elacate* sp. | 9 to 10 months |
| *Priacanthus* sp. | 12 months |

Delayed icing for Rock cod from 5 to 10 hours at ambient temperature and frozen

Oceanic Squids

had a shelf-life of 17, 15 and 10 months at –22°C and oceanic squids 18-19 months at –22°C.

## Manpower development

So far 950 scientists and technical personnel including DOD Research Associates and Fellows representing 24 different User Agencies received training in the collection of meteorological, oceanographic, plankton and fishing data out at sea using modern standardised equipment.

For the first time, a large number of young scientists drawn from different agencies could participate in the scientific cruises of a modern fishery oceanographic research vessel and gain experience in sea truth data collection under various disciplines. This training component would form the nucleus for the future manpower requirements in this specialised field. The success of this scheme is very evident from the participation of large number of scientists and technical personnel and from the achievements given in the forgoing paragraphs.

## Participation by User Agencies in the various cruises of FORV *SAGAR SAMPADA* between January 1985 and February 1989

| | Name of User Agency | Number of Participants |
|---|---|---|
| 1. | Central Marine Fisheries Research Institute (ICAR) | 556 |
| 2. | Central Institute of Fisheries Technology (ICAR) | 221 |
| 3. | Madras University | 27 |
| 4. | Annamalai University | 22 |
| 5. | Indian Institute of Technology, Madras | 19 |
| 6. | National Institute of Oceanography (CSIR) | 13 |
| 7. | Zoological Survey of India | 12 |
| 8. | Fishery Survey of India | 11 |
| 9. | Andhra University | 11 |
| 10. | Cochin University of Science and Technology | 8 |
| 11. | National Remote Sensing Agency | 8 |
| 12. | Central Institute of Fisheries Education (ICAR) | 7 |
| 13. | Kerala University | 7 |
| 14. | Naval Physical and Oceanographic Laboratory | 4 |
| 15. | Vikram University | 4 |
| 16. | Lakhadweep Administration | 4 |
| 17. | Berhampur University | 3 |
| 18. | Central Agricultural Research Institute (ICAR), Port Blair | 2 |
| 19. | Konkan Krishi Vidyalaya | 2 |
| 20. | Fisheries College, Mangalore (UAS) | 2 |
| 21. | Indian Institute of Technology, Bombay | 2 |
| 22. | Fisheries College, Cochin (KAU) | 2 |
| 23. | Space Application Centre | 2 |
| 24. | Fisheries College, Tuticorin (TNAU) | 1 |
| | TOTAL | 950 |

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