Summary

Potential Fishing Zone forecasting by Indian National Centre for Ocean Information Services (INCOIS) would be useful to fishermen in searching the productive fishing ground with respect to time and energy spent in fishing operation in the sea.

Potential Fishing Zone is the zone where maximum probability of fish catch is expected compared to areas which are not notified.

The fish detection studies were carried out off Karwar coast during the period from October 2008 to September 2011, using integrated approach, which is a combined approach for potential fishing zone location making use of SST of NOAA AVHRR images and ocean colour of IRS-P4 OCM images. PFZ maps were received from INCOIS for validation studies.

Validation was carried out on depth zone ranging from 10-40mts, off Karwar coast for notified and non-notified Zone with the fishing vessels Jala Padma (Purse seine) and Shri Ganesh Krupa (Trawl). The fishing areas were located using onboard GPS. The fishing was carried out approximately 10kms from the notified area which was considered as non-notified zone. The fishing was carried out for one hour in both the regions. After haul the total catch was recorded. For our study the landing centre was also calculated on PFZ and Non PFZ days from the landing centres of Karwar, Tadadi and Bhatkal. The days when PFZ was within 40mts depth were considered as PFZ days and the days when depth was beyond 40mts were considered as Non PFZ days.

The total weight and segregated weight of each species of the catch was recorded. The samples were fixed in formalin and brought to laboratory for taxonomic studies and gut content studies. As far as possible the fishes were identified at the site only. Our studies validate PFZ forecast in the Uttara Kannada coast and also show that PFZ forecast is valid for both pelagic and demersal fisheries. Many a times it may not be possible to conduct simultaneous fishing operations to validate the forecast on a long term basis. Hence an indirect method to validate and verify the PFZ forecast is suggested.

The swept area of the trawl and density
Swept area (a) = h*x*(v*t)

Where,

v is velocity in knots of the trawl over the ground when trawling.

x is constant (Fraction of the head – rope which is equal to the width of the path swept by the trawl, the “wing speed”)

h is head rope length and

t is duration of trawling in hours.

The density of fish was calculated using formula:

Density = CPUE/a

Where,

CPUE is the catch per unit effort (kg per hour)

a is the swept area of the trawl (km²).

For comparison between notified and non-notified zone fish density was calculated and graphical analysis of results was carried out.

Analysis suggests the advantage of fishing in Potential Fishing Zones. The fish density was found higher in notified area compared to non-notified area.

Trophic analyses indicate presence of different food chains and account of possibility of spatial and temporal co-occurrence of two or more number of species. The Food and Feeding analysis were carried out and the present study shows that most of the species feed on Phytoplankton, Zooplankton, Molluscs, Crustaceans and small fishes and rest of them show the presence of fish eggs and unidentified digested matter.

Length and weight studies were also conducted to know the condition of the fishes for notified and non notified areas. The results showed all negative allometry except for *Megalaspis cordyla* and *Rastrelliger kanagurta* which showed positive allometry. Comparison of mean length of different age groups and condition factor was recorded for different fishes. Later length–weight relation was calculated using the software “Abee”.
Totally 9 species landed in PFZ area was studied whereas *Sardinella longiceps* was studied month wise using landing data. Sample sizes (n), minimum and maximum values of lengths and weights, as well as parameters a and b of the length weight relationships, are presented for each species, according to which negative allometry was found in all species. The condition of *Sardinella longiceps* was better in PFZ area as compare to the other areas of Karwar coast. The LWR parameters (a, b) of the fish are affected by a series of factors such as season, habitat, gonad maturity, sex, diet, stomach fullness, health, preservation techniques and annual differences in environmental conditions.

The hydrobiological parameters of the study region were recorded. Abiotic factors such as Sea Surface Temperature, Salinity, pH and Biotic factors such as Chlorophyll were monitored from both notified and non-notified regions. The variations are presented in tabular form and graphs. Correlation values between biotic and abiotic factors were calculated. In the PFZ region SST was positively and moderately correlated with Chlorophyll. Salinity was moderately correlated with Chlorophyll and pH showed weak correlation with chlorophyll. In Non PFZ regions the SST had weak correlation with chlorophyll but salinity showed strong correlation with chlorophyll, where as weak or negligible correlation was noticed between pH and chlorophyll. Correlation of biotic and abiotic factors with fish catch density of trawl was also calculated. From the table 7 it is clear that the SST and salinity showed weak correlation with fish catch in PFZ region but high correlation was noticed with pH and moderate correlation was noticed with chlorophyll. In Non PFZ region weak or negligible correlation was noticed for fish catch with biotic and abiotic factors.

The integration of chlorophyll concentration and SST features was found to be useful for exploring fishery resources during a validation experiment. This method takes account of both biological (primary production) and physical (temperature) parameters responsible for fish distribution. High catch points were found in the vicinity of matching features observed in the composite images. At some locations an abrupt increase in CPUE in PFZs was observed. This indicates the capability of satellite sensors to locate the most favourable conditions for resource distribution and fishing operations.