

FISHERY POTENTIAL OF THE GULF OF KACHCHH

VIJAYALAKSHMI R. NAIR, K. GOVINDAN, NEELAM RAMAIAH AND S.N. GAJBHIYE
Regional Centre, National Institute of Oceanography, Versova, Bombay 400 0061.

ABSTRACT

Fishery potential of the interior Gulf of Kachchh and adjacent creek regions was reported for the first time as baseline data for future ecological assessment. The experimental trawling and gill netting indicated that the inner Gulf (av.7.8 kg/h) was three times more productive than the creek (av.2.3 kg/h). The number of species found in the Gulf and creek were respectively 34 and 20 suggesting good biodiversity of the living resources of the area.

The increasing industrial developments around the Gulf of Kachchh necessitates baseline information on the biological production potential including the fishery information on the area as part of pollution monitoring studies. Though fish landing data for different locations in the Gulf are regularly reported by the Department of fisheries, Government of Gujarat, the information covers a wider area and can not be considered for a specific location. Hence, experimental trawling was done for the first time in the interior Gulf and adjacent creeks at 6 locations (Fig.1) during monsoon (August 1986) postmonsoon (November 1986) and premonsoon (February 1987) periods. Stations 1-4 are located in the interior Gulf and Stations 5 and 6 in the creek area. Bottom trawling was done on a mechanised trawler using a high opening bottom trawl net of 20.7 m length. Surface drift gill net of about 700 m length with a mesh size varying from 8 to 11 cm was used for gill netting.

Water quality :

The water temperature in the creeks and Gulf varied at a range of 19-29°C during August-February. The creek sustained very high salinity during the dry season (42.2-50.5‰). A gradual reduction in salinity from the creek towards the outer Gulf was evident especially during nonmonsoonal period (Zingde *et al.* 1988). The fresh water runoff during occasional monsoon spell considerably diluted the seawater in the major creeks feeding the Little Gulf of Kachchh resulting in wide fluctuations in salinity (8.5-

39.2‰). Very high suspended load was observed at the creeks (av.<700 mg/l) than the inner Gulf (av.348 mg/l). The average DO level was above 5.5 mg/l through all seasons. The BOD was also low (av.2mg/l) indicating the water free of organic pollution. The trend in variations of nitrate and phosphate showed that the creeks served as important source of nutrients (NIO, 1987).

Biological characteristics :

The inner gulf regions have extensive growth of mangroves. Chlorophyll *a* showed a variation of 0.8-2.2 mg/m³ with relatively higher values during the monsoon period. Phaeophytin was higher in the creek (av. 2.85 mg/m³) as compared to the inner Gulf (av. 1.94 mg/m³). The area was rich in zooplankton and the creek was more productive during the monsoon period (av.59.2 ml/100 m³) as compared to the Gulf (av.22.6 ml/100 m³). In general, the area sustained a poor benthic macrofauna in terms of biomass and population count. The observed average biomass of 0.6 g/m² was considerably low which could be attributed to strong tidal currents and very high suspended load associated with unstable seabed conditions.

Fishery :

Trawling is almost absent in the area probably due to low catch rate, uneven seabed conditions and fast development of New Kandla harbour. However, gill netting was quite common particularly in the regions around Kandla, Tuna and Navlakhi.

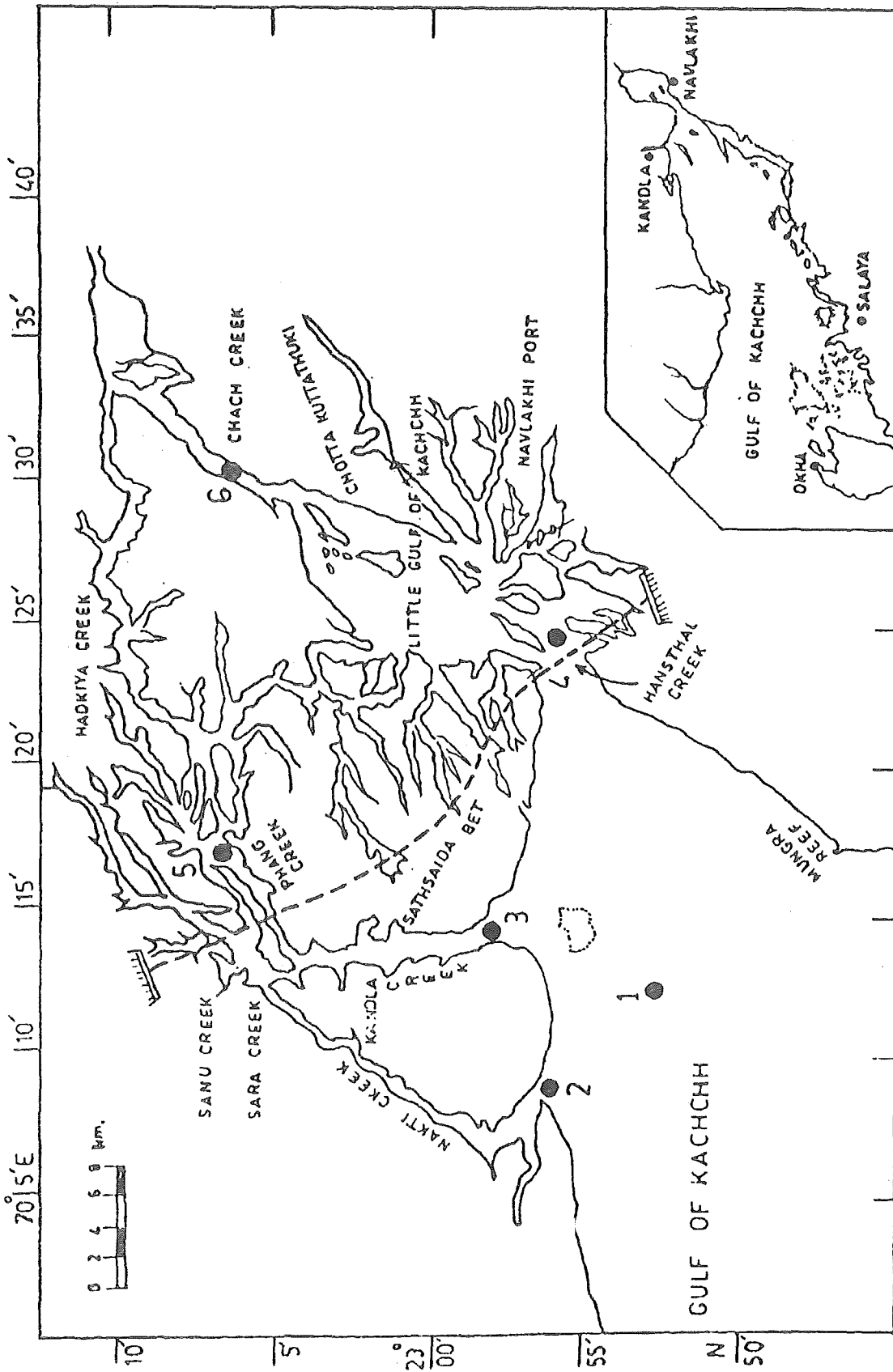


Fig. 1 Sampling locations

Table 1 : Total catch obtained by trawling and gill netting (in parenthesis) at different locations during 1986-87. Values given as kg/h.

Stations	August	November	February
1	0.6	22.5 (3.2)	19.7 (0.6)
2	0.9 (1.9)	6.1 (2.3)	3.7 (4.9)
3	1.2 (0.9)	8.2 (1.2)	13.1 (0.6)
4	1.6	2.7 (0.5)	12.7 (1.3)
5	1.2 (0.4)	0.7 (0.2)	0.7 (0.3)
6	9.9 (1.5)	0.4 (0.04)	1.1 (0.6)

During the monsoon period (August) catch rate was very poor in the interior Gulf (Table 1) and catch rate was 5 times higher at the creek (av.5.5 kg/h) than the inner Gulf (av. 1.1 kg/h) due to high catch from station 5. The fishery potential enhanced during the postmonsoon period recording maximum catch at station 1 (22.5 kg/h). On an average, the inner Gulf (9.9 kg/h) was much more productive than the creek system (0.55 kg/h) during postmonsoon period. The recorded catch rate in the creek for premonsoon period is comparable to that of the postmonsoon period (av.0.9 kg/h). While it further increased at the Gulf area (av 12.3 kg/h). The overall fishery of the area indicated that inner Gulf (av.7.8 kg/h) was three times more productive than the creek (av.2.3 kg/h).

Catch rate during gill netting was low compared to trawling (Table 1). Average catch rate for the Gulf for monsoon, postmonsoon and premonsoon periods were respectively 1.4, 1.8 and 1.8 kg/h. The observed average for the creek in the same order were 0.9, 1.0 and 0.4 kg/h. In terms of gill net catch, the inner Gulf (av.1.6 kg/h) was twice more productive than the creek (av.0.8 kg/h).

The percentage composition of different species for the three seasons are given in Table 2. In the trawl catch 34 species of fish, 12 species

of prawn and 5 species of crabs were recorded. Among the fishes *Harpodon nehereus* dominated the catch. The other common species in the creek were *Johnius vogleri*, *Otolithoides biauritus* and *Protonibea diacanthus* while in the inner Gulf *Chiloscyllium arabicum*, *Trygon walga*, *Pampus argenteus* and *Otolithoides biauritus* were common. The penaeids *Parapenaeopsis hardwickii* and *Acetes indicus* were common in the creek. The common penaeids in the Gulf were *P.hardwickii*, *P. stylifera* and *Metapenaeus kutchensis*. On an average shrimps contributed respectively 3 and 2% to the total catch in the creek and Gulf.

The total species encountered in the gill net catch was 20. The most common species in the creek area were *Thryssa mystax*, *Carcharhinus laticaudus* and *Paranibea semiluctuosa*. *Pampus argenteus* dominated the Gulf area while the species was not observed in the creek area. The other common species in the inner Gulf were *Chirocentrus nudus* and *Thryssa mystax*.

In general, the area sustained a fairly good fishery potential. During August the reduction in salinity favoured the maximum fishery of the interior creek environment when catch rate was low in the Gulf area. The biodiversity of fish and crustaceans in the Gulf of Kachchh indicated a healthy ecosystem which needs to be maintained.

Table 2 : Percentage composition of catch from various stations off Kandla by bottom trawling and gill netting (values in parenthesis during August (A), November (N), February (F) 19886-87.

Name of species	Month	Stations					
		1	2	3	4	5	6
<i>Carcharhinus laticaudus</i>	A	-	(2.4)	-	12.0	-	(15.9)
	N	6.7 (39.6)	4.1 (6.5)	(2.0)	(5.9)	(80)	-
	F	0.2 (17.7)	1.4	0.4	7.9	(59.6)	-
<i>Zygaena malleus</i>	A	-	-	(11.8)	-	-	-
	N	-	-	-	-	-	-
	F	-	-	-	-	-	-
<i>Chiloscyllium arabicum</i>	A	42.2	-	2.0	0.6	-	(49.8)
	N	0.7	12.3	15.6	-	-	-
	F	5.7	1.4	0.5	7.9	-	-
<i>Trygon walga</i>	A	11.7	-	17.9	12.7	-	-
	N	14.2	3.0	15.3	-	-	-
	F	0.3	-	3.8	31.5	-	-
<i>Pristis microdon</i>	A	-	-	-	-	-	54.6
	N	-	-	-	-	-	-
	F	-	-	-	-	-	-
<i>Astrape dipterygia</i>	A	-	-	-	-	-	-
	N	-	-	0.5	-	-	-
	F	0.7	-	-	-	-	-
<i>Polynemus indicus</i>	A	-	1.7	-	0.6	-	0.5
	N	0.04	2.5	0.4	0.4	-	-
	F	1.5	-	-	-	-	-

NOTES

Table 2 : (Contd.)

Name of species	Month	Stations					
		1	2	3	4	5	6
<i>P. heptadactylus</i>	A	-	-	-	-	-	-
	N	0.08	-	0.6	0.6	-	-
	F	-	-	-	-	-	-
<i>Eleutheronema tetradactylum</i>	A	-	-	-	-	-	-
	N	-	(3.5)	(58.1)	7.5	-	-
	F	-	5.4	(2.5)	0.04	-	-
<i>Johnius vogleri</i>	A	6.3	1.2	4.1	2.5	-	3.4
	N	7.0	-	0.7	4.3	-	11.8
	F	8.9	6.1	-	0.4	8.7	0.4
<i>J. glaucus</i>	A	-	-	-	-	72.3	-
	N	-	-	-	-	-	-
	F	-	-	-	-	-	-
<i>J. belangerii</i>	A	-	-	-	-	-	-
	N	-	-	-	(39.6)	-	-
	F	-	-	-	-	-	-
<i>J. diacanthus</i>	A	-	-	-	-	-	-
	N	-	-	0.2	-	-	-
	F	-	-	-	-	-	-
<i>Paramibeia semiluctuosa</i>	A	-	-	-	-	(75.7)	-
	N	-	-	-	-	-	-
	F	-	-	-	-	-	-

NOTES

Table 2 : (Contd.)

Name of species	Month	Stations					
		1	2	3	4	5	6
<i>Otolithoides biauritus</i>	A	8.6	-	6.1	8.6	6.0	2.6
	N	1.4	16.4	13.0 (3.7)	1.3	7.2	1.2
	F	5.1	-	17.2	1.1	-	0.9
<i>Protonibea diacanthus</i>	A	-	-	-	-	9.6	0.6
	N	0.5	8.2	1.3	0.9	-	-
	F	1.9	0.7	3.8	0.2	6.5	8.5
<i>Lepturacanthus savala</i>	A	-	-	3.3	-	-	1.8
	N	1.7	-	-	-	-	21.3
	F	1.9	0.7	3.8	0.2	6.5	8.5
<i>Caranx para</i>	A	-	-	-	-	-	-
	N	0.02	-	0.1	-	-	-
	F	(0.8)	1.4	0.03	-	-	-
<i>Pampus argenteus</i>	A	-	-	1.2 (4.3)	-	-	-
	N	2.0 (1.9)	12.3 (16.3)	6.1 (45.7)	1.1 (1.0)	-	-
	F	6.2 (35.4)	6.8 (18.6)	3.4 (83.3)	(39.7)	-	-
<i>P. chinensis</i>	A	-	-	-	-	-	-
	N	0.1	-	-	-	-	-
	F	-	-	-	-	-	-
<i>Tripauchen vagina</i>	A	-	-	-	-	-	-
	N	-	-	-	-	-	-
	F	0.1	0.1	-	-	-	-

Table 2 : (Contd.)

Name of species	Month						Stations
	1	2	3	4	5	6	
<i>Boleophthalmus glaucus</i>	A	-	-	-	4.8	0.7	
	N	0.3	1.2	-	-	-	
	F	-	-	0.4	2.9	4.2	
<i>Callionymus sagitta</i>	A	0.6	-	-	-	-	
	N	-	-	-	-	-	
	F	-	-	-	-	-	
<i>Mugil cephalus</i>	A	-	-	-	-	-	
	N	-	-	0.6	-	7.1	
	F	-	-	3.1	-	-	
<i>Cynoglossus arel</i>	A	4.7	2.0	2.3	-	0.7	
	N	0.1	0.6	2.5	5.6	-	
	F	2.7	0.1	13.6	12.8	-	
<i>Paraplagusia marmorata</i>	A	-	-	-	2.2	-	
	N	-	-	-	-	-	
	F	-	-	-	-	-	
<i>Synaptura commersoniana</i>	A	-	11.0	-	-	-	
	N	-	-	-	-	-	
	F	-	-	-	-	-	
<i>Arius maculatus</i>	A	-	-	-	-	3.4 (11.0)	
	N	-	6.1	-	-	-	
	F	-	-	-	-	-	

Table 2 : (Contd.)

Name of species	Month	Stations					
		1	2	3	4	5	6
<i>A. caelatus</i>	A	-	-	-	-	3.4 (11.0)	-
	N	-	6.1	-	-	-	-
	F	-	-	-	-	-	-
<i>Harpodon nehereus</i>	A	-	57.8 (8.7)	(8.6)	45.6	(12.2)	6.3 (4)
	N	22.7	19.7	28.5 (5.8)	41.7 (11.9)	17.3	21.3
	F	8.5	-	5.7	0.2	(5.32)	-
<i>Hilsa toli</i>	A	-	(78.7)	(11.8)	-	-	-
	N	(0.2)	-	-	-	-	-
	F	-	-	-	-	-	-
<i>Pellona filigera</i>	A	-	(3.9)	-	-	-	-
	N	-	-	-	-	-	-
	F	0.3	-	1.1	-	-	-
<i>P. elongata</i>	A	-	(3.9)	-	-	-	-
	N	2.4	0.6 (21.8)	(3.7)	-	-	-
	F	-	-	-	-	-	-
<i>Ilisha megaloptera</i>	A	-	-	-	-	-	-
	N	0.2	-	0.3	1.3	-	-
	F	-	4.1	2.0	0.2	0.7	-
<i>Thryssa mystax</i>	A	-	(2.4)	-	2.2	(12.2)	2.8 (14.9)
	N	1.4	(16.3)	(27.6) 0.2	2.6 (37.6)	3.6 (20)	(100)
	F	0.9	4.1	4.2	(10.7)	(35.1)	2.4 (100)

Table 2 : (Contd.)

Name of species	Month	Stations					
		1	2	3	4	5	6
<i>Coilia dussumieri</i>	A	2.3	1.2	1.2	1.3	-	0.7
	N	22.1	6.2	0.6	6.2 (2.0)	-	0.5
	F	5.2	0.3	17.2	0.1	-	-
<i>Chirocentrus nudus</i>	A	-	-	-	-	-	-
	N	(39.6)	(2.8)	-	-	-	-
	F	(46.2)	(81.4)	(16.7)	-	-	-
<i>Triacanthus brevirostris</i>	A	-	-	-	-	-	(4.3)
	N	-	-	-	-	-	-
	F	-	-	-	-	-	-
<i>Tetrodon oblongus</i>	A	-	-	7.7 (5.4)	-	-	0.1
	N	0.3	-	-	3.8	-	-
	F	-	-	-	-	-	-
<i>Lagocephalus lunaris</i>	A	-	-	-	-	-	-
	N	0.1	-	-	-	-	-
	F	-	-	-	-	-	-
<i>Penaeus semisulcatus</i>	A	-	-	-	-	-	-
	N	-	-	-	-	-	-
	F	0.8	0.8	7.6	-	-	-
<i>P. indicus</i>	A	3.9	-	-	-	-	-
	N	-	-	-	-	-	-
	F	-	-	-	-	-	-

NOTES

Table 2 : (Contd.)

Name of species	Month	Stations					
		1	2	3	4	5	6
<i>Metapanaeus kutchensis</i>	A	-	-	-	-	-	-
	N	-	-	-	-	-	-
	F	-	74.8	21.0	-	-	2.4
<i>M. affinis</i>	A	-	-	-	-	-	-
	N	-	-	-	0.9	-	-
	F	-	-	-	-	-	-
<i>Parapanaeopsis hardwickii</i>	A	7.8	0.7	12.6	3.2	-	5.3
	N	0.5	1.1	1.7	3.0	7.2	21.3
	F	40.4	20.4	-	19.7	38.4	7.1
<i>P. sculptilis</i>	A	-	-	8.1	-	3.2	-
	N	-	0.2	-	-	-	-
	F	-	-	-	3.1	-	-
<i>P. stylifera</i>	A	6.3	-	-	-	-	7.4
	N	0.2	-	2.9	0.9	-	-
	F	1.5	13.3	-	4.1	7.2	3.8
<i>Exhippolysmata ensirostris</i>	A	-	-	-	-	-	-
	N	-	0.2	-	1.1	-	-
	F	-	-	-	-	-	-
<i>Exopalaemon styliferus</i>	A	-	0.7	15.4	2.9	3.6	8.1
	N	0.4	1.3	0.3	5.1	7.2	14.2
	F	1.5	-	-	-	-	-

Table 2 : (Contd.)

Name of species	Month						Stations					
	1	2	3	4	5	6	1	2	3	4	5	6
<i>Nematopalaemon</i> sp.	A	-	-	-	-	-	-	-	-	-	-	-
	N	-	-	-	-	-	-	-	-	-	-	-
	F	-	-	-	7.9	15.9	-	-	-	-	-	-
<i>Acetes indicus</i>	A	1.6	0.1	0.8	0.6	0.4	0.1	0.1	0.6	0.4	0.1	0.1
	N	0.7	0.2	-	6.6	57.6	-	-	6.6	57.6	-	-
	F	0.4	0.8	0.1	0.2	2.2	0.9	0.1	0.2	2.2	0.9	0.9
<i>Panulirus polyphagus</i>	A	-	-	-	-	-	-	-	-	-	-	-
	N	-	-	2.4	-	-	-	-	-	-	-	-
	F	5.1	-	-	-	-	-	-	-	-	-	-
<i>Neptunus pelagicus</i>	A	-	-	1.6	-	-	1.0	-	-	-	-	1.0
	N	-	-	-	-	-	-	-	-	-	-	-
	F	-	-	-	-	-	-	-	-	-	-	-
<i>N. sanguinolentus</i>	A	-	-	1.6	-	-	-	-	-	-	-	-
	N	-	-	-	0.4	-	-	-	0.4	-	-	-
	F	-	4.1	2.2	-	-	-	-	-	-	-	-
<i>Charybdis cruciata</i>	A	-	-	-	-	-	-	-	-	-	-	-
	N	-	-	-	-	-	-	-	-	-	-	-
	F	-	-	4.6	-	-	-	-	-	-	-	-
<i>Scylla serrata</i>	A	-	-	-	-	-	-	-	-	-	-	-
	N	0.2	0.04	-	-	-	-	-	-	-	-	-
	F	0.2	6.8	2.1	0.2	2.9	-	0.2	2.1	2.9	-	-

Table 2 : (Contd.)

Name of species	Month	Stations					
		1	2	3	4	5	6
<i>Matuta himaris</i>	A	4.7	-	1.2	-	-	-
	N	0.02	-	0.6	2.6	-	-
	F	5.2	2.7	1.8	0.1	-	-
<i>Squilla sp.</i>	A	-	-	2.0	-	-	-
	N	0.6	0.4	0.3	-	-	-
	F	0.3	-	0.1	0.1	-	-
<i>Sepia sp.</i>	A	-	-	-	-	-	-
	N	0.2	-	-	-	-	-
	F	-	-	0.2	-	-	-

REFERENCES

- NIO. 1988. Tidal power development in the gulf of Kachchh - marine environmental impact assessment. Regional Centre, National Institute of Oceanography, Bombay-22 pp.
- Zingde, M.D., Nair, V.R., Govindan, K. and Sabnis, M.M., 1988. Marine environmental impact assessment of proposed Tidal Power development in the Gulf of Kachchh. *Proc. International Symp. Tidal Power Development. New Delhi*. 16-18 February 1988. 205-208.