Catching Efficiency Of Artisanal Estuarine Winter Migratory Bag Net (*EWMBN*) Operated Along Hooghly – Matlah Estuary, West Bengal, India.

N.A. Talwar, S.P. Banerjee, S. Chakraborty

ABSTRACT: Hooghly–Matlah estuarine system in the state of West Bengal in India sustains world's important multi-species commercial fisheries. Winter migratory bag net is one of the most important artisanal fishing gears used for exploitation of the resources in stretches of the estuary. A study was carried out during 2010–11 to find out the current catching efficiency of this artisanal net. A total of twenty-two (22) fishing trials were carried out in day time along the lower stretches of the estuary. Soaking period was fixed to six (6) hours for every experiment excluding the time of setting and hauling. After 6 hours of hauling, the catch obtained was sorted out into finfishes, shellfishes and by-catches. Catching efficiency of the net was judged after testing the significant difference between the total catches by weight obtained in the net. Results revealed that the catch rate of existing estuarine winter migratory bag net (EWMBN) had an average catch rate of 96.09kg/haul. The average rate of by-catch was 27.13kg/haul. The percentage contribution of commercial groups of finfishes, shellfishes and by-catch were 56.06%, 17.93% and 26.01% respectively. There was no significant difference found between the average catches obtained from the existing winter migratory bag net during the period of study at 5 % level.

Key words: *Hooghly–Matlah estuarine, winter migratory bag net, Catching efficiency*

1. INTRODUCTION

Hooghly-Matlah Estuary at southern fringe of the State of West Bengal is a major estuarine complex of the eastern coast of the country, which has the largest deltaic region in the world with innumerable tributaries and network of creeks. Its aquatic environment is very rich with quite good number of shellfish and finfish species and several aquatic and terrestrial fauna. These natural resources are the chief source of livelihood of deltaic population and besides, providing proteinaceous food to them. It has a long history of traditional fishing practices. Fishery exploitation by migratory bag-net units is a typical feature of the lower zone of the Hooghly Estuary, West Bengal, India during winter season from October to February. The number of fishing camps set up at different centers, the fishermen population migrating to different centers, the number of bag nets operated by them and number of mechanized and non-mechanized boats put into operations. The set bag net fishing activities in Bangladesh found that it had harmful effects on around 100 finfish and shrimp species in the same area of exploitation[7]. Hansen and Mustafa[5] Surveyed the design, behaviour and performance of the set bag net operated in the estuaries of Bangladesh and evaluated the possibility of introducing trammel nets as alternative gear to the set bag net. Estuarine winter migratory bag net (*EWMBN*) constituted the most dominated gear in the entire estuary, accounting for 74.7% of the total catch of this zone. Total estimated estuarine winter migratory bag net landings fluctuated within 2080.6 to 35844.6 tons per season with an average CPUE of 93.72 to 53.12 kg during the period of 1994-95 to 1999-2000 respectively[9]. Though the total catch of estuarine winter migratory bag net shows rising in trend up to 1999-2000, but the overall average CPUE from 1995-96 is in declining trend, which indicates the warning signal of over exploitation. This indicates an urgent need to regulate fishing activities to promote judicious exploitation for sustainable estuarine resources. In 1906, Sir K. G. Gupta [4] undertook investigations on the fisheries of the province of Bengal. Since then several workers have studied the fish and fisheries resources of Hooghly-Matlah estuaries[6; 11; 13; 8; 12]. However, very little work is done on design and fabrication aspects of fishing gears and methods in this region. In this context, a study has been carried out to know the current catching efficiency of artisanal estuarine winter migratory bag net (*EWMBN*) operated along the estuary during winter season.

2. MATERIALS AND METHODS

Informations and observations pertaining to artisanal estuarine winter migratory bag net such as size of the bag net, mesh size in different parts of the net, depth, duration and mode of operation, catch composition and its construction details etc, were collected from local fishermen and by visiting the fishing villages, viz- Kakdwip, Nainan, Nurpur and Falta and fish landing centers viz- Canning, Kakdwip, Namkhana, Fraserganj, Kalisthan, Sagar and Diamond Harbour through questionnaires, interviews and the specifications of the fishing gears were checked and recorded in the field itself especially along the belt of Hooghly-Matlah estuary (Figure 1 and 2).

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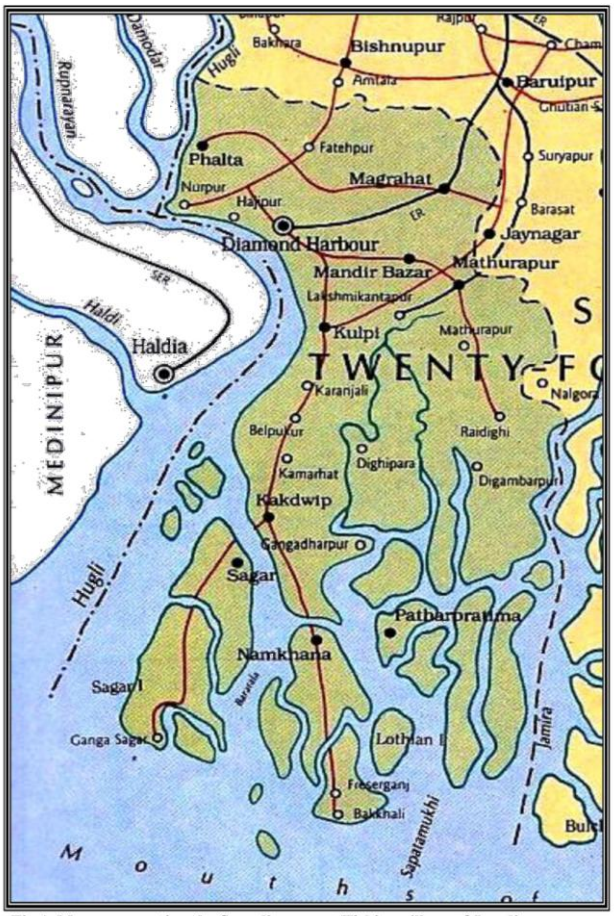

Fig.1. Map representing the Sampling areas (Fishing villages &Landing Centers).

Fig.2. On-field Survey of artisanal estuarine winter migratory bag net (EWMBN)

DATA SHEET 1: Artisanal Estuarine winter migratory bag net (EWMBN)

	DETAILS OF THE JAL													
	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
MATERIALS	← HDPE →													
COLOUR	← OFF WHITE →													
TYPE OF KNOT	← WEAVERS KNOT →													
TWINE SIZE	380 d 36 (R 1670 tex)	380 d 18 (R 840 tex)		380 d 36 (R 1670 tex)	380 d 18 (R 840 tex)		380 d 12 (R 555 tex)				380 d 24 (R1110 tex)	380 d 18 (R 840 tex)		380 d 12 (R 555 tex)
DEPTH (IN MTS).	0	0	7.00	0	0	7.00	6.80	6.80	6.80	3.40	3.40	17.50	7.00	6.80
UPPER EDGES (MESHES)	30	60	360	30	60	360	325	1000	725	350	210	140	140	200
LOWER EDGES (MESHES)	30	60	325	30	60	325	300	725	350	210	150	140	200	200
STRETCHED MESH SIZE (MM)	100	150	140	100	150	140	*U=65 L=60	45	30	25	20	100	90	+RS= 65 LS= 60
MESH SHAPE	← Diamond →													
CUTTING RATIO	IN 1B	AB	AB	1N 1B	AB	AB	AB	1N2B	1N2B	1N2B	AN	2N1B	2N2B	1N2B

*Upper panel Lower panel +Right side panel Left side panel

LINES AND ROPES.

	HEAD ROPE	BREAST ROPE	FOOT ROPE
MATERIAL	← Poly Propylene →		
DIAMETER (MM)	← 20 →		
LAY	← Regular →		
LENGTH (M)	12.5	12.5	12.5

PARTICULARS OF OTHER ACCESSORIES.

DETAILS	FLOATS	POLES	STAKES	WIRE	LAZY LINE
MATERIAL	Plastic	Bomboo	Wood	Steel	Poly propylene
LENGTH (MTS)	-	7 (2 no), 16 (4 no)	5	4	-
QUANTITY (NO)	9	6	2	-	-
SIZE (MM)	182Ø	150 Ø	200 Ø	8x2 Ø	8 Ø
SHAPE	Spherical	Round	Round	-	-
WEIGHT IN AIR	543 gram	-	-	-	-
OTHER PROPERTIES	Total buoy: 23.58 kgf	-	-	-	-

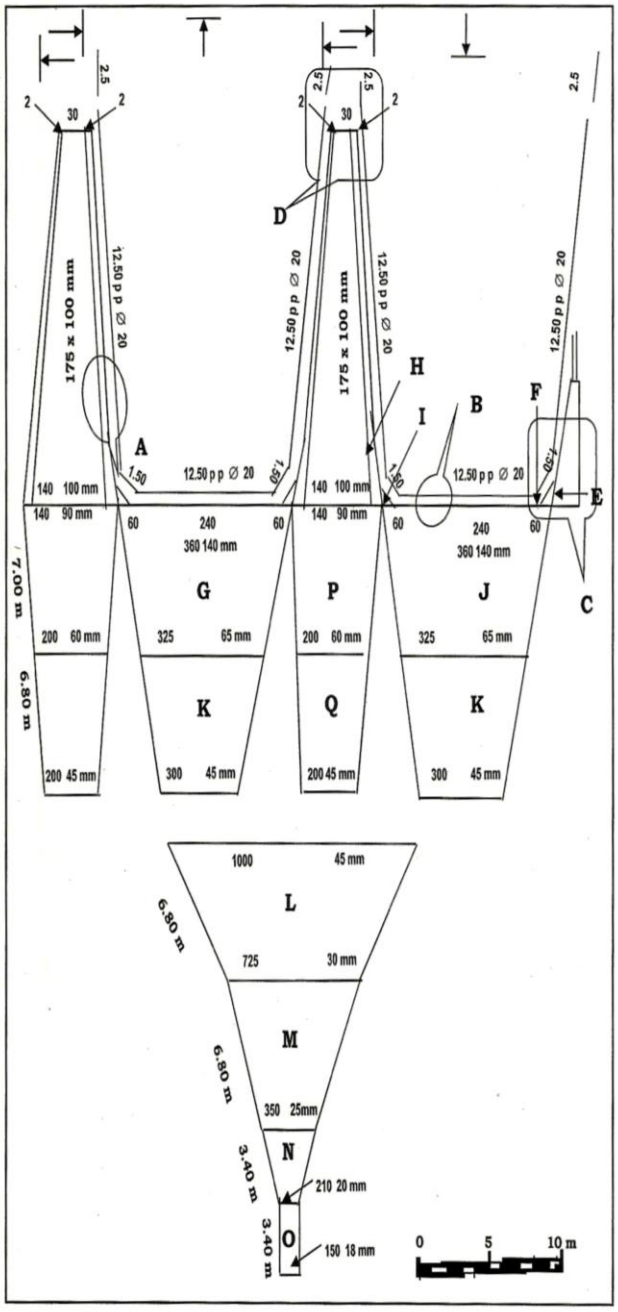

Fig.3. Specification and construction details of artisanal estuarine winter migratory bag net (EWMBN)

An artisanal estuarine winter migratory bag net was designed and fabricated based on data obtained from the survey. The details of specification of the net are given in data sheet 1 and Fig 3, and are presented as per the fishing gear catalogue[3]. The fishing trials were carried out in day time, along the lower estuarine belt, the fishing grounds were chosen based on the other local bag-net operators with reference to depth and direction successively. The net was fixed (set) in the tidal stream of lower estuary against the currents by linking their extended sides of net (wing tips). These wing tips were fastened to holdfasts by means of 16 meters long bamboo poles and 4 meter steel wires. The two wooden stake holdfasts used were embedded some distance apart in the estuarine bed, so that the net is parallel to the direction of the current. The duration of soaking was fixed at six hours excluding period of setting and hauling of net. After six (6) hours of hauling, the catch obtained was sorted out into finfishes, shellfishes and by-catches. Species identification was made on field itself based on FAO species identification sheet and the existing artisanal fishing gears and methods were classified accordingly Von Brandt A classification[14]. Catching efficiency of the net was judged after testing the significant difference between the total catches by weight obtained in the net. This was done by Mann Whitney 'U' test[15; 1].

3. RESULTS AND DISCUSSION

The artisanal estuarine winter migratory bag net, basically a set net is designed and fabricated with its equal lengths of head rope, breast rope, and foot rope of 12.5 meters. The forward part of upper and lower parts have a mesh size f 140 mm. the mesh size of its different parts gradually decreased and terminated into the cod end with mesh size of 18 mm. the head rope and the foot rope are directly interlaced into the main body and wings through 6.0 mm ϕ PP ropes. It has a rectangular mouth kept open by two vertical bamboo poles, which is operated in the tidal stream of the estuary against the current by linking the wing tips of the end to hold-fasts by means of long bamboo poles and steel wires. It was observed from table no.1 and fig no.4 that the artisanal net had a total catch of 2131.80 kg with an average catches of 96.09 kg/haul. The average by- catch was recorded 27.13 kg/ haul during the entire fishing season. A details study of catch during entire period of fishing for every haul varied from 50.75 to 125.15 kg/haul (Table 1 and Fig.4). The highest catch i.e., 125.15 kg/haul were landed in fourteenth haul. For the entire number of samples, the contribution of catch to the total catch was peaked from the end of November and continued up to middle of January. These could be due to the high concentration of nutrients along the estuarine stretch which results in the formation of algal blooms during the post monsoon season[10] .After middle of January i.e. sixteenth haul onwards the catch rate was declined.(from 100 kg /haul to 80.20 kg/haul)

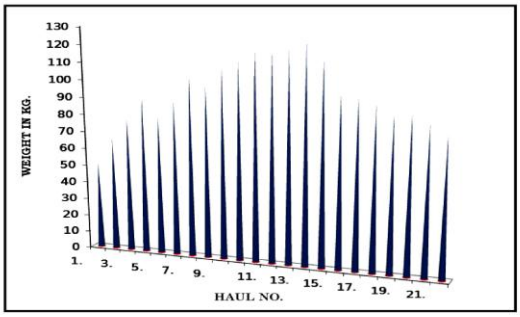

Fig-4.Total catch per haul obtained in artisanal estuarine winter migratory bag net (EWMBN)

Table 1. Total catch (by wt.) obtained during each haul of six (6) hours duration in artisanal estuarine winter migratory bag net during 2010- 11.

Haul No	Date of Sampling	Total catch (kg/haul)
1.	06.10.2010	50.75
2.	13.10.2010	65.50
3.	20.10.2010	78.00
4.	27.10.2010	90.50
5.	03.11.2010	80.59
6.	10.11.2010	90.90
7.	17.112010	104.00
8.	24.112010	100.50
9.	01.12.2010	108.52
10.	08.12.2010	115.45
11.	15.12.2010	120.15
12.	22.12.2010	120.96
13.	29.12. 2010	121.45
14.	05.01.2011	125.15
15.	12.01. 2011	118.35
16.	19.01. 2011	100.00
17.	26.01. 2011	99.45
18.	02.02. 2011	94.56
19.	09.02. 2011	89.90
20.	16.02. 2011	90.54
21.	23.02.011	86.45
22.	28.02. 2011	80.20
Average		**96.90**

The catch obtained in artisanal estuarine winter migratory bag net during period of study was grouped into finfishes, shellfishes and by-catches for the purpose of analysis. As a lower zone of estuary is a positive estuary of mixohaline type (according to Pantulu and Bhimachar[10]), the catches of this net had comprised 12 and 4 number of commercially important finfishes and shellfishes respectively. Among finfishes, twelve (12) number of finfishes namely *Harpadon neherus, Pama pama, Polynemus paradiseus, Ilisha megaloptera, Silago panijius, Trichiurus* spp., *Pampus argenteus, Chirocentrus dorab, Setipinna phasa, Coilia* spp., *Tachysurus jella* and *Osteogenious miletoris* are marine species and *Pangesius pangasius* is freshwater species. In shellfish group, 2 numbers of namely *Metapenaeus* spp. and *Peneaus* spp are marine forms of shrimp and other 2 number namely *Macrobrachum lamerri* and *M. mirable* are freshwater forms of prawns. The contribution of commercial groups of fin fishes to the total catch was 56.06 % in the existing winter migratory bag net. Bombay duck (*Harpadon neherus*) dominated the catch with 9.49%. Anchovy (*Setipinna phasa*) was the second most dominant species contributing around 7.56 % followed by *Trichiurus* spp. (6.77) and *Pama pama* (6.61). The catch of the shell fish group accounted 17.93 % only. The catch composition of *Metapenaeus* spp was 6.29 %. The *Penaeus* spp catch was 4.35 %. *Macrobrachium lamerri* and *M. mirable* also contributed to the total catch with 2.98 % and 4.31 % respectively (Table 2 and Fig.5).

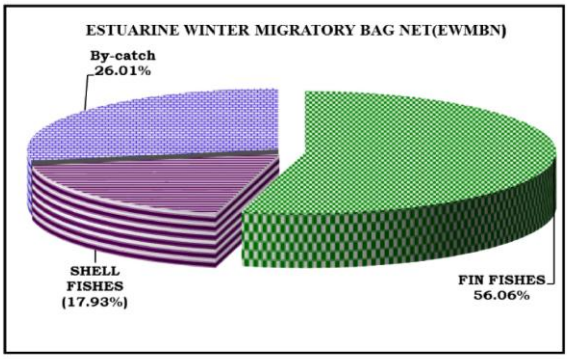

Fig-5.Proportion of finfishes, shellfishes and by-catch obtained in Artisanal estuarine winter migratory bag net (EWMBN)

Table 2. Percentage Composition of catch (by wt) obtained in artisanal EWMBN during 2010-11

Sl. No.	NAME OF FISHES	Wt. in kg	%
A	**FIN FISHES**		
1	***Bombay duck***		
	Harpadon nehereus	188.909	9.49
2	**Croakers (Sciaenids)**		
	Pama pama	131.481	6.61
3	**Threadfins (Polynemids)**		
	Polynemus paradiscus	99.223	4.99
4	**Shads (clupeids)**		
	Ilisha megaloptera	74.626	3.75
5	**Indian whitings (Silaos)**		
	Silago panijius	17.552	0.88
6	**Ribbon fishes**		
	Trichiurus spp	134.665	6.77
7	**Pomfrets**		
	Pampus argenteus	65.173	3.27
8	***Wolf herrings***		
	Chirocentrus dorab	34.778	1.75
9	**Anchovies**		
	a) *Setipinna phasa*	150.372	7.56
	b) Coilia spp	78.606	3.95
10	**Cat fishes**		
	a) *Tachysurus jella*	74.962	3.75
	b)Pangasius pangasius	32.835	1.65
	c) Osteogenious militoris	33.432	1.68
	Sub Total	**1115.614**	**56.01**
B.	***SHELL FISHES***		
	a) *Metapeaeus spp*	125.113	6.29
	b) *Peneaus spp.*	86.647	4.35
	c) *Macrobrachum* lamerri	59.402	2.98
	d) *M. mirable*	85.810	4.31
	Sub Total	**356.813**	**17.93**
C.	**Miscellaneous (By-catch)**	**517.608**	**26.04**
Grand Total (A+B+C)		**1990.035**	**100.00**

4. CONCLUSION

Many workers have reported similar species- wise catch composition during their exploitation of lower zone of estuary by winter migrating bag net[11;2and8] . The catching efficiency of the net was judged after testing the significant difference between catches obtained in artisanal winter migratory bag net during 2010 – 2011. This was done by Mann Whitney 'U' test[15; 1] .Analysis of variance technique as described by Daniel[1] was applied to test the difference between hauls with regards to catches. It can be seen that, there was no significant difference between the catches obtained in artisanal winter migratory bag net at 5% level. From the catches, this artisanal gear appears to be unselective one, catches more quantity of juveniles of finfishes and shellfishes in unmanaged way which is a serious issue of conservation and sustainability of resources concern. However, Since the rank of catches were higher in designed and fabricated artisanal winter migratory bag net during the year of investigation, it can be concluded that it had better catching efficiency as far as the total weight of the catch is concerned.

5. ACKNOWLEDGEMENTS

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