

## MARINE INVERTEBRATES OF DIGHA COAST AND SOME RECOMENDATIONS ON THEIR CONSERVATION

RAMAKRISHNA, JAYDIP SARKAR\* AND SHANKAR TALUKDAR

*Zoological Sruvey of India, M-Block, New Alipore, Kolkata 700 053, India*

### INTRODUCTION

The first study on marine fauna of Digha coast is known from the work of Bharati Goswami during 1975-87 (Bharati Goswami, 1992). Other workers, viz., Bairagi, Bhadra, Mukhopadhyaya, Misra, Reddy (1995); Subba Rao *et. al.*, (1992, 1995); Talukdar *et. al.*, (1996); Ramakrishna and Sarkar (1998); Sastry (1995, 1998) and Mitra *et. al.*, (2002) also reported some marine invertebrates under different faunal groups from Hughly-Matla estuary, including Digha. But uptil recently there is no comprehensive updated list of marine invertebrates from Digha coast and adjoining areas. With the establishment of Marine Aquarium and Research Centre, Digha in the year 1990, opportunity was launched for undertaking an extensive exploration and studying seasonal changes that have been taken place on the coastal biodiversity in this area. Accordingly, the authors of the present work, started collecting the detailed faunal information from Digha and adjoining coastal areas [Fig. 2 and 3].

During the study, it has transpired that exploitation of coastal resources has very abruptly increased in recent years. Several new fishing gears are employed, a number of new marine organisms are recognized as commercial fish and non fish resources. Also, the number of trawlers has increased to a large extent.

The present paper based on the observations from 1990 to 2000 (including the current records upto January, 2002), is an uptodate database for the available species of marine invertebrates from this area.

### MATERIALS AND METHODS

Digha is situated at 21° 36' 30" N latitude and 87° 32' E longitude and has a potential coast line of about 12 km. of its own (Udipore to Digha mohona), of which the western part (Udipore to Digha hospital ghat) is considered to be the accretion zone, whereas the eastern part (Sea Hawk ghat to Shankarpur) is considered as eroded zone.

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\*Department of Zoology, Charuchandra College, 22, Lake Road, Kolkata-700 029, West Bengal, India

The observation and collection of specimens for this work were made as follows :

1. Considering the diurnal catch pattern, daily collections were made from the fishing gears and also from discarded bycatch, cast off on beach [Fig. 4 and 5].
2. Spot collection of specimens and collection of necessary informations were made on weekly and fortnightly basis.
3. Collections were made from individuals cruises of fishing vessels of Shankarpur and Digha mohana.
4. Collections were also made from bag net or Bagda net (triangular net made for collection of post larva of *Penaeus monodon*), [Fig. 3].
5. Collection of rare specimens from fishermen and stray collections from auction yard of Digha mohona and Shankarpur fishing harbour were made.
6. Across and vertical survey of shore in different tide times for collections of shore animals of different habitat and niche was also undertaken.

#### AREAS OF COLLECTION (STUDY AREAS)

During this study, several areas were considered according to the local name of those areas; viz., Udiopore ghat; West Gadadharpur; Ongaria ghat; Bat tala ghat (New Digha ghat); Marine aquarium ghat (Hospital ghat); Old Digha ghat; Sea Hawk ghat; Gadadharpur; Digha mohona; Shankarpur; Jalda khoti; Dadanpatrabar and Junput (Fig-1).

These collecting localities cover the total shore length of about 40 km. The till date collection of different animal species available from the Digha beach and adjoining areas are charted in the form of a checklist (Table 1). Seasonal occurrence of some of the species is listed in Table 2.

**Table 1.** A checklist of invertebrate fauna of Digha coast and adjoining areas. (\* Reported for first time).

Scientific Name	Common Name
I. PHYLUM CNIDARIA	
Class HYDROZOA	
Order CHONDROPHORA	
Family PORPITIDAE	
1. <i>Porpita porpita</i> Linnaeus [Fig. 6]	Blue disc/blue dollar
Family VELELLIDAE	
*2. <i>Verella vellella</i> (Linnaeus) [Fig. 7]	
Order SIPHONOPHORA	
Family PHYSALIDAE	
3. <i>Physalia physalis</i> (Linnaeus).	Portuguese man-o-war.

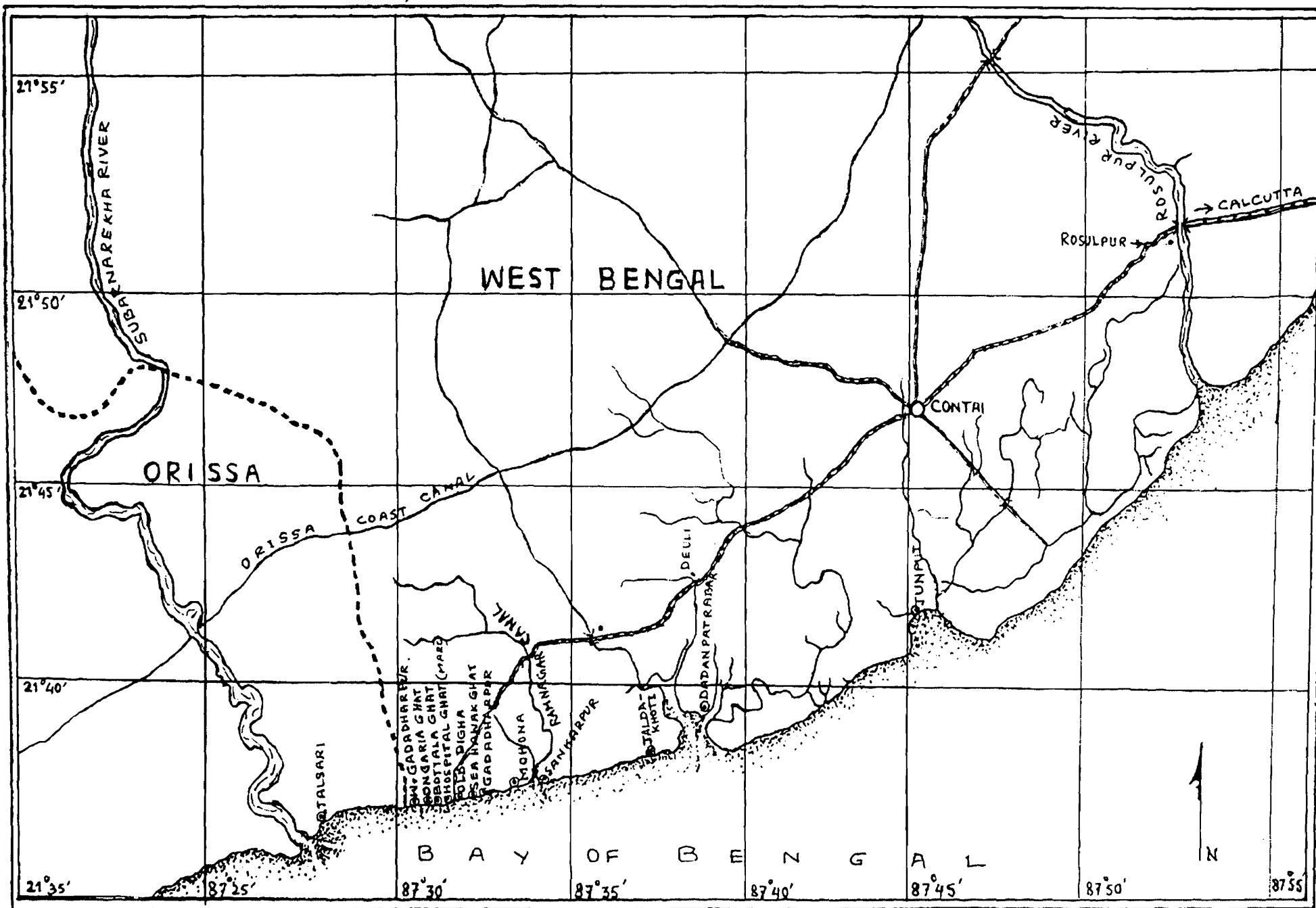


Fig. 1. : Diagrammatic map of the study area.

Family DIPHYIDAE	
4. <i>Diphyes bojani</i> (Chun).	
Order THECATA	
Family CAMPANULARIIDAE	
*5. <i>Obelia spinulosa</i> (Bell) [Fig. 8]	Sea fir.
Class SCYPHOZOA	
Order CORONATAE	
Family ATOLLIDAE	
*6. <i>Atolla wyvillei</i> Haeckel.	Medusa/jellyfish.
Order SEMAEOSTOMAE	
Family CYANEIDAE	
*7. <i>Cyanea purpurea</i> Kishinouye.	do
Order RHIZOSTOMEAE	
Family CATOSTYLIDAE	
8. <i>Acromitus flagellatus</i> (Maas).	do
9. <i>A. rabanchatu</i> Annandale [Fig. 9]	do
*10. <i>Crambionella annandalei</i> Rao.	do
Family CEPHEIDAE	
*11. <i>Netrostoma typhlodendrium</i> Schultz.	do
Family CASSIOPEIDAE	
*12. <i>Cassiopea andromeda</i> (Forskal).	do
Family VERSURIGIDAE	
*13. <i>Versuriga anadyomene</i> (Maas)	do
Class ANTHOZOA	
Subclass HEXACORALLIA	
Order ACTINARIA	
Family EDWARDSIIDAE	
14. <i>Edwardsia tinctoria</i> Annandale	Sea anemone.
15. <i>Halianthus limnicola</i> Annandale	do
Family HALOCLAVIDAE	
16. <i>Metapeachia tropica</i> (Panikkar)	do
Family HALIACTIDAE	
17. <i>Pelocoetes exul</i> Annandale.	do
18. <i>Phytocoetes gangeticus</i> Annandale.	do
19. <i>P. chilkaeus</i> Annandale.	do

Family HALCAMPACTIIDAE	
20. <i>Phytocoeteopsis ranwanii</i> Panikkar.	do
Family ACTINIIDAE	
21. <i>Anemonia</i> sp.	Snake lock sea anemone
22. <i>Paracondylactis indicus</i> Dave [Fig. 10]	Sea anemone
23. <i>Gyrostoma glaucus</i> Annandale.	do
Family METRIDIIDAE	
24. <i>Metridium schillerianum</i> (Stoliczka)	Plumose anemone
Subclass OCTOCORALLIA	
Order PENNATULACEA	
Family VERETILLIDAE	
25. <i>Cavernularia elegans</i> Herklots	Sea pansy/Sagar Kadamba <sup>†</sup>
26. <i>C. obesa</i> Valenciennes.	do
27. <i>C. lutkenii</i> Kolliker	do
28. <i>C. orientalis</i> Thompson & Simpson.	do
Family VIRGULARIIDAE	
29. <i>Virgularia elegans</i> Gray.	Walking stick (Sea pen)
Family PTEROEIDIDAE	
*30. <i>Pteroeides esperi</i> Herklots [Fig. 11]	Feathered Sea pen/Sea feather
II. PHYLUM CTENOPHORA	
Class TENTACULATA	
Order CYDIPPIDA	
Family PLEUROBRACHIDAE	
31. <i>Pleurobrachia globosa</i> Mosser [Fig. 12]	Sea gooseberry.
Class NUDA	
Order BEROIDA	
Family BEROIDAE	
*32. <i>Beroe</i> sp. [Fig. 13]	Comb jelly
III. PHYLUM ANNELIDA	
Class POLYCHAETA	
Family POLYNOIDAE	
33. <i>Lepidonotus tenuisetosus</i> (Gravier)	Scale worm.
34. <i>Gaudichaudius cimex</i> (Quatrafages)	do

<sup>†</sup>According to (Prof.) Dr. Amallesh Choudhury, Dept. Marine Science, Calcutta University.

Family AMPHINOMIDAE	
35. <i>Chloeia parva</i> Baird [Fig. 14]	Fire worm
36. <i>C. rosea</i> Potts.	do
Family NEREIDIDAE	
37. <i>Nereis chingrighattensis</i> Fauvel.	Rag worm or Sand worm
38. <i>N. chilkaensis</i> Southern	do
39. <i>Perinereis nuntia</i> (Savigny) var. <i>heterodonta</i> Gravier.	
40. <i>P. nuntia</i> (Savigny) var. <i>brevicirris</i> (Grube).	
41. <i>P. nuntia</i> var. <i>typica</i> Savigny.	
42. <i>P. cultrifera</i> Grube.	
43. <i>P. nigropunctata</i> Horst.	
44. <i>Dendronereis heteropoda</i> Southern.	
45. <i>Namalyeastis fauveli</i> Rao.	
46. <i>Ceratonereis burmensis</i> Monro.	
Family EUNICIDAE	
47. <i>Marphysa graveleyi</i> Southern.	Rock worm
Family ONUPHIDAE	
*48. <i>Onuphis emerita</i> Annandale & M. Edwards	
49. <i>Diopatra neopolitana</i> delle Chiaje.	
50. <i>D. cuprea</i> (Bosc).	
Family LUMBRINERIDAE	
51. <i>Lumbriconereis heteropoda</i> Morenzeller.	
52. <i>L. notocirrata</i> Fauvel.	
Family NEPTHYDIDAE	
53. <i>Nepthys dibranchis</i> Grube.	
54. <i>N. oligobranchia</i> Southern	
Family SPIONIDAE	
55. <i>Polydora ciliata</i> Johnston.	Spiroid worm
Family OWENIIDAE	
*56. <i>Owenia fusiformis</i> delle Chiaje.	
Family GLYCERIDAE	
*57. <i>Glycera alba</i> (Muller).	
*58. <i>G. convoluta</i> Keferstein.	
Family TERESELLIDAE	
*59. <i>Loimia medusa</i> (Savigny)	

Family MALDANIDAE	
60. <i>Euclymene annandalae</i> Southern.	
Family PHYLLODOCIDAE	
*61. <i>Etone barantollae</i> Fauvel.	
Family HESIONIDAE	
*62. <i>Telashapia annandalei</i> Fauvel.	
IV. PHYLUM ECHIURA	
Class ECHIURIDA	
Order ECHIUROINEA	
Family THALASSEMATIDAE	
Subfamily THALASSEMATINAE	
63. <i>Anelassorhynchus branchiorhynchus</i> (Annandale & Kemp)	
64. <i>A. dendrorhynchus</i> (Annandale & Kemp)	
65. <i>A. microrhynchus</i> (Prasad)	
V. PHYLUM ARTHROPODA	
Class CRUSTACEA	
Subclass CIRRIPIEDIA	
Order THORACICA	
Family BALANIDAE	
66. <i>Balanus amphitrite</i> Darwin.	Acorn barnacle
*67. <i>Balanus variegatus</i> (Darwin)	do
*68. <i>Megabalanus tintinnabulum</i> Newman & Ross	Giant Acorn barnacle
Family CHTHAMALIDAE	
69. <i>Chthamalus stellatus</i> (Poli) [Fig. 20]	Star barnacle
Family LEPADIDAE	
*70. <i>Lepas anatifera indica</i> Annandale.	Goose barnacle
Family POECILASMATIDAE	
*71. <i>Octolasmis warwickii</i> Gray [Fig. 21]	do
Subclass MALACOSTRACA	
Order STOMATOPODA	
Family SQUILLIDAE	
72. <i>Squilla nepa</i> Laterille.	Mantis shrimp
73. <i>Oratosquilla interrupta</i> (Kemp)	
74. <i>Harpiosquilla raphidea</i> (Fabricius)	
75. <i>Gonadactylus chiracra</i> (Fabricius).	

Order MYSIDACEA	
Family MYSIDACEDAE	
76. <i>Rhopalophthalmus egregius</i> Hansen.	Mysis
77. <i>Castrosaccus muticus</i> Tattersall.	
78. <i>Macropsis orientalis</i> Tattersall.	
Order AMPHIPODA	
Family PHOTIDAE	
79. <i>Cleantis natalensis</i> Barnard.	
Order ISOPODA	
Family IDOTEIDAE	
80. <i>Chetriphotis megacheles</i> (Giles)	
Family BOPIRIDAE	
81. <i>Bopyrus</i> sp.	Parasitic Isopod
Family CYMOTHOIDAE	
82. <i>Nerocila serra</i> (Schioedt & Meinrt)	
Family LIGIIDAE	
83. <i>Ligia exotica</i> Roux.	Beach wood louse
Order DECAPODA	
Family SCYLLARIDAE	
84. <i>Thenus orientalis</i> (Lund) [Fig. 21]	Flat-head locust lobster
Family PALINURIDAE	
85. <i>Panulirus polyphagus</i> (Herbst)	Mud spiny lobster
86. <i>P. ornatus</i> (Fabricius)	Ornate spiny lobster
Family ALPHEIDAE	
87. <i>Alpheus euphrosyne</i> De man.	Snapping shrimp
88. <i>A. malabaricus</i> Fabricius	do
Family HIPPOLYTIDAE	
89. <i>Exhippolysmata ensirostris</i> (Kemp)	Hunter shrimp
90. <i>Saron marmoretus</i> (Oliver)	do
Family PALAEMONIDAE	
91. <i>Expalaemon styliferus</i> (H. Milne Edwards)	Rashna prawn
92. <i>Macrobrachium equidens</i> (Dana)	Rough river prawn
93. <i>M. malcolmsonni</i> (H. Milne Edwards)	Monsoon river prawn
94. <i>M. rosenbergii</i> De Man.	Giant river prawn
95. <i>M. rude</i> (Heller)	Hairy river prawn



96. <i>M. scabriculum</i> (Heller)	Prawn
97. <i>M. mirabile</i> (Kemp)	
98. <i>M. villosimanus</i> Tiwari.	
99. <i>M. lamarrai</i> (H. Milne Edwards)	
100. <i>Nematopalaemon teuipes</i> (Henderson)	Spider prawn
Family PENAEIDAE	
101. <i>Atyopopenaeus stenodactylus</i> (Stimpson)	Periscope shrimp
102. <i>Metapenaeus brevicornis</i> (H. Milne Edwards)	Yellow shrimp
103. <i>M. affinis</i> (H. Milne Edwards)	Jhinga shrimp
104. <i>M. dobsoni</i> (Miers)	Kadal shrimp
105. <i>M. lysianassa</i> (De Man)	Bird shrimp
106. <i>M. monoceros</i> (Fabricius)	Spected shrimp
107. <i>Parapenaeopsis occlivirostris</i> Alcock.	Hawknosed shrimp
108. <i>P. coromandelica</i> Alcock.	Coromandel shrimp
109. <i>P. sculptilis</i> (Heller)	Rainbow shrimp
110. <i>P. maxillipeda</i> Alcock.	Torpedo shrimp
111. <i>P. uncta</i> Alcock.	Uncta shrimp
112. <i>P. longipes</i> Alcock	Flamingo shrimp
113. <i>P. stylifera</i> (H. Milne Edwards)	
114. <i>P. hardwickii</i> (Miers)	
115. <i>Penaeus indicus</i> H. Milne Edwards.	Indian white shrimp
116. <i>P. canaliculatus</i> (Oliver)	Witch prawn
117. <i>P. monodon</i> (Fabricius)	Giant tiger prawn
118. <i>P. semisulcatus</i> De Haan.	Green tiger prawn
119. <i>P. japonicus</i> Bate.	
120. <i>P. merguensis</i> De Mann.	Banana prawn
121. <i>P. penicillatus</i> Alcock.	
122. <i>Trachypenaeus curvirostris</i> (Stimpson)	Southern rough shrimp
Family SERGESTIDAE	
123. <i>Acetes indicus</i> H. Milne Edwards	Sergested shrimp
124. <i>A. erythraeus</i> Nobilis.	
Family SOLENOCERIDAE	
125. <i>Solenocera choprai</i> Nataraj.	Ridge back shrimp
126. <i>S. indica</i> Nataraj.	
127. <i>S. crassicornis</i> (H. Milne Edwards)	Coastal mud shrimp

Family DIOGENIDAE	
128. <i>Diogenes custus</i> (Fabricius)	Hermit crab
129. <i>D. miles</i> (Herbst)	do
130. <i>D. affinis</i> (Henderson)	do
131. <i>D. platimanus</i> Henderson.	do
132. <i>D. averus</i> Heller.	do
133. <i>D. rectimanus</i> Meirs.	Hermit crab
134. <i>D. costatus</i> Henderson.	do
135. <i>D. investigatoris</i> Alcock.	do
136. <i>Dardanus hessii</i> Meirs.	do
137. <i>Clibanarius padavensis</i> De Man.	do
138. <i>C. clibanarius</i> (Herbst)	do
139. <i>C. infraspinatus</i> Hilgendorf.	do
140. <i>C. olivaceus</i> Henderson	do
Family COENOBITIDAE	
*141. <i>Coenobita cavipes</i> Stimpson [Fig. 22]	do
Family DORIPPIDAE	
142. <i>Dorippe faechino</i> De Hann.	Crab
Family MATUTIDAE	
143. <i>Matuta victor</i> Fabricius.	Swimming crab
Family PORTUNIDAE	
144. <i>Portunus sanguinolentus</i> (Herbst) [Fig. 15]	Three-spotted crab
145. <i>P. pelagicus</i> (Linnaeus)	Blue crab or Neptune crab
146. <i>Charybdis affinis</i> Dana.	Cross & Angle crab
147. <i>C. quadrimaculata</i> A.M. Edwards	
148. <i>C. elongatus</i> A.M. Edwards	
149. <i>C. crucifera</i> A.M. Edwards [Fig. 16]	
150. <i>Scylla serrata</i> De Haan.	Giant Mud crab
Family MAIIDAE	
*151. <i>Doclea hybrida</i> (Fabricius)	
Family OCYPODIDAE	
152. <i>Ocypoda macrocera</i> H.Milne Edwards [Fig. 17]	Red crab or racing crab
153. <i>O. ceratophthalma</i> (Palas)	Ghost crab
154. <i>Macrophthalmus sulcatus</i> M. Edward	
155. <i>M. transversus</i> (Latreille)	

156. <i>M. pectinipes</i> Guerin.	
157. <i>M. depressus</i> Ruppel.	
158. <i>U. (Celuca) triangularis bengali</i> Crane [Fig. 18]	Fiddler crab/Dhobi crab
159. <i>Uca (Celuca) lactea annulipes</i> (M. Edward) [Fig. 19]	do
160. <i>U. (Deltuca) rosea</i> (Tweedie)	do
161. <i>U. acuteus</i> Stimpson.	do
162. <i>Dotilla inermis</i> De Man.	Soldier crab
Class MEROSTOMATA	
Order XIPHOSURIDA	
Family XIPHOSURIDAE	
163. <i>Tachypleus gigas</i> (Muller)	Horse-shoe crab
164. <i>Carcinoscorpius rotundicauda</i> (Latreille) [Fig. 23]	Smooth-tailed Horse-shoe crab
VI. PHYLUM MOLLUSCA	
Class SCAPHOPODA	
Family SIPHONODONTALIIDAE	
165. <i>Cadulus clavatum</i> (Gould)	Tusk shell
Family DENTALIIDAE	
166. <i>Dentalium variable</i> Deshayes	Tooth shell
167. <i>D. octangulatum</i> Donovan	do
Class GASTROPODA	
Order ARCHAEOGASTROPODA	
Family FISSURELLIDAE	
168. <i>Scutus abnormis</i> Nevill	
Family TROCHIDAE	
169. <i>Umbonium vestiarius</i> (Linnaeus)	Button shell
Family TURBINIDAE	
170. <i>Turbo brunneus</i> (Roeding)	Turban shell
Family NERITIDAE	
171. <i>Nerita (Amphinerita) lineata</i> Gmelin	Nerite shell
172. <i>Nerita (Theliostyla) chamaeleon</i> Linnaeus	do
173. <i>N. undata</i> Linnaeus	do
174. <i>Neritina (Dostina) violacea</i> (Gmelin)	
Order MESOGASTROPODA	
Family LITTORINIDAE	
175. <i>Littorina (Littorina) undulata</i> (Gray)	Periwinkle
176. <i>Littorina (Littorinopsis) melanostoma</i> Gray	do
177. <i>Littorina (Littorinopsis) scabra scabra</i> (Linnaeus)	do

Family TURRITELLIDAE	
178. <i>Turritella attenuata</i> Reeve	Turret shell/Screw shell
Family POTAMIDIDAE	
179. <i>Cerithidea (Cerithideopsis) cingulata</i> (Gmelin)	Horn shell
180. <i>Cerithidea (Cerithidea) obtusa</i> Lamarck	do
181. <i>Telescopium (Telescopium) telescopium</i> Montfort	
Family EPITONIIDAE	
182. <i>Acrilla gracilis</i> (Sowerby)	
Family CYPRAEIDAE	
183. <i>Monetaria moneta</i> (Linnaeus)	Cowrie
184. <i>Ornamentaria annulus</i> Linnaeus	Gold ringer/Ringed money cowrie
Family NATICIDAE	
185. <i>Natica chemnitaii</i> Reclutz	Moon shell
186. <i>N. lineata</i> Lammarck	Lined Moon
187. <i>N. petuvariana</i> (Reclutz)	
188. <i>N. globosa</i> Chemnitz	
189. <i>N. vitellus</i> (Linnaeus)	Banded moon
190. <i>N. maculosa</i> (Lamarck)	
191. <i>N. tigrina</i> (Roeding)	
192. <i>N. gualteriana</i> Reclutz	
193. <i>Sinum neritoideum</i> (Linnaeus)	
194. <i>Polinices mammilla</i> (Linnaeus)	
195. <i>P. tumidus</i> (Roeding)	
196. <i>P. dydima</i> (Swainson)	
Family ARCHITECTONICIDAE	
197. <i>Architectonica perspectiva</i> (Linnaeus)	Sun-dial shell
Family THIARIDAE	
198. <i>Larnia burmana</i> (Blanford)	
Family EULIMIDAE	
199. <i>Nisso pyrramidelloides</i> G & H Nevill	
200. <i>Eulima cuspidata</i> A. Adams	
Family BURSIDAE	
201. <i>Bursa spinosa</i> (Lamarck)	Long-spined Frog shell
202. <i>B. rana</i> (Linnaeus)	Frog shell

Family TONNIDAE	
203. <i>Tonna maculata</i> (Lamarck)	Tun shell
204. <i>T. dolium</i> (Linnaeus)	do
205. <i>T. sulcosa</i> (Born)	do
Family FICIDAE	
*206. <i>Ficus gracilis</i> (Sowerby)	Graceful Fig
*207. <i>F. variegata</i> Roeding	Variegated Fig
Order NEOGASTROPODA	
Family MURICIDAE	
208. <i>Murex tribulus</i> Linnaeus	Rock shell
209. <i>Rapana rapiformis</i> (Born)	
210. <i>Cymia lacera</i> (Borne)	
Family THAIDIDAE	
211. <i>Thais bufo</i> (Lamarck)	
212. <i>T. carinifera</i> (Lamarck)	
213. <i>Cuma disjuncta</i> Annandale	
Family MELONGENIDAE	
214. <i>Semifusus pugilinus</i>	Crown Conch
215. <i>Pugilinus cochlidium</i> (Linnaeus)	
Family NASSARIIDAE	
216. <i>Nassarius foveolatus</i> (Dunker, Reeve)	Mud-flat snail
217. <i>N. stolatus</i> (Gmelin)	
Family OLIVIDAE	
218. <i>Oliva ispodula</i> Linnaeus	Olive shell
219. <i>O. vidua</i> (Roeding)	
220. <i>Olivancillaria gibbosa</i> (Borne)	Globular'Olive
221. <i>Amalda ampla</i> (Gmelin)	
Family TURRIDAE	
222. <i>Drillia crenularis</i> (Lamarck)	Turrid shell
223. <i>Turricula javana</i> (Linnaeus)	
224. <i>Turridrupa bijubata</i> (Reeve)	
225. <i>Brachytoma crenularis</i> (Lamarck)	
Family TEREBRIDAE	
226. <i>Terebra durgella</i> Ray	Augur shell
227. <i>T. tenera</i> Hinds	do
228. <i>T. tricincta</i> Smith	do

Family CANCELLARIIDAE	
229. <i>Scalptia scalariformis</i> (Lamarck)	
Family MARGINELLIDAE	
230. <i>Persicula ventricosa</i> (Fischer)	
Order ENTAMOTAENIATA	
Family PYRAMIDELLIDAE	
231. <i>Pyramidella dolabrata terebellum</i> (Mueller)	
232. <i>Turbonilla felicitata</i> Laseron	
233. <i>Odostomia oxia</i> Watson	
234. <i>O. babylonica</i> Winkleworth	
Family RINGICULIDAE	
235. <i>Ringicula encarpiferens</i> de Folin	
236. <i>R. propinquans</i> Hinds	
Family CYLICHNIDAE	
237. <i>Cylichna protracta</i> Gould	
Family RETUSIDAE	
238. <i>Retusa pyramidata</i> (A. Adams)	
Family AGLAJIDAE	
*239. <i>Melanochlamys</i> sp. [Fig. 25]	Black Sea-slug
Order ARCHITECTONOIDEA	
Family AMATHINIDAE	
*240. <i>Amathina tricarinata</i> (Linnaeus) [Fig. 24]	Limpet
Order NOTAPSIDEA	
Family PLEUROBRANCHIDAE	
241. <i>Pleurobranchea</i> sp.	
Order NUDIBRANCHIA	
Family ARMINIDAE	
242. <i>Armina (Pleurophyllidia)</i> sp.	
Family POLYCERIDAE	
243. <i>Kalinga ornata</i> Alder & Hancock.	
Order BASOMATOPHORA	
Family ELLOBIIDAE	
244. <i>Elobium gangeticum</i> (L. Pfeiffer)	
245. <i>Cassidula nucleus</i> Mortyn.	
246. <i>Pythia plicata</i> Ferussac	

Order SOLEOLIFERA	
Family ONCHIDIIDAE	
*247. <i>Onchidium typhae</i> Buchannan	
Class BIVALVIA	
Order ARCOIDA	
Family ARCIDAE	
248. <i>Anadara inequivalvis</i> (Bruguiere)	Ark shell
249. <i>A. granosa</i> (Linnaeus)	do
250. <i>Scapharca deyrollei</i> Jousneume	
251. <i>S. inequivalvis</i> (Bruguiere)	
Order MYTILOIDA	
Family MYTILIDAE	
252. <i>Perna viridis</i> (Linnaeus) [Fig. 27]	Green Mussel
253. <i>Modiolus tulipa</i> (Lamarck)	Horse Mussel
254. <i>M. striatulus</i> (Henley)	do
Family PINNIDAE	
*255. <i>Pinna (Atrina) pectinata pectinata</i> Linnaeus	Pen shell
Order PTEROIDA	
Family ANOMIIDAE	
256. <i>Anomia achaeus</i> Gray	Jingle shell
Order OSTREOIDA	
Family PECTINIDAE	
257. <i>Pecten (Chlamys) tranquebarica</i> (Gmelin)	Scalop
Family OSTREIDAE	
258. <i>Crassostrea gryphoides</i> (Schlotheim)	Giant Rock oyster
259. <i>C. mytiloides</i> (Lamarck)	Rock oyster
260. <i>C. dentculata</i> Borne	do
261. <i>C. imbricata</i> (Lamarck)	do
262. <i>C. madrasensis</i> Preston	do
263. <i>Saccostrea cucullata</i> (Born)	do
Order VENEROIDA	
Family CARDIIDAE	
264. <i>Cardium coronatum</i> Splengler	Cockle
265. <i>C. asiaticum</i> Bruguiere	do
Family VENERIDAE	
266. <i>Meretrix meretrix</i> (Linnaeus)	
267. <i>Sunetta scripta</i> (Linnaeus)	

268. <i>Pelecyora trigona</i> Reeve	
269. <i>Paphia textilis</i> (Gmelin)	
270. <i>P. malabarica</i> (Schroeter)	
271. <i>Timoclea (Glycodonta) imbricata</i> (Sowerby)	
Family MACTRIDAE	
272. <i>Mactra elegans</i> Sowerby	Surf clam
273. <i>Mactra violacea</i> Gmelin	do
274. <i>Mactra (Coelomacra) turgida</i> Gmelin	do
275. <i>Mactra (Mactrinula) luzonica</i> Deshayes	do
276. <i>Mactra (Mactrinula) mera</i> Deshayes	do
277. <i>Mactra (Mactrinula) plicataria</i> Linnaeus	do
278. <i>Standella pellucida</i> (Chemnitz)	
Family CULTELLIDAE	
279. <i>Pharella javanicus</i> (Lamarck)	
280. <i>Siliqua radiata</i> (Linnaeus) [Fig. 26]	Sunset shell
281. <i>S. albida</i> Dunker	
Family PSAMMOBIIDAE	
282. <i>Sanguinolaria (Soletellina) acuminata</i> Deshayes	
Family CORBICULIDAE	
283. <i>Polymesoda (Gelonia) bengalensis</i> (Lamarck)	
Family DONACIDAE	
284. <i>Donax (Hecuba) scortum</i> Linnaeus	Wedge Clam/Leather Donax
285. <i>Donax (Latona) incarnatus</i> Gmelin	
286. <i>D. lubricus</i> Henley	
Family TELLINIDAE	
287. <i>Tellina angulata</i> Linnaeus	Tellin shell
288. <i>T. sinuata</i> Scenger	
289. <i>T. planissima</i> Anton	
290. <i>Strigilla splendida</i> (Anton)	
291. <i>Macoma birmanica</i> (Philippi)	
292. <i>Macoma (Psammacoma) truncata</i> (Jones)	
293. <i>Apolymetis edentula</i> Spengler.	
Order ADAPEDONTA	
Family SOLENIDAE	
294. <i>Solen brevis</i> Gray	
Family GLAUCONOMIDAE	
295. <i>Glaucanome orientalis</i> (Gmelin)	



Order MYOIDA	
Family PHOLADIDAE	
296. <i>Pholas orientalis</i> (Gmelin)	Boring clam
297. <i>P. candida</i> Linnaeus.	do
298. <i>Martesia vivicola</i> Sowerby	
299. <i>Barnea candida</i> (Linnaeus)	
Family TEREDIIDAE	
300. <i>Teredo clava</i> Gmelin.	Wood-boring shipworm
Order PHOLADOMYOIDA	
Family PANDORIDAE	
301. <i>Pandora obtusa</i> Leach.	
302. <i>P. ceylonica</i> Sowerby	
Family LATERNULIDAE	
303. <i>Laternula truncata</i> (Lamarck)	
Class CEPHALOPODA	
Order SEPIOIDEA	
Family SEPIIDAE	
304. <i>Sepiella inermis</i> (Ferussac & Orbigny) [Fig. 28]	Spineless cuttlefish
305. <i>S. aculeata</i> Orbigny.	Spined cuttlefish
*306. <i>Sepia pharaonis</i> Ehrenberg.	Stripped cuttlefish
Order TEUTHOIDEA	
Family LOLIGINIDAE	
307. <i>Loliolus investigatoris</i> Goodrich [Fig. 29]	Squid
308. <i>Loligo duvauceli</i> Orbigny.	do
*309. <i>L. bengalensis</i> Jothynayagam.	do
310. <i>Doryteuthis singhalensis</i> Ortmann.	White squid
Order OCTOPODA	DEVIL FISH
Family OCTOPODIDAE	
311. <i>Octopus globosus</i> (Appelloef)	Globe octopus
*312. <i>O. rugosus</i> Bose.	
*313. <i>O. macropus</i> Risso.	
VII. PHYLUM BRACHIOPODA	
Class INARTICULATA	
Family LINGULIDAE	
314. <i>Lingula anatina</i> Lamarck [Fig. 34]	Lamp shell
VIII. PHYLUM PHORONIDA	
315. <i>Phoronis bhadurai</i> Ganguly & Majumdar	

IX. PHYLUM ECHINODERMATA	
Class HOLOTHUROIDEA	
Order DENDROCHIROTIDA	
Family CUCUMARIIDAE	
316. <i>Thorsonia investigatoris</i> (Koehler & Vaney) [Fig. 32]	“U” shaped Sea cucumber
Order MOLPADIA	
Family MOLPADIDAE	
317. <i>Molpadia musculus</i> (Risso)	Sea cucumber
Family CAUDINIDAE	
318. <i>Acaudina molpadioides</i> (Semper)	do
Class ASTEROIDEA	
Order PAXILLOSIDA	
Family ASTROPECTINIDAE	
319. <i>Astropecten euryacanthus</i> Luetken [Fig. 30]	Feathered-arm Sea-star
320. <i>A. indicus</i> Doederlein.	Burrowing starfish
321. <i>A. mauritanus</i> Gray.	Sea star
Family GONIASTERIDAE	
322. <i>Goniodiscaster vallei</i> (Koehler)	do
323. <i>Stellaster equestris</i> (Retzius)	do
Class OPHIUROIDEA	
Order OPHIURIDA	
Family OPHIACTIDAE	
324. <i>Ophiactis delagoa</i> Balinsky.	Brittle star
325. <i>O. modesta</i> Brock.	do
Family OPHIOTRICHIDAE	
*326. <i>Ophiocnemis marmorata</i> (Lamarck) [Fig. 31]	do
327. <i>Macrophiothrix longipede</i> (Lamarck)	do
Class ECHINOIDEA	
Order TEMNOPLEUROIDA	
Family TEMNOPLEURIDAE	
328. <i>Temnopleurus toreumaticus</i> (Leske) [Fig. 33]	Small Sea urchin
Order CLYPEASTEROIDA	
Family CLYPEASTERIDAE	
*329. <i>Clypeaster rarispinus</i> de Meijere	Sand dollar
Family LAGANIDAE	
*330. <i>Lagemum decagonale</i> (de Blainville)	do
Family ASTRICLYPEIDAE	
*331. <i>Echinodiscus auritus</i> Leske [Fig. 35]	do

**Table 2.** : Seasonal occurrence of major invertebrates, recorded at Digha-Shankarpur-Junput coast.

Major Groups & Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
CNIDARIA :												
<i>Porpita porpita</i> & <i>Velella velella</i>	-	-	-	+	+	-	-	-	-	-	-	-
SIPHONOPHORES	+	+	+	-	-	-	-	-	-	-	-	+
<i>Physalia physalis</i>	-	-	-	+	+	-	-	-	-	-	-	-
JELLY FISHES :	+	+	+	+	-	-	-	+	+	+	-	+
SEA ANEMONES :	+	+	+	+	+	+	+	+	+	+	+	+
SEA PENS :	+	+	+	+	-	-	-	-	-	-	-	+
CTENOPHORES :	+	+	+	+	-	-	-	-	-	-	-	+
POLYCHAETES :	+	+	+	+	+	+	+	+	+	+	+	+
ECHIURIDS :	+	+	+	+	+	-	-	-	-	-	-	+
CRUSTACEA :												
Acorn Barnacles :	+	+	+	+	+	+	+	+	+	+	+	+
Goose Barnacles :	+	+	+	-	-	-	-	-	-	+	+	+
<i>Squilla</i> sp.	+	+	+	+	+	+	+	+	+	+	+	+
ISOPODS :	+	+	+	+	+	+	+	+	+	+	+	+
PRAWNS :	+	+	+	+	+	+	+	+	+	+	+	+
HERMIT CRABS :	+	+	+	+	+	+	+	+	+	+	+	+
Other CRABS :	+	+	+	+	+	+	+	+	+	+	+	+
HORSE-SHOE CRABS:	+	+	+	+	+	-	-	-	-	-	+	+
Trilobite larva :	+	+	+	+	+	-	-	-	-	-	-	+
MOLLUSCA :												
SCAPHOPODS :	+	+	+	-	-	-	-	-	-	-	-	+
<i>Umbonium vestiarius</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Turbo brunneus</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Littorina</i> spp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Nerrita</i> spp.	+	+	+	+	+	+	+	+	+	+	+	+

Table 2. : (Cont'd.).

Major Groups & Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
<i>Natica</i> spp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Acrilla</i> spp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Tonna</i> spp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Murex tribulus</i> :	+	+	+	+	+	+	+	+	+	+	+	+
<i>Polinices</i> spp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Cerithidia</i> spp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Amalda ampala</i> .	+	+	+	+	-	-	-	-	+	+	+	+
NUDIBRANCHS :	+	+	+	+	-	-	-	-	-	+	+	+
<i>Perna viridis</i>	+	+	+	+	-	-	-	-	-	-	+	+
<i>Crassostraea</i> spp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Macra</i> spp.	+	+	+	+	+	+	+	+	+	+	+	+
<i>Macoma</i> spp.	+	+	+	+	+	-	-	-	-	+	+	+
<i>Donax</i> spp.	+	+	+	+	+	+	-	-	-	+	+	+
SQUIDS :	+	+	+	+	+	-	-	-	+	+	+	+
CUTTLE FISHES :	+	+	+	+	+	-	-	-	+	+	+	+
<i>Octopus</i> spp.	+	+	+	-	-	-	-	-	-	-	-	+
BRACHIOPODS :	+	+	+	+	-	-	-	-	-	-	-	+
PHORONIDS :	+	+	+	-	-	-	-	-	-	-	-	+
ECHINODERMATA												
Star Fishes	+	+	+	+	+	-	-	-	-	+	+	+
Brittle Stars :	+	+	+	-	-	-	-	-	-	-	+	+
<i>Temnopleurus toreumaticus</i> :(URCHIN)	+	+	+	-	-	-	-	-	-	-	+	+
Sea Cucumbers :	+	+	+	+	+	+	-	-	+	+	+	+

[+ Available, - Not recorded]

## SUMMARY OF OBSERVATIONS

In this study a total of 331 species under 207 genera, 137 families, 44 orders, 4 subclasses, 18 classes and 9 phyla have been counted.

The multidirectional observations across the coastal environment indicate that over the last ten years certain fauna (*Paracondylactis indica*, *Virgularia elegans*, *Pteroeides esperi*, *Ocypoda macrocera*, *Carcinoscorpius rotundicauda*, *Tachypleus gigas*, *Dentalium* spp., most of the nudibranchs, *Perna viridis*, *Pecten*, *Lingula anatina*, *Astropecten euryacanthus*, *Goniodiscaster vallei* and *Temnopleurus toreumaticus*) have become rare due to overexploitation of the marine biological resources, while others, formerly unrecorded (37 species) from this area, have been collected and identified (\* marked).

Beside these, one species of mole crab (*Alburnia* sp.), a burrowing decapod; one species of nudibranch and one species of bryozoa (*Membranipora* sp.) are also collected by authors, but failed to identify properly during this study.

It is also observed that, *Amalda ampla*, is also being increasingly threatened in Digha coast due to uncontrolled collection of live specimen by local women for some ornamental purposes.

The present record of *Cadulus clavatum* and *Stellaster equestris* are based only upon the previous record (Goswami, 1992; Subba Rao, *et al.*, 1992 and Sastry, 1998 respectively). No live specimen, neither a single shell have not been found.

Since Digha beach became familiar, large number of visitors came for pleasure trip and also for zoological excursions. Very often they continued their works while collecting a large number of specimens. Simultaneously, they also collected a number of species which are now rare due to destruction of their habitat and over exploitation.

With this, the recent development of aquaculture has introduced a new economic group along with fishermen and their daily activities destroy a good numbers of invertebrates (including their egg capsules) and also the fish spawn at the time of collecting the post larva of tiger shrimp (*Penaeus monodon*) [Fig. 3, 4 and 5].

In view of faunal richness which is now threatened by exploitation of marine fishery resources, tourism without ecofriendly awareness and overall socio-economic development, this coastal zone demands more protective measures.

## RECOMMENDATIONS REGARDING CONSERVATION OF BIODIVERSITY

1. A programme for the awareness of fishermen, tourists, collectors of zoological samples has to be undertaken, as the fishermen and also the over-enthusiastic tourists destroy the living organism (with or without their knowledge).
2. Restrictions must be imposed on fishing activities except permicible seasons, and also on the mesh size of fishing nets.

3. Dragging on intertidal areas is to be banned or restricted and selective sorting and releasing of bycatch organisms in the sea before their death must be made compulsory.
4. Overexploitation by repeatedly collecting the same organisms (especially the various species of live Sea anemone, Sea pen, Hermit crab, Red crab, Horse-shoe crab, bivalve and Sea star) year after year from beach by the study team from various educational institutions for display in their museum should be restricted.

General tourists as well as excursion team often collect a lot of specimen in the first flush of enthusiasm but it is observed that most of those are finally dumped on the beach where the animals are allowed to die and rot. This has also to be banned.

In this context an alternative way might be taken as taking a number of photographs of the organisms from various angles without disturbing them and to collect only very few examples of each species, particularly of rare and poorly populated species.

5. Comprehensive assesment (chemical, biological and environmental) of bycatch organisms in the light of fishery exploitation and bio-medical studies may be invited.

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