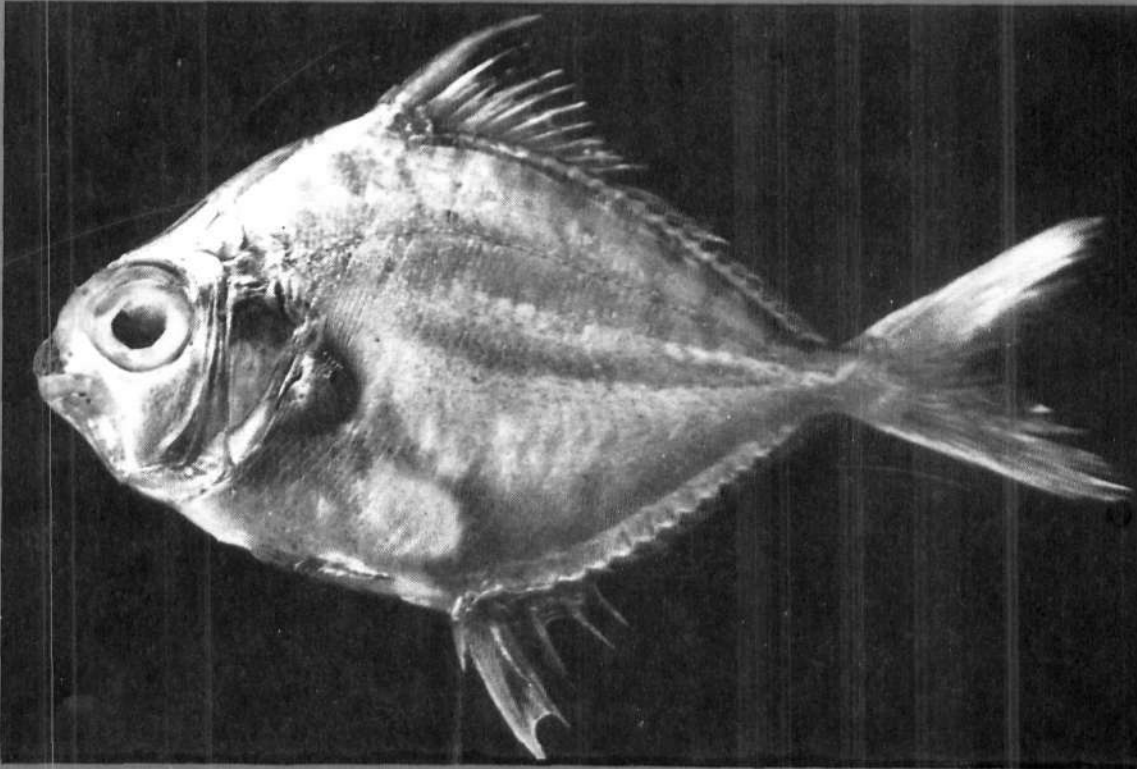




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FISH MORTALITY DUE TO POLLUTION BY INDUSTRIAL EFFLUENTS IN INSHORE WATERS OF KAYALPATNAM*

Mortality of fishes and aquatic organisms due to pollution was observed in inshore waters of Kayalpatnam and adjacent area. The pollution was mainly caused by the industrial wastes released by Dharangadhara Chemical Works and Plastic Resins and Chemicals Ltd, situated at Shahupuram near Kayalpatnam landing centre. Dead fishes were found floating and some washed ashore for about 3 to 4 km along the coast of Kayalpatnam and Tiruchendur on 2-11-8'9 (Figs. 1-5). A brief account of this incident with results of analysis of relevant parameters is given.

Pollution problems and related fish mortality were noted in and around Kayalpatnam coast on prior occasions also during 1982-'87. Such mortality occurred usually in November and occasionally in December as it happened in 1983 and 1986 and in February, 1985. It happens only when the creek opens, immediately after the rain discharging the concentrated effluents accumulated in the creek. The cause of the mortality was assumed to be high concentration of acid found in the industrial waste released from the chemical factory. Dharangadhara Chemical Works Ltd., is the major complex which produces a variety of chemicals such as caustic soda, liquid chlorine, hydrochloric acid, trichloroethylene, polychloroethylene, beneficiated ilmenite and vinyl chloride monomer. Traces of mercury and acid were

major pollutants discharged into the effluent channel leading to the lagoon and then into the sea.

Plastic Resins and Chemicals Ltd. is a private factory situated adjacent to DCW Ltd. The kinds of products manufactured are polyvinyl chlorine resin, benzene, tar and waste aromatics. The type of pollutants are total suspended solids (carbon) oil in traces and organic compounds (chlorinated hydrocarbons). The pollutants from the DRC mix with the effluents coming from M/s. DCW which are ultimately discharged into the sea.

The lagoon extends over a distance of 2 km before joining the sea. The lagoon mouth remains closed for most of the period except during the peak of northeast monsoon when it opens discharging the polluted water into the sea. The polluted water is yellowish-brown in colour when it mixes with the open sea water and flows mostly towards the southern side due to the prevailing current in the sea. The sudden release of polluted water into the sea might have resulted in the mass mortality of fish and aquatic organisms in the inshore waters. This kind of mortality occurs only for a day or two. Subsequently the concentration of pollutant is reduced considerably due to further influx of fresh water by incessant rain.



Fig. 1. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (Mulletts and other fishes).



Fig. 2. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (Cat fishes).

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Fig. 3. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (Group of eels).

During our regular visit to Kayalpatnam landing centre on 20-11-'89 in connection with fishery biology work, we encountered such a fish mortality in Kayalpatnam coast. Dead fishes and aquatic organisms were seen right from lagoon mouth to Tiruchendur. The concentration of dead organisms was more near the DCW lagoon and was lesser towards Tiruchendur. Dead fishes

TABLE 1. Percentage composition and size range of different marine organisms which suffered mortality on 2-11-'89 along the Kayalpatnam coast

Species	Percentage	Size range (mm)
<i>Mugil</i> spp.	25	75 - 240
<i>Hemirhamphus marginatus</i>	5	80 - 105
<i>Tachysurus maculatus</i>	13	60 - 90
<i>Jhoni</i> spp.	2	180 - 210
<i>Thryssa mystax</i>	2	90 - 140
<i>Chorinemus</i> sp.	4	200 - 270
<i>Pampus argenteus</i>	3	150 - 210
<i>Thyrsoidea macrura</i>	15	2110 - 3230
<i>Gymnothorax</i> sp.	2	650 - 790
Other eels	3	400 - 900
<i>Epinephelus</i> spp.	2	230 - 350
<i>Platycephalus</i> spp.	2	100 - 220
<i>Diagramma</i> sp.	2	200 - 290
<i>Lutianus</i> spp.	1	190 - 220
<i>Lethrinus nebulosus</i>	5	170 - 215
<i>Callyodon</i> spp.	2	200 - 235
<i>Scatophagus argus</i>	4	130 - 165
<i>Therapon</i> spp.	1	75 - 115
Crabs	2	90 - 105
Cow fish	2	70 - 120
Star fish	2	65 - 70
Clams	1	30 - 50
Sea weed		

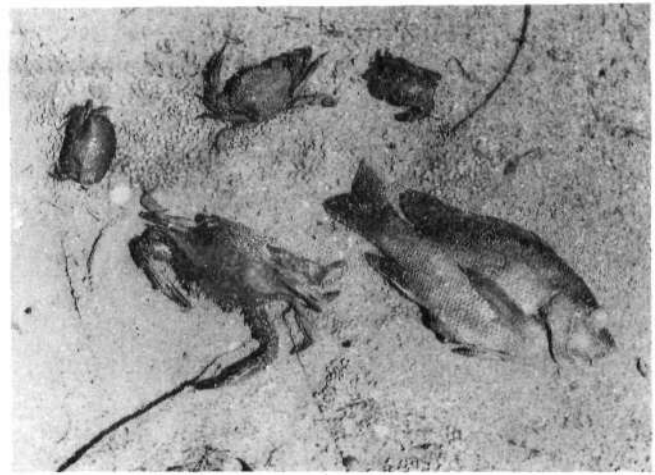


Fig. 4. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (Crabs and fish).

were collected and measured. The list of fishes and their percentage composition and size ranges are given in Table 1. As many as 23 groups of marine organisms comprising fish, crabs, star fish, molluscs etc. were found to be affected by the polluted water. Mulletts, cat fish and eels were affected severely.

In order to understand the causes for the mortality, water samples were collected at four different stations and analysed for parameters such as temperature, dissolved oxygen, salinity, pH and mercury content (Table 2). The Physico-chemical parameters indicate that temperature, salinity and dissolved oxygen were well within the normal tolerable ranges in all the stations, whereas pH appeared to be on the critical side. During low tide, the pH remained on the acidic side in all the four stations and the acidity increased towards the D.C.W. lagoon. During high tide the pH was little higher in all the stations and it was 7.62 and 7.9 in Mada Koil and Kayalpatnam landing centres respectively. The mortality might have been caused by high toxic nature of acidity.

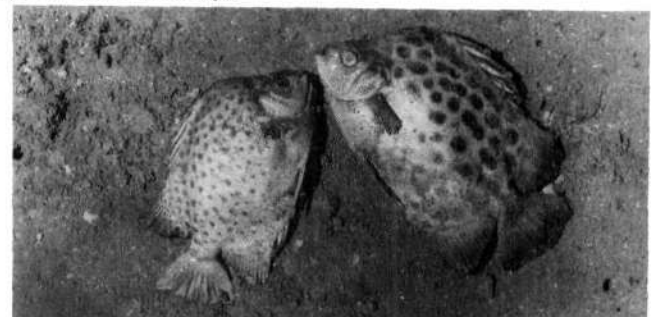


Fig. 5. Fish mortality due to pollution by industrial effluents in inshore waters of Kayalpatnam. (*Scatophagus argus*).

TABLE 2. *Distribution of dissolved oxygen, salinity, temperature, pH and mercury at different places situated at various distances from the lagoon mouth at low tide and high tide on 2-11-89*

Station	Distance from lagoon mouth	Time (hrs)	Tide	Temperature (°C)		Dissolved oxygen (ml/l)	Salinity (‰)	pH	Mercury (mg/l)
				Atmosphere	Surface				
DCW lagoon	100 m (towards inland)	09.30	Low	29.5	27.2	*	30.10	3.26	3200
DCW lagoon mouth	0.0 m	09.40	Low	29.5	27.6	4.00	31.14	4.25	1100
Mada Koil landing centre	1.6 km	10.00	Low	29.8	27.6	4.35	31.75	5.82	560
Kayalpatnam landing centre area	3.0 km	10.20	Low	30.0	27.8	4.29	32.01	6.68	320
DCW lagoon	100 m (towards inland)	14.30	High	33.2	28.5	*	30.97	3.85	3000
DCW lagoon mouth	0.0 m	14.40	High	33.2	28.5	5.26	32.52	6.88	260
Mada Koil landing centre	1.5 km	15.00	High	33.0	28.8	6.18	33.22	7.62	180
Kayalpatnam landing centre area	3.0 km	15.30	High	33.0	28.8	6.06	33.22	7.90	120

* could not be analysed.