Proc. Symp. Mar. Chem. in the Arab Region, Suez, April, 1991 : 255 - 262

Effect of a Domestic Wastes Effluent on Two Marine Boring Organisms off Lattakia, Syria

By

Ayman Habal and Fouad Abosamra

Scientific Studies and Research Center. P.O.Box 4470, Damascus, Syria

Abstract

The effects of domestic pollutants on the abundance and breeding seasons of the mollusc Bankia gouldi and the crustacean Limnoria tripunctata were studied. The breeding period was not found to be greatly affected, although L. Tripunctata was found to peak mainly in September at the testing site of the study; however an earlier study twenty kilometers north of this site had L. tripunctata peaking in June and September.

The number of impacted larvae of both species was found to be inversely affected by the increase of some domestic pollutants levels that were analyzed.

Introduction

Of the marin fouling organisms found on the Syrian coastal areas, wood-boring organisms inflict the major damage to the local merchant, recreational and fishing wooden boats. However, the degree of infestation was found to vary from one location to another.

The object of theis research was to determine the effect of domestic pollutants, ammonia, nitrites and phosphates, on the abundance and therefore, the breeding seasons of the two wood - boring organisms that were identified in an earlier study (Habal, 1980) to be **Bankia gouldi** which is a mollusc, and **Limnoria tripunctata,** is a crustacean.

Materials and Methods

Wooden panels made from the local timber, **Pinus brutia** were used in two small testing stations with PVC coated racks which allowed to horizontally fix the submersed wooden panels at two meters depth. The panels used were 30x15x1.5 cm in dimensions and the method of Turner (1959) was adopted whereby monthly duplicate panels were used and replaced by new sets each month.

The number of B. gouldi attacks was determined by counting the number of points of entry of these organisms with their characteristic two calcareous tubes in each hole, whereas the number of L. tripunctata was determined by counting the number of surface tunnels, if formed, with their slanted points of entry and the several small pores

terconnecting the tunnels with the sea. When tunnels were not complete, the slanted points of entry sufficed.

The two testing stations were moored at locations about 1.0 km before and 1.5 Km after domestic sewage discharge points respectively, Fig. (1). Water temperature was taken daily and average for each month, and monthly water samples were taken and chemically analysed from each depth using polyethylene plastic samplers and conserved at 4 °C for at least 48 hours prior to analyses. Chemical analysis of the samples was conducted according to Grasshoff **et. al.,** (1983). Ammonia was analyzed using indophenol method, nitrite using the diazonium method and phosphate was determined according to the molybdate method.

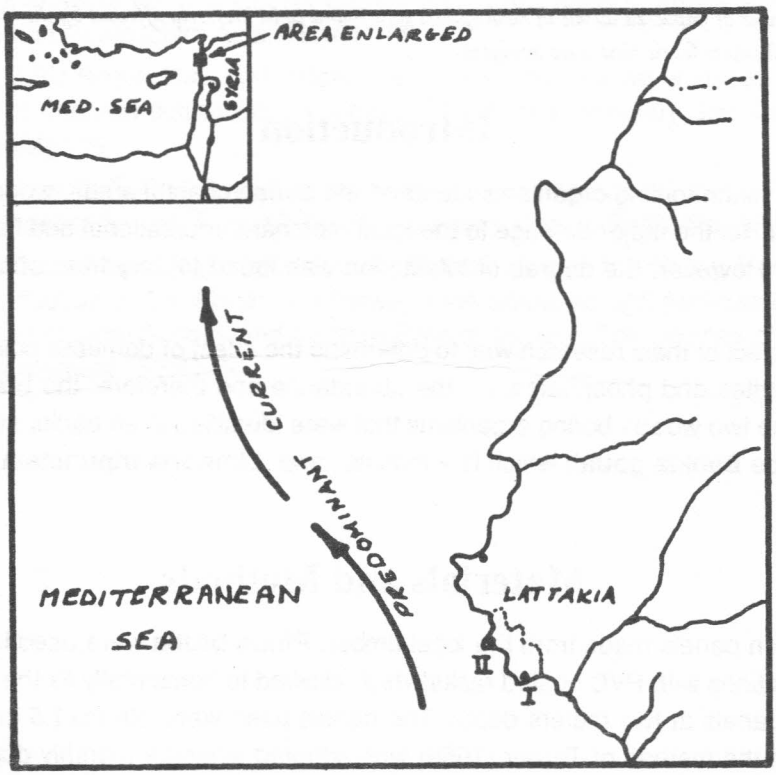

Figure (1)

Location of the two testing sites before (I) and after (II) domestic sewage discharge points, and the predominant currents at Lattakia

Results

1. The Chemical Analysis of Marine Water Samples:

The results of the chemical analysis of the marine water smaples collected from the two mooring sites are summarized in Table (1) and represented in Figure (2).

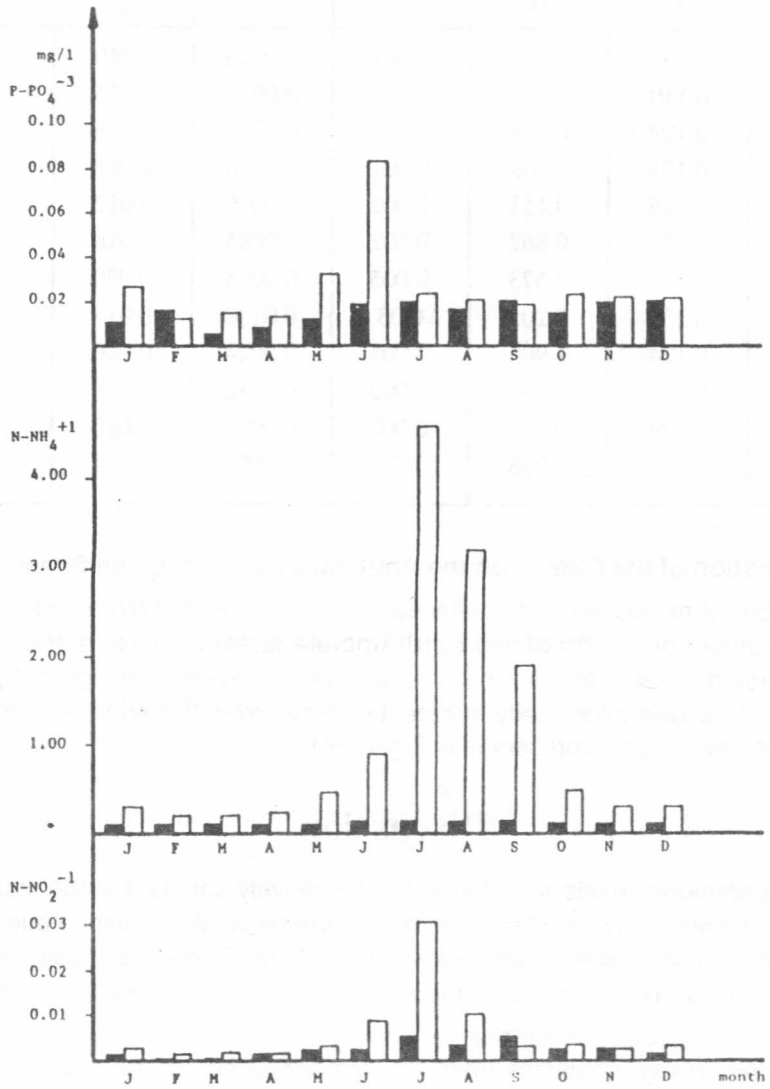

Figure (2)

The concentration of pollutantts before (■) and after (□) the domestic seage discharge points at Lattakia

Table (1) : The concentration of pollutants at the two testing sites, before (I) and after (II) sewage points.

Month	$N\text{-}NH_4^{+1}$ mg/l		$N\text{-}NO_2^{-1}$ mg/l		$P\text{-}PO_4^{-3}$ mg/l	
	I	II	I	II	I	II
January	0.105	0.305	0.001	0.0025	0.010	0.025
February	0.110	0.201	_	0.0010	0.015	0.011
March	0.102	0.228	_	0.0015	0.005	0.015
April	0.121	0.209	0.001	0.0010	0.008	0.013
May	0.125	0.453	0.002	0.0030	0.012	0.032
June	0.130	0.862	0.002	0.0085	0.018	0.083
July	0.132	4.573	0.005	0.0055	0.020	0.024
August	0.135	3.205	0.03	0.0130	0.017	0.021
September	0.124	1.905	0.005	0.0024	0.020	0.018
October	0.115	0.490	0.002	0.0032	0.015	0.023
November	0.103	0.282	0.002	0.0018	0.010	0.013
December	0.105	0.298	0.001	0.0024	0.011	0.012

2. Determination of the Effects on the Abundance and Breeding Seasons:

the number of molluscan and crustacean attacks were counted monthly. Table (2) shows the number of **B. gouldi** and **L. tripunctata** attacks before (I) and after (II) domestic sewage discharge points. These results are represented in Figure (3). The surface temperature was taken daily five centimeters below the surface and averaged monthly. The results are represented in Figure (4).

Discussion

Although ammonia levels were found to be relatively constant at the first sampling site (I) located before sewage discharge points, the nitrite and phosphate levels fluctuated, but within acceptable levels, Johanston (1976). Therefore these values were considered and the normal basal of the marine water at that particular area, Table 1 and Figure (2).

The marine boring organisms under study showed normal rates of growth at the first site, with **B. gouldi** having two distinct breeding seasons, Figure (3), the first peaking in April and the second in mid-October. This agrees with the earlier sudy conducted at a station moored at the White Harbour twenty kilometers north of the first site where the testing station for this study was moored (Habal, 1980). On the other hand, **L. tripunctata** had what appeared to be the two non-distinct breeding seasons,

Table (2) : The number of wood-borer attacks before (I) and after (II) the domestic sewage discharge points.

Month	B. gouldi		L. tripuncata	
	I	II	I	II
January	4	0	0	0
February	2	0	0	0
March	12	2	7	5
April	68	16	16	3
May	31	4	84	10
June	18	1	283	14
July	12	2	498	12
August	15	4	381	38
September	55	12	1401	412
October	115	46	258	135
November	129	20	32	13
December	2	2	14	6

Fig. (3), the first peaking in June and the second in September along with a decrease in the breeding rates. This differed from the earlier study at the White Harbour in that **L. tripunctata** there had two distinct breeding seasons peaking in June and August. Both wood-boring species under study showed minimal boring activities in the months of December through February which corresponded to the colder temperatures, Figure (4). However, **L. tripunctata** was found to be more sensitive to temperature variations the maximal breeding activites taking place in the warm summer months.

On the other hand, the second moorning and sampling site (II), located after the sewage discharge points. showed increase in the basal levels of ammonia, nitrites and phosphates, Figure (2). The levels of ammonia and nitrites showed a noticeable increase in the summer months with ammonia levels reacing an almost fourty-fold increase in July over the annual normal basal levels found at site (I). The increase in the levels of the studied pollutants in the summer is attributed to the increase in the city's population from vacationers.

The breeding seasons and rates of both **B. gouldi** and **L. tripunctata** at site (II) located after the sewage discharge points were found to be affected by the increase in the levels of the analyzed pollutants. The decrease in the breeding rates of both species was dramatic, Figure (3). While the two breeding seasons of **B. gouldi** remained essentially the same, **L. tripunctata** was reduced to a single distinct breeding season peaking in September. Whether this is due to a decreased ability of the larvae to impact on the wooden panals, or that their growth was stunned by the high levels of pollutants

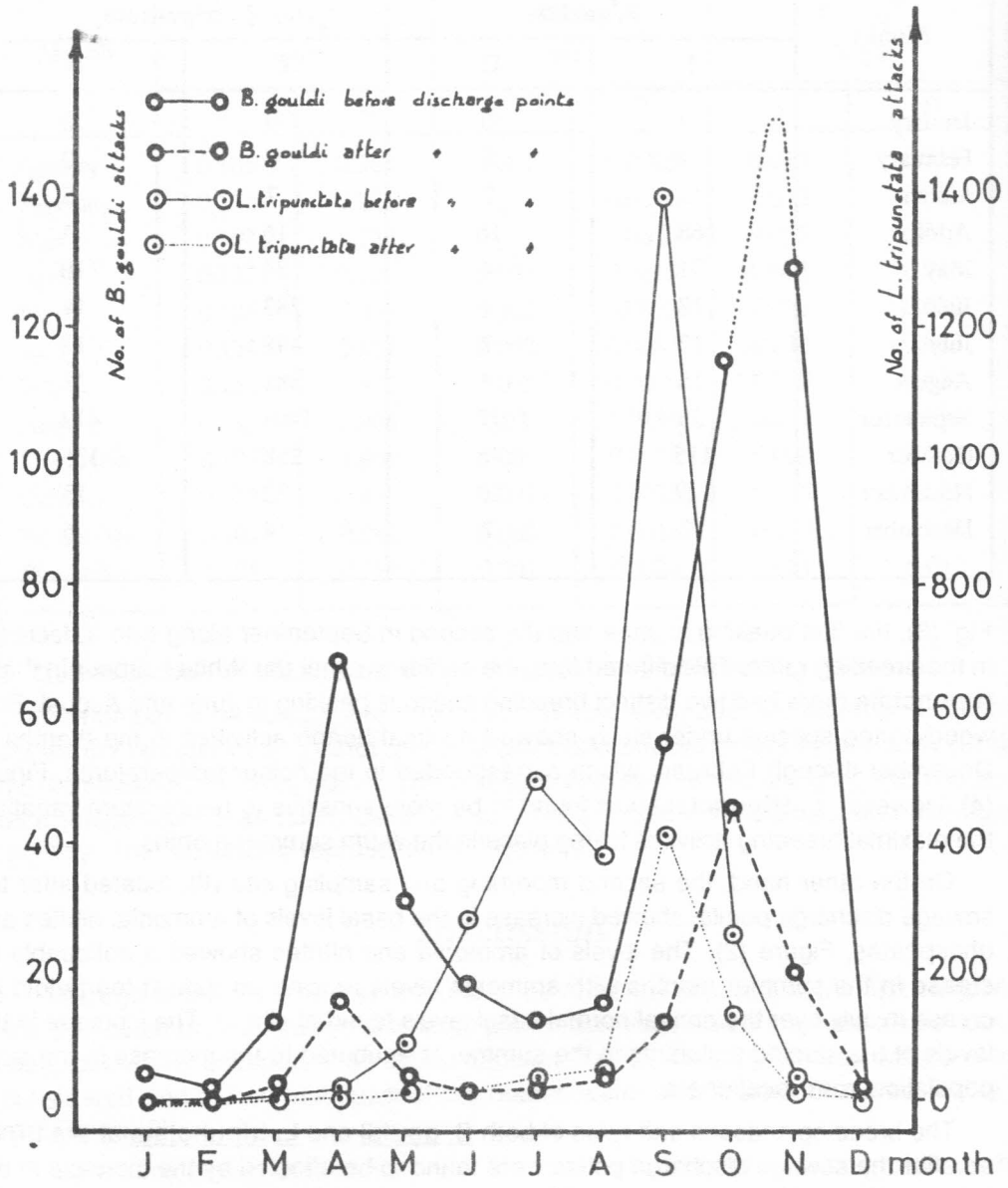

Figure (3)

The breeding seasons of B. gouldi and L. tripunctata before (I) and after (II) domestic sewage discharge points at Lattakia

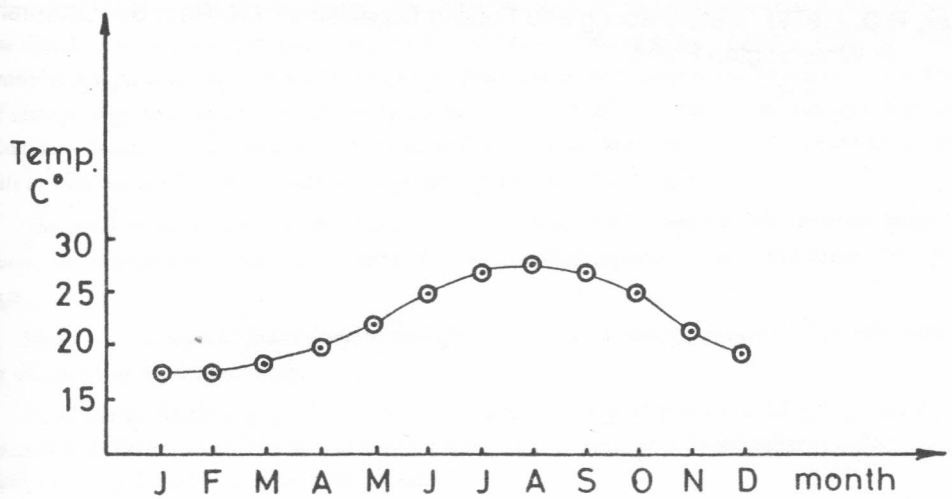

Figure (4)

The surface temperature at Lattakia port taken five centimeters below the surface

lutants found, can be determined from the available data, and the mechanism by which the increase of pollutants, especially ammonia, adversally affect the breeding rates, or growth, of these two marine boring organisms needs further studies to elucidate the relationship between the increase in domestic pollutants levels and the decrease in the breeding rates observed.

Conclusion

The breeding seasons and rates of the two marine boring organisms **B. gould** and **L. tripunctata** were found to be affected by the increase of domestic sewage pollutants. However, the mechanism of such effected can not be determined from the availabel data.

References

Grasshoff, K. et. al (1980) "Methods of Sea Water Analysis". Velage. Chemie. Second Edition.

Johanston, R. Edito (1976) "Marine Pollution". Acadmic Press, London, p. 312.

Habal, A. (1980) "the Identification of Marine Fouling Organisms and their Breeding Seasons at Lattakia Port". Fifth International Congress on Marine Fouling and Corrosion. Barcelona, Spain 1980, p. 13

Turner, R.D. (1959) "Marine Boring and Fouling Organisms". D.L Rey, Ed. University of Whashington Press.