

# Environmental Education and Nongovernmental Activities in Protecting the Enclosed Coastal Sea of the Malacca Straits

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**This paper discusses the amounts and types of pollutants present in the inland sea of the Malacca Straits. The functional role of nongovernmental organizations and the Malaysian educational system have played in endeavouring to protect this possibly stagnant and very vulnerable water body is also discussed.**

The Malacca Straits sandwiched by Peninsular Malaysia and surrounded by Singapore, Sumatra and the Northern Islands of Langkawi can be considered an enclosed sea because the Straits are tidally influenced although some water exchange is caused by coastal currents.

The Straits receive a significant amount of pollution from several sources. Most of Malaysia's agro-based industry is located on the Western side of the Peninsula. The Malacca Straits are exposed to  $148 \times 10^3$  tonnes/yr in organic from BOD these industries. Approximately  $48 \times 10^3$  tonnes/year is generated from livestock farming and  $68 \times 10^3$  tonnes/year from sewage from the human community. While heavy metals, persistent pesticides and mineral oils can also be considered to be prominent pollutants of the Strait, it should be emphasized that raw sewage discharge into the aquatic environment is the major culprit.

## **Sewage Contamination**

In the Asian context, it is a well established fact that in countries such as Pakistan, Bangladesh, Maldives, Sri Lanka, and Myanmar 100% of their sewage is discharged into adjacent waters as untreated raw sewage whilst in Malaysia 90%, Indonesia 85%, Thailand 90% Philippines 89% and in India which has only 45 treatment plants for a population of 100,000 while the rest is discharged raw. Pondering on this schizophrenic situation, the  $PO_4$  concentration in surface and bottom waters of the Malacca Straits is 0.42 and 0.85 in July - August; 0.17 and 0.27 between August - September and 0.31 and 0.47 mg - at - P/L in January, respectively. For  $NO_3$  fluctuations they are 0.35 and 1.31; 0.12 and 0.21; and 0.61 and 2.51 mg - at - N/L, respectively. With regard to *E. coli* contamination the counts were maximal between July - August -  $164 \times 10^3$ , 99 between August - September, and  $141 \times 10^3$  in January in the Northern Region of the Straits;  $241 \times 10^3$ , 63 and  $30 \times 10^3$  in the Middle Region while in the Southern Region  $156 \times 10^3$ , 25 and  $75 \times 10^3$ , respectively. *Vibrio parahaemolyticus* was detected between July - August in the Southern Region, August - September in the Southern and Middle

Regions and in January on a similar status. Regarding *Salmonella* they were detected in the Middle Region between August - September whereas in January in the Southern and Middle regions.

Bacterial counts in marketed bloody cockles, *Anadara granosa* L., indicated faecal coliform counts of  $3.2 \times 10^5$  MPN/gm meat while that for *E. coli*  $5.6 \times 10^3$  MPN/gm meat. The isolates of these *E. coli* have also been found to be resistant to antibiotics, viz. sefalotin, chloramphenicol, kanamycin, penicillin G, polymycin, neomycin and trimetoprine. Hence, the gravity of the pollution status in the inland lake of the Malacca Straits is apprehendable.

## FUNCTIONAL ROLES OF NGO'S AND LOCAL EDUCATIONAL PROCESS IN PROTECTING THE MALACCA STRAITS

### Involvement of Nongovernmental Organizations

The organizations involved are:

1. The Malaysian Nature Society,
2. Sahabat Alam (Friends of the Environment) an arm of the Consumers Association of Penang,
3. ENSEARCH, and
4. Community Centers Voluntary Group Activities.

The Malaysian Nature Society focuses its effort on enlisting public support for preservation of natural resources and endangered species. The Society collects signatures to demonstrate that there is strong interest in a particular issue. Furthermore, the Society organizes study sessions for members of both the younger and older generation to teach people how to preserve the environment.

In connection with the activities of Sahabat Alam, they produce booklets highlighting issues of concern. One of their successful stories is the Juru River Dilemma. These are also highlighted in the local press by the organization. At times they also organize local and international conferences with respect to the environment. ENSEARCH plays a similar role to that of Sahabat Alam.

The role played by Community Centers Voluntary Group Activities, in essence, is that they on weekends and other convenient times, they organize voluntary "cleanup" sessions known locally as "Gotong Royong". Occassionally these activities are given strong support by the local authorities to instigate civicmindness.

The Federal Government has recognised these organizations for their splendid endeacours, and requested the Malaysian Nature Society and ENSEARCH to be the NGO's to comment on development projects after EIA and SIA studies have been proposed for the implementation of any Government Development Program. This is

certainly in line with the current emphasis placed on the environment after the Langkawi Declaration on the Environment in 1989 agreed upon by the Heads of Governments of the Commonwealth.

### **Input via Environmental Education**

In the local context, this aspect is still in its infancy at lower educational levels. However, in secondary schools "Science Clubs" are formed so as to promote civic-mindedness and consciousness in the younger generation with regard to protection of the environment. The Malaysian Nature Society contributes to this form of an educational program.

At institutions of higher learning much research is carried out in connection with pollution problems of the Malacca Straits. The University of Malaya, Universiti Pertanian Malaysia, Universiti Kebangsaan Malaysia and Universiti Sains Malaysia have some environmental courses in their undergraduate teaching program. In the Faculty of Fisheries and Marine Sciences, UPM, the following courses are offered: Aquatic Microbiology and Chemical Oceanography and Marine Pollution, whilst in the Faculty of Science and Environmental Studies, Department of Environmental Studies the following related courses are offered: Environmental Chemistry, Environmental Development, Environmental Information System, Applied Environmental Analysis, Environmental Planning Management, Environmental Impact Assessment, Water Pollution Control and Management, Environmental Policy Making, and Environmental Studies Practice.

Universiti Sains Malaysia has no specific department, but at the School of Biological Sciences in the Thrust Areas of Aquatic Biology and Environmental Sciences the following two courses are offered: Environmental Contamination and Aquatic Pollution.

In the School of Chemistry, Environmental Chemistry is offered. At the other two institutions of Universiti Malaya and Universiti Kebangsaan Malaysia the tendencies of Environmental Educational Program are somewhat similar. Thus, in the area of Environmental Education there is yet much to be done.