

## Genetic differentiation and gene flow between populations of blood-cockles, *Anadara granosa*, along the Malay peninsular coast

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The commercially important blood-cockle, *A. granosa* is known to be a useful bioindicator to levels of marine pollution, particularly the accumulation of heavy metals. The cultivation of *A. granosa* have been concentrated along the West coast rather than the East coast of Malaysia, with certain sites in the west being subjected to high levels of pollution, which acts as a selective pressure to the natural populations of this species. The biology of life history of *A. granosa* is well docu-

mented and is a good model to test evolutionary hypotheses, particularly on marine larval dispersal. A study of *A. granosa* populations along the coast Malaysia, by allozyme analysis using cellulose acetate electrophoresis, would distinguish the populations if there is genetic differentiation between them (i.e. East-West coast populations, polluted versus non-polluted waters) and whether any adaptive traits are accounted by the levels of gene flow among the populations.

## Status of PAH contamination in coastal Korea: Results of 1999 and 2000 Korean mussel watch program

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National status of polycyclic aromatic hydrocarbons (PAH) contamination was investigated as a part of the Korean Mussel Watch Program. In the year 1999, sampling was focused on biota and sediment and in the year 2000, seawater sample was included and more detailed sampling was done in major harbors. Here results of 1999' bivalve, sediment and 2000' seawater will be presented. The average total PAH concentration of bivalve was 524 ng/g dry weight with range of 210–1,510 ng/g dry weight. Due to the environmental differences, three coasts, i.e., west, south and east showed characteristic distribution. Several source recognition index indicated that the pollution source of the west coast is mainly petrogenic from ship's activity, river-runoff and etc. East coast was also affected by petrogenic, but 'hot spot' like near industrial complex

station was dominated by pyrogenic sources. Away from these point sources other east coastal area was relatively clean. South coast showed more complex source and background concentration was highest. Sediment samples were collected from west and south coast. Mean concentration was 704 ng/g dry weight with range of 217–2,810 ng/g dry weight. 'Hot spots' and other stations showed distinct different source, pyrogenic and petrogenic respectively. Average concentration of seawater sample was 551 ng/l with range of 25.9–10,200 ng/l. Seawater sampling was focused on major harbors some of that posed harmful effect on human health. Principal component analysis revealed that Pohang harbor was influenced by similar but different sources.

## Persistent organochlorines in environment of coastal area, a case study in Vietnam

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In order to evaluate the status of coastal pollution caused by persistent organochlorine compounds including DDTs (DDT and its metabolites), HCHs (hexachlorocyclohexanes), Dieldrin, Endrin, and Aldrin, numerous surface water and

sediment samples were taken from river and estuaries at Hue province and Thaibinh province in Vietnam. Among the studied organochlorine pesticides, DDT was the predominant compound followed by DDD, DDE, and lindan. In general,

the amount of DDT found in surface water and sediment samples is lower in dry season. However, it indicated that DDT was certainly used in these areas and could be considered as pollution source of the surveyed coastal areas because of their harmful, bio-accumulative and persistent properties. The concentrations of p,p'-DDTs, as well as those of p,p'-DDE, p,p'-DDD and p,p'-DDT, at two estuaries in Hue province were particularly recognized much higher than other studied areas. The concentrations of OCs in Balat estuary at current study

were approximately much smaller than those in the past, showing clearly the decline of utilization of pesticides and chemical products containing OCs. Aldrin, Dieldrin, Endrin were not found in almost collected samples so it can be assumed that those chemicals were unutilized in Vietnam. The absence of Aldrin, Dieldrin, and Endrin as well as a seasonal variation of DDTs in the investigated locations in this period of study showed a good coincidence with the previous reports about surface seawaters in these coastal areas in Vietnam.

## **An assessment of trace metal pollution in coastal areas of Bangladesh**

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Trace metals from the three coastal regions of Bangladesh and also from the Ganges-Brahmaputra-Meghna (GBM) river system were analyzed. In the Central region the lower Ganges system shows relatively higher concentration of non-detrital fraction of heavy metals due to the presence of industrial and agricultural runoff in the drainage basin. In GBM estuary low concentration is found in water but higher concentration found in sediments. However, compared with other climatological latitudes most of the values found in the estuary are much lower. In the Eastern region, seasonal variation of heavy metals in *Perna viridis* inhabiting the Moheshkhali Channel of the Bay of Bengal reveals the highest concentration of these metals during the monsoon period. However, the level of these metals was well below the permitted levels recommended for human consumption internationally. 16 species of Marine fish were also analyzed and the concentration found was well below the level for human consumption. Almost same level of trace metals concentration was found in Karnafuly estuary and north eastern region of Bangladesh coast.

In the Western region concentrations of Fe, Cu, Zn and Cd

in surface waters and Cr, Cd, Pb, As, Cu, Mn and Fe in bottom sediments of Sundarban Mangrove Forest area were measured. Concentrations of Fe, Cu, Zn and Cd in water samples and concentration of Mn, Cu, Zn, Cd, and Pb in sediment exceeded the certified values. Comparing with the certified limits given by WHO, Pb, Zn and Cu exceeded the toxic level among the macrobenthos. The source of water pollution from the Ganges-Brahmaputra-Meghna estuary is from domestic sewage, land washout and river run-off. Results suggest that only the western region was comparatively polluted. Perhaps the mixing and dispersion effect in the central and eastern region by the combination of a strong river run-off during monsoon and semi-diurnal tide along the coast of the Bay of Bengal creates a dynamic regime which prevents from longer residence time in the near shore region. On the other hand, in the western region the ecosystem become a sump for pollutants because the normal structure and circulation of currents in the Bay of Bengal tend to prevent the mixing of these shallow waters with the rest of the ocean.

## **Coastal research programmes at Environmental Management Center (EMC)**

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Environmental Management Center (EMC) is founded in 1993 through grant from Japan Government. One of EMC's roles is to perform research related to environmental impact control. To execute this role, EMC is supported by research groups. There are five research groups at EMC i.e. atmospheric research group, environmental toxicology research group, noise and vibration research group, environmental remediation research group and waste treatment research group.

Environmental toxicology research group has performed research activities since 1995. Most of the research activities are to study toxic substances either heavy metals or organic substances in Indonesian's rivers. Only limited number of research activities studied toxic substances in coastal areas. In 1995 the research group studied tributyltin (TBT) compounds in harbor sediment. The purpose of this study was to identify pollution of organotin from ships. The study focused on