

the Sundarban mangrove forests were studied. Concentrations of Fe, Cu, Zn and Cd in water samples and Mn, Cu, Zn, Cd, and Pb in sediment and concentration of Mn, Cd, Cu, Zn and Cu exceeded the toxic levels among the macrobenthos.

An important issue is to find out extents to which pollution from the river reaches the Sundarban ecosystem. Mixing and dispersion of pollutants in the region by the combination of a

strong river run off during a monsoon and semi-diurnal tide along the central & east coast creates a dynamic regime which prevents longer residence time in the near shore region. On the other hand, Sundarban mangrove ecosystem has become a sump for pollutants because the normal structure and circulation of currents in the Bay of Bengal tend to prevent mixing these shallow waters with the rest of the ocean.

## Accumulation of Mercury, Cadmium and Lead in Tissues of Dall's Porpoise (*Phocoenoides dalli*) off Sanriku Coast in Japan

Jian Yang<sup>1</sup>, Takashi Kunito<sup>2</sup>, Shinsuke Tanabe<sup>2</sup> and Nobuyuki Miyazaki<sup>1</sup>

<sup>1</sup> Otsuchi Marine Research Center, Ocean Research Institute, University of Tokyo, Akahama 2-106-1, Otsuchi 028-1102, Iwate, Japan  
yang@wakame.ori.u-tokyo.ac.jp

<sup>2</sup> Center for Marine Environmental Studies, Ehime University, Tarumi 3-5-7, Matsuyama 790-8566, Japan

Non-essential element mercury (Hg), cadmium (Cd) and lead (Pb) were measured with 13 tissues (liver, kidney, muscle, bone, skin, heart, lung, intestine, blubber, spleen, pancreas, forestomach and main stomach) of 22 Dall's porpoise (*Phocoenoides dalli*) (11 males and 11 females) collected off Sanriku coast of northern Honshu in Japan. All Hg, Cd and Pb showed specific concentration in each tissue. The gender concentration differences were only noted for Hg in bone and intestine, as well as for Cd in muscle and blubber. Highest concentration of Hg (mean  $\pm$  s.d.:  $25 \pm 19 \mu\text{g/g}$  dry wet weight; range: 7.7–96  $\mu\text{g/g}$  dry wet weight;  $n$ : 22), Cd ( $79 \pm 47 \mu\text{g/g}$  dry wet weight; 26–221  $\mu\text{g/g}$  dry wet weight; 22) and Pb ( $0.16 \pm 0.07 \mu\text{g/g}$  dry wet weight; 0.07–0.34  $\mu\text{g/g}$  dry wet

weight; 17) were observed in liver, kidney and bone, respectively. They could be considered as the respective target tissues for accumulation of Hg, Cd and Pb. The hepatic Hg and renal Cd concentrations overlapped the ranges of Hg- and Cd-induced paresthesia reported in human. Detoxification effects were functioned in liver for Hg and in kidney for Cd by formation of Hg–Se or Cd–metallothionein (Cd–MT) complexes. The bone Pb concentration in Dall's porpoise could be listed in lowest Pb concentration rank among cetaceans, implying very low environmental Pb exposure. These results may help us to interpret why no evident pathological effects of these non-essential elements occur in Dall's porpoises of the present study.