

## Session I-B

### **SEAFOOD PARADOX: FOOD SAFETY IMPLICATION OF METAL POLLUTION ALONG THE NORTHERN COAST OF CENTRAL JAVA, INDONESIA**

Budi Widianarko

Postgraduate Program on Environment and Urban Studies, Soegijapranata  
Catholic University (UNIKA), Jl. Pawiyatan Luhur IV/1, Semarang 50234  
INDONESIA

E-mail: [widianarko@unika.ac.id](mailto:widianarko@unika.ac.id)

Seafood is generally believed to be a good source of high quality protein in human diet. A combination of high protein, vitamins and unsaturated fatty acids contents, especially omega-3 highly unsaturated fatty acids (HUFAs), in seafood is beneficial to human health. In developing countries, especially in coastal areas seafood is also economically affordable to the majority of the population. In general, percentage of edible lean tissue in seafood (i.e. fish) is higher than in beef, pork and poultry. Moreover, seafood protein is highly digestible and composed of essential amino acids in a good balance. Accordingly, consumption of seafood has therefore been promoted by most developing countries including Indonesia. However, increasing disposal of metals into coastal ecosystem has resulted in elevated metal concentrations in seafood. This results in a paradox, i.e. consumption of seafood has a high nutritive value, but at the same time becomes a very important route of exposure to toxic metals. The present study evaluates dietary exposures to trace metals associated with consumptions of seafood from the north coast of Central Java. The exposure assessment was done based on concentrations of three metals (Cd, Cu and Zn) and consumption levels of four major seafood (shrimp, cockle, milkfish and mullet). Consumption data of inhabitants of three settlements in the city of Semarang were used to illustrate the risk of metal contamination. A compilation of

several previous studies resulted in concentrations (dry weight) of Cd (1.70–16.5  $\mu\text{g/g}$ , 0.01–0.04 $\mu\text{g/g}$ , 0.06–0.08  $\mu\text{g/g}$ , 0.65–1.22  $\mu\text{g/g}$ ), Cu (4.24–6.49  $\mu\text{g/g}$ , 0.23–0.61 $\mu\text{g/g}$ , 1.09–1.38  $\mu\text{g/g}$ , 16.5–26.2  $\mu\text{g/g}$ ), Zn (75.0–103.0  $\mu\text{g/g}$ , 3.91–5.53  $\mu\text{g/g}$ , 27.8–49.2, 35.1–37.5  $\mu\text{g/g}$ ), respectively in cockle, mullet, milkfish and shrimp. Weekly consumption levels of each seafood by inhabitants of the Trimulyo, Tambak Lorok and Tanah Mas settlements were used for estimating dietary exposure risks of these metals. The magnitude of risks are expressed in terms of two parameters, i.e. the hazard quotient and maximum allowable consumption of each seafood.

**Key words:** seafood, consumption, metals, dietary exposure, Central Java