

## **Organochlorines Dynamics in Indonesian Tropical Climate A Study in Segara Anakan Estuary**

**Sri Noegrohati**

**Faculty of Pharmacy, Gadjah Mada University, Yogyakarta-Indonesia.**

### **Abstract**

Segara Anakan Estuary, a semi-enclosed coastal area in south coast of Central Java, continuously receive discharges from rivers of west java and central java, and seawater from the Indian Ocean by tidal actions. The POPs reach Segara Anakan estuary by waterways and atmospheric transportation, which is governed by physicochemical characteristics of POPs and climate condition.

The POPs studied in Segara Anakan estuary are HCB, Heptachlor, Hepox, Endosulfan, Endrin, p,p'-DDE, p,p'-DDD, and p,p'-DDT. p,p' DDT dissipation and degradation pattern in soil under Indonesian tropical climate was influenced by rainy season and dry season. The dissipation pattern was biphasic with faster rate in rainy season, while the degradation product, p,p' DDE and p,p' DDD was formed in rainy season, but in dry season, only p,p' DDD was formed.

Rainy and dry season also influence the transportation, bioavailability and fate of POPs in the environment, which is determined by complex equilibrium, such as sorption-desorption between particles and the overlying or interstitial waters, and evaporation-precipitation. In rainy season, Segara Anakan receives more rivers discharges from inland, including the deposited POPs in the washed off surface runoff and suspended particles. Upon meeting with saline water, they are sedimented in the estuary. However, the water velocity in rivers increases from 0.3 m/sec in dry season to 0.7 m/sec, causing POPs washed out off from the estuarine environment. Therefore the ΣDDT of estuarine sediment in rainy season was 3.2 µg/kg, lower than in dry season 4.2 µg/kg. The ratio of DDT/DDE+DDD were 0.4 in dry season and 0.2

in rainy season, indicating of no fresh input of DDT in inland, surrounding the estuary and in estuary itself. Comparing with the level of p,p'-DDE in estuarine water of 1994, 0.31 µg/L, which is much higher than determined in this study 0.01 µg/L.

In dry season, the salinity of estuarine water increases from 2.2‰ in rainy season to 25.7‰, and salting out effect prevails. The POPs level in estuarine water is lower and in sediment is higher than in rainy season. The ratios of POPs concentrations in sediment to water for POPs transported more through waterways in dry season were 2.0 to 3.4 times of those in rainy season, confirmed the salting out effect to the sorption-desorption equilibrium. The ratios of POPs transported more through atmospheric pathway were 1.1 to 1.2, indicating of more input from precipitation.

This study confirms that estuarine sediment act as scavenger and also as source of POPs to the organisms. In this semi-enclosed coastal area, the determined POPs level were higher than in the river, causing the organisms in estuarine at higher risk then in the river. The ratio of POPs concentrations in soft mass of *Geloina* spp. to estuarine water were in the range of 4 to 75, fillet of *Mugil* spp. to water were 15 to 350, and human milk to estuarine water were 175 to 2976. The daily consumption rate limit (CR<sub>lim</sub>) for fishmeal consumer calculated based on their DDT carcinogenicity is 0.9 kg/day, and for breast fed babies is 0.015 L/day human milk. Therefore risk management on POPs is still required, especially for p,p'-DDT.