

CONTAMINATION BY PERSISTENT ORGANIC POLLUTANTS AND ENDOCRINE DISRUPTING CHEMICALS IN VIETNAM – PATTERNS, BEHAVIOR, TRENDS AND TOXIC POTENTIAL

Pham Hung Viet* and Tu Binh Minh*

Research Center for Environmental Technology and Sustainable
Development, Hanoi National University

334 Nguyen Trai Street, Thanh Xuan, Hanoi, Vietnam.

(E-mail: vietph@hn.vnn.vn; minh@agr.ehime-u.ac.jp)

Widespread contamination by persistent organic pollutants (POPs) and their toxic effects on wildlife and humans have been major concerns and have received considerable attention during the past four decades. Some of POPs have also been reported to disrupt endocrine functions in wildlife. Vietnam is a developing country located in the central part of the Southeast Asian tropical region and therefore, understanding of occurrence of POPs may help increase knowledge regarding the role of this region as emission sources of POPs for pristine areas. This paper provides a comprehensive overview of the occurrence of POPs and endocrine disrupting chemicals (EDCs), their distribution, behavior and fate in various environmental compartments such as air, water, sediments, soils and biota from Vietnam. Data of some case studies conducted in our laboratory in recent years have also been reviewed to provide in-depth insights into the environmental behavior and trends of contamination by these toxic chemicals in the Vietnamese environment. Existing monitoring data reported during the 1990s clearly indicate elevated contamination of DDTs in most of these compartments in Vietnam. Studies in frame of the Asia-Pacific Mussel Watch Program have revealed that fish, mussels and resident birds from Vietnam contained higher concentrations of DDTs as compared to other countries in region, suggesting the role of Vietnamese environment as a significant emission source of DDT in the Southeast Asian region. Widespread contamination of some endocrine active compounds such as alkylphenols and phthalates

was observed along the coasts of northern and middle Vietnam. Elevated concentrations of bis-phenol A were found in some locations in Red River delta, North Vietnam, comparable or higher than those reported for developed nations in Western Europe and North America. This suggests the presence of significant source of bisphenol-A along Red River estuary. Residue concentrations of butyltin compounds in Vietnamese mussels and fishes were apparently lower than those in other countries, indicating less pollution of these compounds along the coasts of Vietnam. A case study on seasonal variation of alkylphenols and phthalates in surface water of river delta and estuary of north and middle Vietnam indicated the differences in distribution of these compounds between dry and rainy seasons. Higher concentrations of alkylphenols and phthalates were found in dry season in estuary; while the contrasting pattern was observed in the river delta, showing elevated residues in rainy season. This result suggests the different behavior of alkylphenols and phthalates in river delta and coastal environment. The temperature dependence in tropical environment as well as the influence of the specific local sources may be reasons for the observed results in seasonal variations. To our knowledge, this is the first extensive study on the widespread contamination of EDCs in Vietnam environment. Regarding the trends of contamination by POPs, preliminary survey conducted in Red River delta water and sediments indicated a rapid decline trend in water and a slow decrease in sediments during 1995-2001. From ecotoxicological perspectives, concentrations of bis-phenol A and di(2-ethylhexyl)phthalates [DEHP] in surface water from some locations in Vietnam exceeded the guideline values for Ecotoxicological Effects and the Environmental Risk Limit, respectively, suggesting potential for toxic implications on aquatic wildlife. The estimated dietary intakes of Butytlins for Vietnamese were lower than those from other countries, while intakes of PCBs and DDTs were relatively high among Asian developing countries. Future studies should be focused on the time trends of POPs and EDCs in biota in Vietnam in order to predict future trend of contamination and to reveal new clues for understanding possible toxic impacts on aquatic organisms.