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Challenges in marine pollution research

Monitoring and assessments of the aquatic environmental health status should become integral components of adaptive management programs that are aimed to monitor and remediate pollution and the damage it causes to the aquatic environment. Such efforts taken separately may not be sufficient for detecting unwanted changes of integrative ecosystem health in a complex marine environment. Complexity is here provided by spatio-temporal gradients, such as geographic, latitudinal, depth, as well as seasonal shifts. In addition, organisms show commonly variable reactions at various levels of integration (e.g., at the level of genome and proteome, physiology, cell, tissue and organ, individual, population and community). Biota is also characterized by variability in their taxonomic and ontogenetic sensitivity and different reaction norms of sex. The tendency of most toxicants for differential individual bioaccumulation and biomagnification within food webs further complicates the situation. To date, only a few attempts have been made to challenge an integrative approach using, physical and chemical habitat assessments, biological monitoring and physiological, biochemical and genotoxicological parameters to assess the environmental health status of a contaminated aquatic ecosystem that could directly lead to food safety measurements in ocean fisheries and aquaculture. In order to integrate abiotic and biotic endpoints, different approaches should be pursued in a systems-oriented way: physical, chemical, biological; laboratory vs. field; realms (freshwater, brackish, marine-bottom, water column, interfaces); organisms (producer, consumer and decomposer); biological integration levels (ecological, behavioral, chemical and subcellular). This holds for observational monitoring as well as for experimental approaches at all integrations levels-from molecules to ecosystems. Challenges are provided at most levels of aquatic pollution: pollution monitoring, treatment and management, economic, social and policy aspects in the protection of the marine environment at National and International levels. Bioaccumulation occurs within a trophic level and represents the concentration increase of a substance in certain tissues of organisms due to absorption from food and the environment. Biomagnification commonly results from chemical persistence, food chain energetics or rate of internal degradation and excretion. For enhanced biomagnification, the pollutant must be long-lived, mobile, soluble in fats and biologically active. Among the newly emerging xenobiotics are endocrine disrupting chemicals (EDCs), capable of adversely affecting the function of endocrine systems, leading to changes in growth, development and reproduction of exposed animals and human. Although the occurrence and implications of steroid estrogens in the environment has received some attention, there is only limited evidence for bioaccumulation in wild or farmed fish that provide precious food sources for human consumption.

Biography

Hans-Uwe Dahms has received his PhD and DSc degrees in Biology. He was invited to more than 80 countries worldwide for research and lecturing. He is presently a Professor at the Department of Biomedical Science and Environmental Biology in Kaohsiung Medical University, Taiwan. His current research is concerned with environmental health issues affecting public health.

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