

# Persistent organic pollutants in sediments from Sai Gon-Dong Nai River basin, Vietnam: Levels and temporal trends

Minh N.H., Minh T.B., Iwata H., Kajiwara N., Kunisue T., Takahashi S., Viet P.H., Tuyen B.C., Tanabe S.  
Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 2-5, Matsuyama 790-8577, Japan;  
Hanoi National University, 334 N. Trai St., Thanh Xuan Dist., Hanoi, Viet Nam; Nong Lam University, Thu  
Duc District, Hochiminh City, Viet Nam

**Abstract:** Surficial sediment samples were collected from Hochiminh City canals, the Sai Gon-Dong Nai River, and its estuary, one of the most predominant industrial areas in Hochiminh City, southern Vietnam, for determination of selected persistent organic pollutants (POPs). Contamination pattern was as follows: PCBs  $\geq$  DDTs > HCB > CHLs > HCHs. Concentrations of PCBs and DDTs ranged from 0.50-150 ng/g and 0.15-72 ng/g dry wt, respectively. On the other hand, concentrations of CHLs, HCHs, and HCB were mostly DDTs in the city canals but PCBs  
**Author Keywords:** Persistent organochlorine; Sediment; Temporal trend; Vietnam

**Index Keywords:** chlordane; chlorphenotane; hexachlorobenzene; lindane; organochlorine pesticide; polychlorinated biphenyl; fluvial deposit; hazard assessment; organic pollutant; organochlorine; pollutant source; pollutant transport; river basin; urban area; aquatic environment; article; chemical composition; dry weight; estuary; hazard assessment; organic pollution; priority journal; river basin; sediment; urban area; Viet Nam; water contamination; water pollutant; water pollution; wood; Environmental Monitoring; Geologic Sediments; Hydrocarbons, Chlorinated; Reference Values; Rivers; Time Factors; Vietnam; Water Pollutants, Chemical; Asia; Dong Nai River; Eurasia; Ho Chi Minh City; Southeast Asia; Viet Nam; Isoptera

Year: 2007

Source title: Archives of Environmental Contamination and Toxicology

Volume: 52

Issue: 4

Page : 458-465

Cited by: 7

Link: [Scopus Link](#)

Chemicals/CAS: chlordane, 12789-03-6, 57-74-9; chlorphenotane, 50-29-3; hexachlorobenzene, 118-74-1, 55600-34-5; lindane, 58-89-9; Hydrocarbons, Chlorinated; Water Pollutants, Chemical

Correspondence Address: Tanabe, S.; Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 2-5, Matsuyama 790-8577, Japan; email: [shinsuke@agr.ehime-u.ac.jp](mailto:shinsuke@agr.ehime-u.ac.jp)

ISSN: 904341

CODEN: AECTC

DOI: 10.1007/s00244-006-0157-5

PubMed ID: 17354037

Language of Original Document: English

Abbreviated Source Title: Archives of Environmental Contamination and Toxicology

Document Type: Article

Source: Scopus

Authors with affiliations:

- Minh, N.H., Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 2-5, Matsuyama 790-8577, Japan
- Minh, T.B., Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 2-5, Matsuyama 790-8577, Japan
- Iwata, H., Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 2-5, Matsuyama 790-8577, Japan
- Kajiwara, N., Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 2-5, Matsuyama 790-8577, Japan
- Kunisue, T., Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 2-5, Matsuyama 790-8577, Japan
- Takahashi, S., Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 2-5, Matsuyama 790-8577, Japan
- Viet, P.H., Hanoi National University, 334 N. Trai St., Thanh Xuan Dist., Hanoi, Viet Nam
- Tuyen, B.C., Nong Lam University, Thu Duc District, Hochiminh City, Viet Nam
- Tanabe, S., Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 2-5, Matsuyama 790-8577, Japan

References:

- Anh, M.T., Chi, D.H.L., Vinh, N.N., Loan, T.T.C., Triet, L.M., Slooten, K.B., Tarradellas, J., Micropollutants in the sediment of the SaiGon-DongNai River: Situation and ecological risks (2003) *Chimia*, 57, pp. 537-541
- (1995), <http://www.atsdr.cdc.gov>, Agency for Toxic Substances and Diseases Registry ATSDR, Available at:, September, Accessed: December 15, 2005
- Barakat, A.O., Kim, M., Qian, Y., Wade, T.L., Organochlorine pesticides and PCBs residues in sediments of Alexandria Harbour, Egypt (2002) *Mar Pollut Bull*, 44, pp. 1421-1434
- Bignert, A., Olsson, M., Persson, W., Jensen, S., Zakrisson, S., Litzén, K., Eriksson, U., Alsberg, T., Temporal trends of organochlorines in Northern Europe, 1967-1995. Relation to global fractionation, leakage from sediments and international measures (1998) *Environ Pollut*, 99, pp. 177-198
- (2003) Canadian quality guidelines for the protection of aquatic life: Summary table: Canadian environmental quality guideline, <http://www.ccme.ca/publications>, Canadian Council of Minister of the Environment CCME, Winnipeg, Manitoba, Canada. Available at:, Accessed: December 15
- Doong, R., Peng, C., Sun, Y., Liao, P., Composition and distribution of organochlorine pesticide residues in surface sediments from the Wu-Shi river estuary, Taiwan (2002) *Mar Pollut Bull*, 45, pp. 246-253
- Doong, R., Sun, Y., Liao, P., Peng, C., Wu, S., Distribution and fate of organochlorine pesticide residues in sediments from the selected rivers in Taiwan (2002) *Chemosphere*, 48, pp. 237-246
- Development and evaluation of sediment quality assessment guidelines (1994) FDEP, Tallahassee, Florida 32399-3000, Florida Department of Environmental Protection FDEP, Nov, USA, 1994
- Fillmann, G., Readman, J.W., Tolosa, I., Bartocci, J., Persistent organochlorine residues in sediments from the Black Sea (2002) *Mar Pollut Bull*, 44, pp. 122-133
- Hoekstra, P.F., O'Hara, T.M., Fisk, A.T., Borga, K., Solomon, K.R., Muir, D.C.G., Trophic transfer of persistent organochlorine contaminants (OC) within an Arctic marine food web from the southern Beaufort- Chukchi Seas (2003) *Environ Pollut*, 124, pp. 509-522
- Hong, H., Chen, W., Xu, L., Wang, X., Zhang, L., Distribution and fate of organochlorine pollutants in the Pearl River estuary (1999) *Mar Pollut Bull*, 12, pp. 376-382
- Hong, S.H., Yim, U.H., Sim, W.J., Oh, I.R., Lee, I.S., Horizontal and vertical distribution of PCBs and chlorinated pesticides in sediments from Masan Bay, Korea (2003) *Mar Pollut Bull*, 46, pp. 244-253
- Iwata, H., Tanabe, S., Sakai, N., Nishimura, A., Tatsukawa, R., Geographical distribution of persistent organochlorines in air,

- water and sediments from Asia and Oceania and their implications for global redistribution from lower latitudes (1994) *Environ Pollut*, 85, pp. 15-33
- Iwata, H., Tanabe, S., Ueda, K., Tatsukawa, R., Persistent organochlorine residues in air, water, sediments and soils from the lake Baikal region, Russia (1995) *Environ Sci Technol*, 29, pp. 792-801
  - Kang, Y., Sheng, G., Fu, J., Mai, B., Zhang, Z., Lin, Z., Min, Y., Polychlorinated biphenyls in surface sediments from the Pearl River Delta and Macau (2000) *Mar Pollut Bull*, 40, pp. 794-797
  - Kannan, K., Tanabe, S., Quynh, H.T., Hue, N.D., Tatsukawa, R., Residue pattern and dietary intake of persistent organochlorine compounds in foodstuffs from Vietnam (1992) *Arch Environ Contam Toxicol*, 22, pp. 367-374
  - Khim, J.S., Lee, K.T., Kannan, K., Villeneuve, D.L., Giesy, J.P., Koh, C.H., Trace organic contaminants in sediment and water from Ulsan Bay and its vicinity, Korea (2001) *Arch Environ Contam Toxicol*, 40, pp. 141-150
  - Mattina, M.I., Iannucci-Berger, W., Dykas, L., Pardus, J., Impact of long-term weathering, mobility and land use on chlordane residues in soil (1999) *Environ Sci Technol*, 33, pp. 2425-2431
  - Minh, T.B., Kunisue, T., Yen, N.T.H., Watanabe, M., Tanabe, S., Hue, N.D., Qui, V., Persistent organochlorine residues and their bioaccumulation profiles in resident and migratory birds from North Vietnam (2002) *Environ Toxicol Chem*, 21, pp. 2108-2118
  - Minh, N.H., Someya, M., Minh, T.B., Kunisue, T., Watanabe, M., Tanabe, S., Viet, P.H., Tuyen, B.C., Persistent organochlorine residues in human breast milk from Hanoi and Hochiminh city City, Vietnam: Contamination, accumulation kinetics and risk assessment for infants (2004) *Environ Pollut*, 129, pp. 431-441
  - Minh, N.H., Minh, T.B., Kajiwara, N., Kunisue, T., Subramanian, N., Iwata, H., Tana, T.S., Tanabe, S., Contamination by persistent organic pollutants in dumping sites of Asian developing countries: Implication of emerging pollution sources (2006) *Arch Environ Contam Toxicol*, 50, pp. 474-481
  - Monirith, I., Ueno, D., Takahashi, S., Nakata, H., Sudaryanto, A., Subramanian, A., Karuppiyah, S., Tanabe, S., Asia-pacific mussel watch: Monitoring contamination of persistent organochlorine compounds in coastal waters of Asian countries (2003) *Mar Pollut Bull*, 46, pp. 281-300
  - Nhan, D.D., Am, N.M., Hoi, C., Dieu, L.V., Carvalho, F.P., Villeneuve, J.P., Cattini, C., Organochlorine pesticides and PCBs in the Red river delta, North Vietnam (1998) *Mar Pollut Bull*, 36, pp. 742-749
  - Nhan, D.D., Carvalho, F.P., Am, N.M., Tuan, N.Q., Yen, N.T.H., Villeneuve, J.P., Cattini, C., Chlorinated pesticides and PCBs in sediments and mollusks from freshwater canals in Hanoi, Vietnam (2001) *Environ Pollut*, 112, pp. 311-320
  - Noren, K., Meironyte, D., Certain organochlorine and organobromine contaminants in Swedish human milk in perspective of 20-30 years (2000) *Chemosphere*, 40, pp. 1111-1123
  - Phuong, P.K., Son, C.P., Sauvain, J.J., Tarradellas, J., Contamination by PCBs, DDTs, and heavy metals in sediments of Ho Chi Minh city's canals, Viet Nam (1998) *Bull Environ Contam Toxicol*, 60, pp. 347-354
  - Qui, X., Zhu, T., Yao, B., Hu, J., Hu, S., Contribution of difocol to the current DDT pollution in China (2005) *Environ Sci Technol*, 39, pp. 4385-4390
  - Rawn, D.F.K., Lockhart, W.L., Wilkinson, P., Savoie, D.A., Rosenberg, G.B., Muir, D.C.G., Historical contamination of Yukon Lake sediments by PCBs and organochlorine pesticides: Influence of local sources and watershed characteristics (2001) *Sci Total Environ*, 280, pp. 17-37
  - Sinh, N.N., Thuy, L.T.B., Kinh, N.K., Thang, L.B., The persistent organic pollutants and their management in Vietnam (1999) *Proceedings of the Regional Workshop on the Management of Persistent Organic Pollutant, POPs*, pp. 385-406. , United Nations Environment Programme, Hanoi, Vietnam, March 16-19
  - Strandberg, B., van Bavel, B., Bergqvist, P., Broman, D., Ishaq, R., Pettersen, H., Rappe, C., Occurrence, sedimentation and

- spatial variation of organochlorine contaminants on settling particulate matter and sediments in the Northern part of the Baltic Sea (1998) *Environ Sci Technol*, 32, pp. 1754-1759
- Thao, V.D., Kawano, M., Tatsukawa, R., Persistent organochlorine residues in soils from tropical and subtropical Asian countries (1993) *Environ Pollut*, 81, pp. 61-71
  - Torres, J.P.M., Pfeiffer, W.C., Markowitz, S., Pause, R., Malm, O., Japenga, J., Dichlorodiphenyltrichloroethane in soil, river sediment, and fish in the Amazon in Brazil (2002) *Environ Res*, 88, pp. 134-139
  - Zhang, G., Min, Y.S., Mai, B.X., Sheng, G.Y., Fu, J.M., Wang, Z.S., Time trend of BHCs and DDTs in a sedimentary core in Macao estuary, Southern China (1999) *Mar Pollut Bull*, 12, pp. 326-330
  - Zhang, Z.L., Hong, H.S., Zhou, J.L., Huang, J., Yu, G., Fate and assessment of persistent organic pollutants in water and sediment from Minjiang river estuary, Southeast China (2003) *Chemosphere*, 52, pp. 1423-1430
  - Zhou, J.L., Maskaoui, K., Qiu, Y.W., Hong, H.S., Wang, Z.D., Polychlorinated biphenyl congeners and organochlorine insecticides in the water column and sediments of Daya bay, China (2001) *Environ Pollut*, 113, pp. 373-384