

Overview of Water Environmental Pollution in Vietnam

Nguyen Thi Hue

Institute of Environmental Technology (IET), Vietnamese Academy of Science and Technology (VSAT).

18-Hoang Quoc Viet R., Cau Giay distr., Hanoi, Vietnam

Tel: (04)7 911 654; Fax: (04)7 911 203; Email: nthue2003@yahoo.com

Abstract

Many rivers are choked with contamination and untreated waste from craft villages and industrial production zones in Vietnam. Most of the monitored rivers are found to be polluted with substances like N and P, from 4 to nearly 200 fold compared with water resource of type A in and from 2 to 20 times in comparison with water source of type B in Vietnamese Standard limit. 20% of the old industrial enterprises have renovated and modernized their production technologies. 90% of the old enterprises do not have any wastewater treatment system and most of the old industrial zones do not have a central wastewater treatment plant. Wastewater is directly discharged into lake/pond and river, causing serious pollution of surface water quality. The water resource management is facing a some problems. Although law on water resources was enacted and came into force since 1st January 1999 but it had not been implemented in direct contact with enterprises/companies, which the cause of pollution. The polluted water resource not only affect the present generation but also future generations. If the situation continues, fish and other creatures will die and become extinct causing irreversible damage to Vietnam's ecological system.

Keywords: surface water, ground water, pollution.

Surface water quality

For river

Viet Nam country has 2360 rivers with a length of more than 10 km. The total area in- and outside Viet Nam of all international catchments is close to 1.2 mill. km², which is approximately 3 times the size of Viet Nam. The rivers flowing through Viet Nam include many international rivers, such as Mekong and Red rivers. The monitored data for 4 rivers running the main urban of Vietnam as Red river (Hanoi), Cam River (Haiphong), Huong River (Hue) and Saigon River (HCM City). The result in Fig.1 and 2 showed that ammonia-nitrogen (NH₄-N) and biochemical oxygen demand (BOD₅) vary was considerably and exceed national water quality class A standards by several fold. The problems are worst during the dry season, when the flows in the rivers are reduced.

The Cau, Nhue and Day rivers in the Northern Vietnam are also seriously polluted. Water in the Cau river contains many dangerous pollutants including industrial lubricants. Waste products dumped in rivers affect natural levels of bacteria and nutrients and biochemical reactions occur. BOD and Chemical Oxygen Demand (COD) levels are two to three times higher than Vietnamese standard limits. At a lower section of Cau river, the water quality had been infected with a high concentration of BOD and COD, which are 10 times Vietnamese standard limits. By 2010, it is forecast in the social-economic development plan put together by the provinces which the Cau river passes through, that levels of BOD will rise by 1.5 times of what they are now, phosphorus and nitrogen levels are also expected to increase by a

similar amount. Rivers, which run through Hanoi city (Tolich, Kimnguu, Nhue), are also containing very high concentration of COD, NO₂⁻, NO₃⁻ and SS. The water of Nhue river in Ha Tay province is turning black and noxious (MONRE, 2006).

Fig 1. BOD levels in Vietnamese major rivers

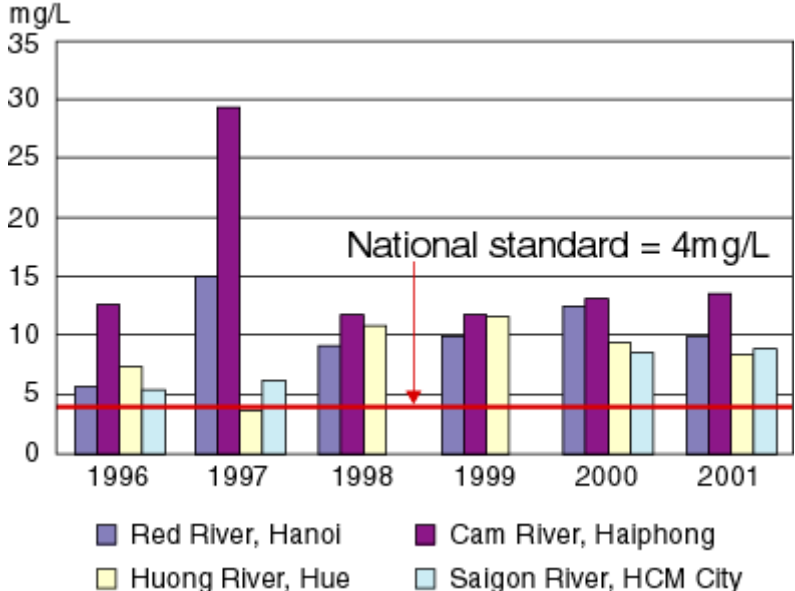
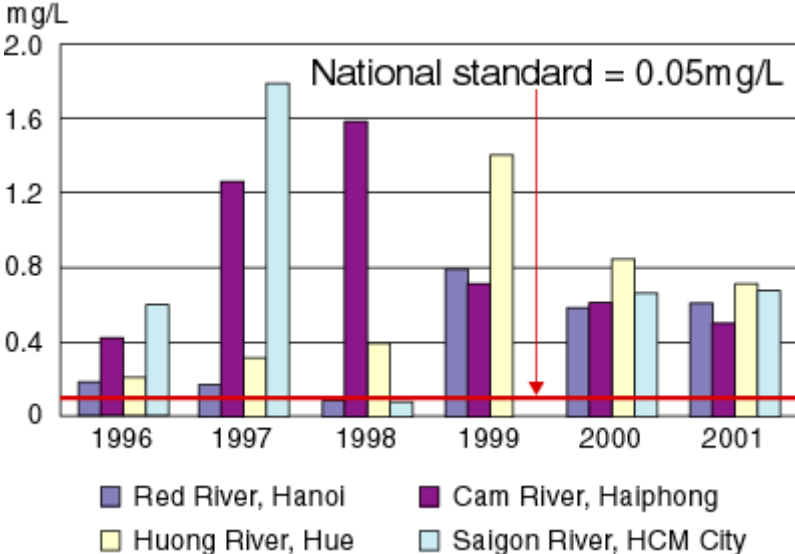


Fig 2. NH₄ levels in Vietnamese major rivers



Source: NEA, SOE reports 1997-2002.

Rivers in the southern region are in deep trouble and in a high alert situation. Organic pollution in Sai Gon, Vam Co Dong rivers is very serious. The COD level is three time higher than it should be. According to MONRE, there are about 4,000 enterprises discharging wastewater, of which 439 enterprises are the most serious, and are required reallocated, closed or will have to adapt cleaner technologies and treatment of their wastewater. In accordance with industrial parks (IPs) and export processing zones (EPZs) in the Southern Key Economic Zone (SKEZ) discharge over 137,000 m³ of wastewater containing nearly 93 tons of waste into the Dong Nai, Thi Vai and Saigon Rivers each day. By 2010, waste in the Dong Nai river

will increase by 1.7 times compared with 2007. Meanwhile, two out of 12 IPs and EPZs in Ho Chi Minh City, three out of 17 in Dong Nai, two out of 13 in Binh Duong, and none of the IPs and EPZs in Ba Ria-Vung Tau have wastewater treatment facilities.

According to environmentalists the SKEZ needs investment of 5.7 trill. VND (380 mill. USD) in 2005 and 13 trill. VND (867 mill. USD) in 2010 to deal with environmental pollution.

For reservoirs and lakes

Viet Nam is about 3600 reservoirs of various sizes, of which less than 15 percent are large or medium (capacity of over 1 mill. m³ or a height of more than 10 meters). A several major natural lakes having a large area, such as Ba Be (4.5 km² for a surface area and of 90 million m³ for a volume) and West Lake.

Most of the lakes in Hanoi are seriously polluted with high BOD levels. Lakes in the capital city are losing their capacity to regulate water levels, especially during the rainy season due to loss of lakes and unsuitable embankments. The water samples of 25 lakes and 5 rivers in Hanoi city were surveyed for two seasons as dry season (March 2005) and rainy season (August 2005) by Institute of Environmental Technology (IET,VAST) and ALMEC Corporation Ltd., (Japan). The results showed that the COD's values, which are approximately 24% in dry season and 44% in rainy season, are over Vietnamese Standard for the 25 lakes. The water quality of Ngoc Lam (LB7), Ba Mau (DD7) and Kim Lien (DD9) lakes was gravely polluted (JICA, 2005).

The parameters, such as COD (Fig.1), BOD₅ (Fig.2) and SS (Fig.3) are also exceeded Vietnamese Standard in both seasons. It can be explained that the lakes are not regularly cleaned. Domestic wastewater was directly discharged into the lakes and garbage is disposed into the lakes. Hoan Kiem lake located in the center of city but water is polluted. The value of COD and BOD in Hoan Kiem lake exceed Vietnamese Standard. Garbage is disposed into lake. In dry season, water level is quite low. Most the concentrations of toxic metal are lower than Vietnamese Standard value, but some parameters such as Fe, Mn and Coliform are always varied between dry and rainy seasons.

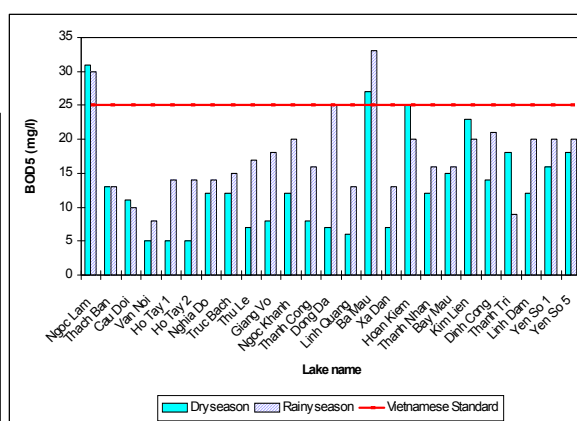
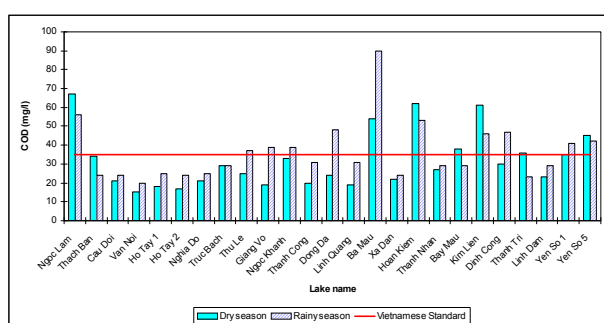


Fig. 1. The value of COD in dry and rainy season Fig. 2. The value of BOD₅ in dry and rainy season

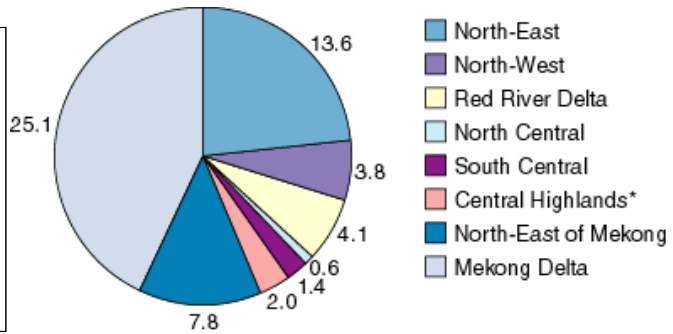
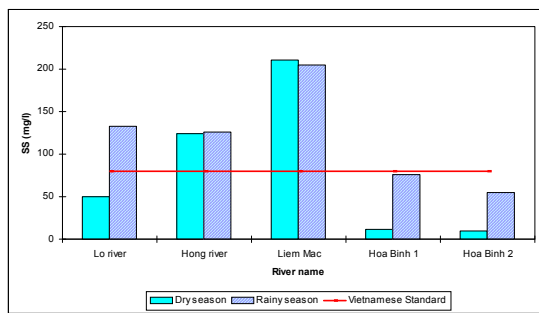


Fig. 3. The value of SS in dry and rainy season Fig 4. Exploitable Groundwater Bill. m³/year

Groundwater quality

Figure 4 indicated that groundwater resources in Viet Nam are abundant with the total potential exploitable reserves of the country's aquifers estimated at nearly 60 bill. m³ per year. The availability varies from abundant resources in the Mekong River Delta to somewhat limited resources in the North Central Region.

The level of ammonia in the groundwater in Hanoi is higher than the National standard by 2-8 times. All samples taken from the upper aquifer exceed ammonia standard many times. Scientists estimate that with the current abstraction rate of 700,000 m³/day, there will be a high risk of lowering the water table down to 114 m and the groundwater pollution would spread over the Hanoi city (VEPA, 2003).

In close coordination with National Arsenic Sub-committee and being fruitful supported by Vietnam government, UNICEF in Hanoi has been granted to implement many projects/programs regarding to this issue including basic survey of arsenic contamination in underground water in some regions, studies on arsenic removal technology. A broad survey of arsenic pollution in the 12 provinces of the Red River Delta, Mekong Delta and Central area was carried out from November 2003 to April 2004 by IET with UNICEF funding support. A total of 12,439 water samples were tested with arsenic in 419 communes of 33 districts in the 12 provinces. Analytical results showed that in some provinces of the Red River Delta and Mekong Delta, where tube well water had arsenic content exceeding much higher than the Vietnamese allowed standard (there are 34.92% and 21.07 % of tube wells found with arsenic higher than 0.01 mg/l and 0.05 mg/l, respectively). Especially some communes in Ha Nam province, the tube wells water was a high arsenic level like Vinh Tru, Binh Luc, Duy Tien, Kim Bang communes (there are 52.46 % and 35.16 % of tube wells found with arsenic higher than 0.01 mg/l and 0.05 mg/l, respectively). 3 provinces in Mekong, in spite of that the number of field test was still limited, a remarkable number of water samples was found with high arsenic in Dong Thap province (39.15% tube wells found with arsenic higher than 0.05 mg/l) (MONRE, 2004).

Activities of Water Environmental Protection in Institute of Environmental Technology (IET)

IET researchers' ability to develop and apply water quality monitoring technologies and wastewater treatment technologies, and to conduct training necessary for protecting water environment is carried out. Transfer technologies on water quality monitoring and analysis (National and provincial monitoring system on water quality; methods for implementing

monitoring objectives; water sampling points; sampling frequency; the evaluation method of analytical data/results; water quality monitoring in field works and equipment used) are implemented. Recommend appropriate monitoring procedure to relevant government organizations through the process of collecting and assessing data from some pilot state water monitoring stations are affirmed. Transfer technologies on wastewater treatment (physical-chemical and chemical treatment processes; biological aerobic treatment processes; wastewater treatment by aquatic plants; biological anaerobic treatment processes) are realized.

Recommendation

Water resource is also being polluted by people who live in rural areas who use it for washing and other daily activities. That's why a lot of diseases concerning the intestine, skin and other cancers keep occurring. The Government has implemented the standard values on the basis of new scientific data on health effects to human health has the highest priority of protection. A detailed action plan should be developed with the coordination of concerned ministries. Effective and close coordination between multi-sectors, scientists and authorities and sufficient investment are very important to properly study and accurately remedied in water resource protection.

References

MONRE, National environment report 2006, state of water environment for river valley: Cau, Nhue-Day and Dong Nai systems.

Report on sampling and analyzing of LAKE and river water in HANOI. the contract between Institute of Environmental Technology (IET) and ALMEC Corporation (JICA Study Team) July 15, 2005.

VEPA website. Jun 11, 2003.

Ministry of Rural and Agriculture Development, MONRE, Institute of Environmental Technology, VAST. Project "*Broad survey of arsenic contamination in tube well water in 12 provinces, Vietnam*". Hanoi, May 2004.