

The Current State of River Basins in Vietnam-Pollution and Solution

Hoang Duc Hanh¹, Nguyen The Dong²

¹Institute of Environmental Technology,
Vietnam Academy of Science and Technology

²General Department of Environment
Ministry of Natural Resources and Environment

Abstract

About 2 decades after "Renovation", Vietnam economy is developing remarkably; beside fast economic growth, it is the fact that all river basins in Vietnam are now facing pollution problems. Among many river basins in Vietnam, Cau, Nhue-Day and Dong Nai basins belong to the most polluted group. The river water is polluted with organic compounds, oil, suspended solids, etc, since untreated wastewater is often discharged freely into the rivers from cities, towns, industrial zones and craft villages. The pollution is threatening health of the basins' residents. Some efforts of Vietnam on improving river basins' environment management were presented.

Keywords: River basin, Cau, Nhue-Day, Dong Nai, water quality, pollution

River basins in Vietnam: An overview

With 13 large river systems, which cover 10,000 km² in total, Vietnam is considered to have a complex and dense river network with most of the large river systems linked. Amongst those 13 main river systems, 9 have basins which contribute to 90% of total river basin area in the whole country. The 9 main river basins are those of Red, Thai Binh, Bang Giang-Ky Cung, Ma, Ca La, Thu Bon, Ba, Dong Nai, and Cuu Long river. The Red river and the Mekong river systems have the largest basin areas (155,000 and 795,000 km² respectively) as well as the highest total volume of water flow. Other than that, each river system has its own distinctive characteristics, thus environmental management approaches may vary greatly from one river basin to another, depending on socio-economic conditions, land use, environmental factors, and their economical and ecological values, .etc.

In this short review, 3 river basins chosen to focus on are of the Cau, Nhue-Day and Dong Nai river. The Cau river, a large river of the Thai Binh river system, is 288 km long and passes through Bac Kan, Thai Nguyen, Vinh Phuc, Bac Giang, Bac Ninh, Hai Duong provinces and Hanoi before it merges with Thai Binh river. The whole river basin area of Cau river and its branches is originally rich in natural resources such as forests, minerals, etc. However, those natural resources have rapidly depleted together with the economic growth of the provinces along the river. Many human activities such as mining, agriculture, establishment of craft villages, ...continue to add more pressure on the natural resources. Moreover, the population density of the Cau river basin is twice as high as the average population of Vietnam (427 per km²) and is unevenly distributed between the rural and the urban areas. Although the GDP of the provinces along Cau river has recently rise up, there is a reduction in environment condition here.

Nhue-Day river system includes Day river, which is linked with the Red river but has its own basin with tributary rivers such as Nhue, Tich, Thanh Ha, etc. The Nhue-Day river basin

(7,665 km²) stretches from the mountainous Ha Tay, Hoa Binh provinces to Ha Nam, and finally to the coast Ninh Binh, Nam Dinh provinces. After dam construction and reform, the Day river (237 km) is now a draining river and serves to diverge floods in the rainy season. The Nhue-Day river basin, which mainly is plain, creates many advantages for building and economic development. In addition, many branches (Tich, Thanh Ha, Hoang Long river) flow through towns, cities and industrial zones and provide important water sources for agriculture and industrial production. Again, the population density of the basin is about 3.5 times higher than the national average, with most of the population concentrates in Hanoi, Ha Tay and Nam Dinh. In recent years, the expansions of big cities like Hanoi and Ha Tay, together with the spreading of residential areas, industrial zones, and craft villages have brought up the GDP of provinces along the Nhue-Day river system. At the same time this economic development has put the river environment in great danger.

Different from the 2 river systems described previously, Dong Nai river system flows in the south Vietnam and passes through 11 provinces and cities in total. That includes HCM city, Lam Dong, Binh Phuoc, Binh Duong, Tay Ninh, Dong Nai, Dak Nong, Long An, Ba Ria-Vung Tau, Binh Thuan and Ninh Thuan provinces. The river basin covers an area of 14,800 km² and has 266 rivers and streams of over 10km each. The Dong Nai basin system is reach with minerals resources such as gold, iron, tin, zinc, etc. which are being exploited rapidly. Besides mineral resources, this basin system is also covered by tropical forests with a great biodiversity of tropical ecosystems. These forests also protect the area from flash-flood in the rainy season and maintain water lever for Dong Nai river in the dry season. However, fast urbanization in the basin and the high growth rate of the population have contributed to gradual deforestation. Although the basin has a rapid economic development and urbanization, the environment is concerned and protected to an extent. As a result, this is considered one of the economic development regions which have achieved fast and sustainable economic growth.

The current state of Vietnam river basins pollution

After the Renovation, Vietnam has been developing nonstop in economy. However, this economic development is faster than the establishment of the infrastructures. As a result, growth puts increasing pressure on the environment in general. The river systems' environment also shares the same fate; many reports have described the dramatic decrease of river water quality and the high concentration of various toxins in the water. The level of pollution varies among different river systems and also among different parts of one system. In this part, the particular situations of the 3 concerned river basin systems are described separately.

In general, the surface water of Cau river is locally polluted by organic pollutants, suspended solids and oil waste. In the section passing through Bac Kan province, the river is polluted heavily with BOD₅ and suspended solids. The part flowing through Thai Nguyen city is probably polluted the most, due to the untreated waste water released by heavy industrial factories, paper mill, mining (gold and coal mining) and agriculture activities along the river. Pollutants in this part of Cau river are mainly organic compounds (eg. Nitrogenous compounds) and oil compounds which give the river a distinct oily smell. The river section from Vat bridge to Pha Lai has been severely polluted with organic substances and the level of pollution becomes far higher than the permitted standard. This organic pollution was caused by waster water from domestic, urban and tourism activities as well as oil pollutants

from industrial waste. Moreover, this part of the river system has many craft villages established along the bank. These villages mainly focus on food processing, animal husbandry, paper recycling, scrap recycling, metallurgy, etc. and waste water is often discharged directly in to the river.

In comparison to the Cau river, the Nhue-Day river basin is facing an alarming level of pollution caused by the release of waste water from domestic, industrial, agricultural and aquaculture activities. In the case of the Nhue river, since the To Lich river heavily polluted water mixes with the Nhue river, the section flowing through Ha Dong of Nhue is tainted with COD and BOD5 at a level 4 times higher than the standard. The Nhue river after the confluence point with To Lich has water darkened with scum, sludge and has a fishy smell. This condition only worsens in the dry season as the pollutants are less diluted. Moreover, the pollution of the Nhue river causes a chain reaction which leads to pollution of the Day river, since the 2 rivers are linked. The section of Day river from Ha Dong to Phu Ly town is mainly polluted with organic substances; however, the flowing section to Hoang Long suffers from both Nhue river's pollutants and waste water discharged from Phu Ly town. To sum up, the Nhue-Day river basin is one of the most polluted basin systems in Vietnam with domestic waste water contributing 56% of the river total volume.

Similarly to the 2 described river basins, the Dong Nai river basin is also severely affected by pollutants resulted from fast economic growth with little regard to environmental issue. Especially, the downstream section of Dong Nai is heavily polluted with organic, suspended solid substances and has lead concentration few times higher than the permitted limits. The water downstream is also seriously salinized to the point that can not be used for domestic and agricultural purposes. In the part of Sai Gon river system, rivers are severely polluted with organic pollutants (eg. N-NH₄⁺ level is about 30 times higher than VN standard), coliforms (3-168 times higher than permitted limit) and heavy metals (eg. Fe content in Be river: 10-12 times higher than VN standard). The most critical case is Thi Vai river, which is highly contaminated with mercury, zinc, organic compounds, etc. With this severe pollution, almost all species are unable to survive and the river is now a dead river.

Water quality management

As described in the previous parts, many of the river basins in Vietnam are now suffering from heavy pollution level. Therefore, protecting the river basins' environment is a crucial part in water resource management. However, water quality management in river basins meets many difficulties. They include the unclear definition of responsibilities and competences among ministries and sectors; the lack of mechanism to acquire resources from private, non-governmental, international organizations and communities in water resource protection, etc. Recently, environmental legislation has been adapted by the Vietnamese government to support the water source protection. Some of the most important laws are the Law on Environmental protection (2005), the Water resource law (1998), the Land law (2003) and Systems of Vietnamese Standards – river/lake water quality standards. Although, the environmental legislation has provided the activities of water resource protection a legal ground, the application and implementation of those laws are still limited and inadequate.

Water quality management of the river basins is separated to 2 levels. In the national level, the Ministry of Natural Resources and Environment (MONRE) was established in 2002 with the main task of preparing master planning on water resource protection, management and use in

the principle river basins. With this task, the MONRE has promoted institutional preparation for effective water management and submitted to the Government for issue. In addition, MONRE has also contributed many guidelines for environmental legislation improvement. At the regional level, the provincial Departments of Natural Resources and Environment (DONREs) have been established. Therefore, the water quality management started with focusing at the localities. However, these local organizations have no common voice, unity or close cooperation in water resource management, thus their activities still have little effect on improving the river basin environment. Some of them even have the wrong concepts of environmental protection purposes for the river basins and their responsibilities in organizing environmental protection in the local river basin.

Another important step in water quality management is examination and inspection. This is an important action to ensure that the environmental laws are being obeyed and protect the river basins of the illegal waste water discharge from industrial zones, craft villages and domestic uses. The importance of this step has been emphasized by the incidence of Thi Vai river, where Vedan company had illegally released untreated waste water for 14 years before being exposed earlier this year. Even though this release of waste water has been stopped but Thi Vai river has turned to a “dead” river which will take billions to restore its water quality. These billions would not be wasted if only the illegal activities were discovered earlier. The inspection can be periodic or spontaneous; also there are insitu inspection in which the industrial zones and establishments analyse their own environmental conditions and exsitu inspection carried out by MONRE and/or DONREs. The inspection activity also helps identifying the economical activities which release the most contamination into the river basins, as well as companies causing serious pollution and ones having environmental friendly practices. From the result of inspection and examination, legal activities can be applied to establishments which purposely breach environmental laws and adjustment would be considered to ensure a sustainable economic development in Vietnam river basins. However, in fact both water quality management planning and inspection activities are limited since the environmental protection organizations’ lack of man power and financial resources. Moreover, the environmental legislation is still developing, and needs years of experiment and correction to tightly regulate the activities of water resource management.

Some priority solutions to protect the water environment of river basins in Vietnam

As mentioned in the previous parts of the report, the level of pollution in river basins is increasing rapidly together with the fast growth rate of the economy. In this situation, preventing increased pollution and restore the polluted rivers to their previous condition are urgent tasks. The common solutions for these tasks are improving legal regulations, management and inspection activities, cleaning technologies and public awareness. Firstly, the law on water resources are needed to be revised to give clearer definition of responsibilities and coordination mechanisms between central and local authorities, among ministries and among local governments of provinces in one river basin. Moreover, an environment protection mechanism for one particular river basin with clear indication of environmental problems and provision of codes of conduct for relevant parties should be stated for every river basins. In addition, the inspection and monitoring system should be strengthen. Not only the enterprises that cause serious pollution are carefully investigated, the establishment of potential new pollution sources should be strictly banned. The governmental organizations have to carry out regular environmental inspection and investigation; moreover, the government should encourage the enterprises to implement self-monitoring programs and

regulations according to the Law of Environmental Protection (2005). Beside the industrial zones, the local water environmental protection organizations should cooperate to give careful measurements of pollution generated urban domestic activities. The fees on waste water discharged should also be revised and issued basing on the principle “polluters pay”. The fine collected would then be invested on improving environmental technologies as well as man power in environmental protection organizations. Public awareness is an important part in improving the water environment protection. As the residents in the river basins aware of the conditions of the basins and how that affects their lives, they would be more responsible and participate in protecting the surrounding environment.

In the particular cases of the 3 river basins concerned in this report, the solutions are more specific regarding the different conditions of the 3 basins. For Cau river basin, the immediate action should be to treat waste water released from industrial and mining activities in Bac Kan and Thai Nguyen, waste water from Bac Giang and Bac Ninh craft villages and domestic waste water from cities along the basin. The most serious polluted areas in the basin should be more concerned and controlled and investment permits for industrial activities such as mineral exploitation and paper pulp production should be strictly limited.

In Nhue-Day river case, the treatment of domestic waste water from Hanoi and other cities should be focused on. Moreover, a strict control should be applied to severely polluted areas such as To Lich river. In this basin, 5 industrial types that threaten the water environment (cassava starch processing, basic chemicals production, dyeing, leather tanning and paper pulp production) should be carefully considered before permission.

Finally, in Dong Nai river basin a similar treatment of domestic waste water should be applied not only to HCM city but also to other cities in the same basin. Several heavily polluted areas like Thi Vai river, Sai Gon river, Tay Ninh canal, etc. should also be strictly controlled like in other basins. However, there are 5 industrial types that should be temporarily banned from this river basin instead of limiting like in others. They include cassava starch processing, rubber latex processing, basic chemicals production, dyeing and leather tanning. At the same time, there are 5 other industrial types whose investment permission should be limited. These are plating industry, fishery processing, agricultural chemicals production and fertilizers production, and paper pulp production in Thi Vai river basin.

References

The environment report of Vietnam, MONRE 2006

The scientific reports on Cau, Nhue-Day, Dong nai rivers environment studies, VAST 2000-2007.