

Environmental Audit on the Water Quality Improvement Projects: Four Major Rivers of Korea (Korea)

Theme: Increasing the Impact of Environmental Audits

Author: Korea

Background

Since the First Clean Water Supply Plan, Korea's the first comprehensive water quality management plan, was announced in 1989, the Korea government has been making great efforts to improve the water quality of four major rivers¹ in Korea. The plan was followed by the Second Clean Water Supply Plan in 1993 and Comprehensive Water Management Plan in 1996, and approximately USD 15 billion was spent for the implementation of these plans from 1993 to 2000.

However, the water quality of the four rivers had not shown any significant improvement. On the contrary, in February 1998, the BOD level of Lake *Paldang*, the primary source of drinking water for the *Seoul* Metropolitan region, rose to as high as 1.5 mg/L, forcing the Korean government to develop new water quality management plans with different approaches independently customized for each of the four major rivers. For this, the Water-management Policy Coordination Commission headed by the Prime Minister was newly established. In November 1998, it came up with the Special Measures for Water Management in Han River Basin as its first work, followed by the Special Measures for *Nakdong* River Basin in 1999 and the Special Measures for *Yeongsan & Guem* River Basin in 2000².

A series of these special measures were noteworthy in that not only they were developed separately in accordance with each river's different characteristics but also first introduced many preventative measures against water pollution in addition to the post-contamination ones of the past.

The followings were the key points of the new water quality management plans - i.e. the special measures for the four major rivers:

- Water quality management policies: designation of River Basin Area, Total Pollutant Volume Regulation System, construction of additional sewage treatment plants, installation of buffer zone around rivers/lakes, regular river-cleaning operations.
- Financial sources: levy of the water-use charge, establishment of the River Basin Management Fund.

¹ The four major rivers: Han River, Nakdong River, Guem River and Yeongsan River.

² Meanwhile, some special acts for each of four major rivers, the legal basis of the newly developed special measures, were enacted in February 1992.

- Organizational improvement: establishment of the Basin Management Committee and regional River Basin Environmental Offices – subsidiary bodies under the Ministry of Environment.

Outline of the Audit

The Board of Audit and Inspection (BAI) examined the special measures for the four major rivers from February to October in 2001. The objectives of the audit were to find out the reasons why the water qualities of the rivers had not been improved as planned and to suggest the possible solutions.

This audit focused on the following points:

- Investment management for water quality improvement projects
- Appropriateness of relevant laws and regulations
- Regulation of contamination source location – i.e. polluter location
- Construction and operation of sewage treatment plants
- Process of livestock-sewage treatment

Methodology

This audit was planned as a performance audit. After collecting relevant qualitative and quantitative data from a variety of sources such as document review, field visit and interviews with many stakeholders, the audit team analyzed them from diverse angles.

Also, to maintain the professionalism of the audit, an environmental engineering specialist with a Ph. D degree was hired by contract, and two experts were seconded from the Ministry of Environment and the Environmental Management Corporation³). In addition, a special advisory group was formed with seven environmental experts from the private sector including three in the field of water quality management so that the audit team could benefit from their advice and opinions throughout the whole processes of audit from planning to reporting.

Audit findings and recommendations

Investment management for the water quality improvement projects

According to the special measures for the four major rivers, from 1996 to 2000, local governments were supposed to spend USD 11,185 million in total – USD 9,999 million transferred from the central government plus USD 1,186 million from their own purse - in the four rivers' water quality improvement projects such as construction of sewage treatment plants. Yet, some local governments turned out not to make planned investment on the pretext of the lack of funds, resulting in only USD 8,297 million of actual investment (74.2%

³ A non-profit public organization specialized in pollution control and environmental improvement.

of the expected amounts). Even worse, 9.9% of the spending, that is approximately USD 829 million, was used for other purposes like road building rather than water quality improvement.

Nevertheless, the Ministry of Environment (MOE), which is responsible for the management of investments on water quality improvement projects, could not take any sanctions against those local governments. It was mainly because MOE did not have any policy tools for ensuring the accountability of local governments such as post-project examination or feedback review.

Recommendations

BAI recommended that MOE adopt a post-project examination and feedback review system where local governments regularly report their own investments and the progress of the projects to MOE. The results of MOE's examination of the reports were to be reflected in the budget process for the next year's projects.

Designation of the Tap Water Source Conservation Zone (TWSCZ)

The TWSCZ was introduced for the purpose of securing clean tap water by conserving the source area. In accordance with the Tap Water Act, an area, where a tap water intake facility is installed or will be installed, is to be designated as a TWSCZ.

In the TWSCZ, any behaviors that could be a potential threat to preserving clean water are strictly prohibited. For example, the construction/reconstruction of certain kinds of buildings such as factories, livestock-sewage treatment facilities, restaurants and some residential buildings like multi-family houses is not allowed.

However, the Tap Water Act provided only where to designate the TWSCZ - i.e. the area where a tap water intake facility is installed or will be installed - without stipulating when to designate it -i.e. the timing of designation. As a result, out of 229 tap water intake facilities nationwide, the surrounding areas of 32 tap water intake facilities⁴⁾ had not yet been declared as TWSCZs although they had been in operation for one month to 34 years.

Also, even for 173 tap water intake facilities which were already designated as TWSCZs, designation was made one month to 61 years after the facilities had started their operation. It followed that more polluters could be constructed in the TWSCZs for that period, eventually worsening the water quality in those areas.

Recommendation

BAI recommended that MOE revise the related regulations to specify when to designate the TWSCZ.

Regulation of Polluter Location in TWSCZs

Regarding the regulation of polluters in the TWSCZ, a few loopholes were found in the special measures for the four rivers. Specifically, in the TWSCZs, it was not allowed to newly locate a

⁴ 83 intake facilities, which do not need to be designated as TWSCZs because they intake underground water, were excluded.

restaurant or lodging facility whose gross floor area was wider than 400m². It was, however, possible to change an existing building wider than 400m² into a restaurant or an accommodation, being used to circumvent the restriction. Also, while the occupation of water surface for water leisure business was not allowed, the land occupation for affiliated facilities such as a parking lot was, indirectly allowing for more pollution in turn.

Recommendation

BAI recommended that MOE take necessary measures to ban the aforementioned change of building use and land occupation

Construction and Operation of Sewage Treatment Plants

In regard to the construction and operation of sewage treatment plants, two problems were pointed out.

The first was inefficient execution of the construction budget. By applying exaggerated population growth rates when calculating the capacity of sewage treatment plants to be constructed, some local governments were pursuing to construct excessively over-sized ones. On the other hand, other local governments did not install any sewage treatment facilities in 20 riverside-towns due to the lack of budget even after recognizing the need. As a result, sewage from those towns flowed directly into the rivers without any processing.

The second problem was improper application of the water quality standards to the sewage treatment plants in design or construction phase. They were not designed in accordance with the new water quality standards which were supposed to be reinforced in 2004 but with the then one – i.e. 2001 standards, hence additional reinforcement works were expected to be unavoidable in the near future.

Recommendation

BAI recommended that relevant local governments adjust the size of the sewage treatment plants which were being constructed excessively big and revise the design of those to which the old standards were applied.

Livestock-sewage Treatment

The BOD level of livestock sewage is so high - 100 times as high as normal sewage - that it has a great influence on water quality. To process livestock sewage, the Korean government built public livestock-sewage treatment facilities. However, unlike normal sewage which is carried through the sewer to the treatment facilities, livestock-sewage must be manually transported to the treatment facilities because there was no sewer for livestock-sewage. So, the treatment facilities for livestock-sewage has an inborn weakness to be fully utilized.

In fact, out of 29 livestock-sewage treatment facilities nationwide, the operation rates of the 20 facilities were turned out to be below 50%. In addition, as the Ministry of Agriculture and Fishery had been encouraging recycling livestock-sewage as organic fertilizer and offering financial assistance for that, many farmers were increasingly turning to recycling. Thus, the demand for the public livestock sewerage system was likely to keep declining.

Moreover, from the economic and environmental viewpoint, recycling is more desirable since the installation and operation cost for the recycling facilities is less⁵⁾ than that of public livestock-sewerage facilities. Further, it has the side-effect of reducing the use of chemical fertilizer.

Nonetheless, some cases were found that several local governments were put forward with building new public livestock sewerage facilities with the purpose of only getting financial support from the central government.

Recommendation

BAI recommended that MOE gradually shift the policy for livestock-sewage from processing by public treatment facilities to recycling for the production of organic fertilizer.

Follow-ups on the BAI's Recommendations

Taking the BAI's recommendations, the Ministry of Environment prepared and carried out the following measures.

First, as for managing investment for water quality improvement, MOE adopted the post-project examination and feedback system as BAI suggested. To do that, MOE set up "Guidelines for the Execution of Transferred Funds" as a ministerial decree. The decree institutionalized MOE's regular examination of local governments' investments; reflection of the examination results in the next year's projects. It also made sure that if a local government does not invest its own share or not use the transferred funds for other purpose than water quality improvement, MOE would cut off financial supports for that local government.

Also, MOE decided to rectify the unreasonable legal provisions on TWSCZ designation and polluter regulation in the TWSCZs. In addition, it would rearrange the size and priority of sewage treatment facilities which were then under construction or scheduled to be constructed.

Second, as for the construction of public livestock-sewage treatment facilities, MOE decided to let professional researchers elaborate on short/long term plans and would re-examine the validity of the ongoing construction after on-site inspection.

Lessons Learned

The key principles of water quality improvement are to 1) locate less polluters, 2) let the existing polluters produce less sewage and 3) process the sewage before discharging. Yet, most of the funds for the water quality improvement have been spent on 3) so far. In particular, priority has been given to constructing and operating environmental infrastructure such as sewage treatment plants.

However, it is true that sewer system is often neglected even though it is as important as end processing facilities. In this regard, it is regretful that we did not fully examine the pipes

⁵ Whereas installation and operation cost of recycling was 15,000 \$/m² and 15 \$/m², respectively, that of public treatment facilities was 72,000 \$/m² and 25 \$/m².

connecting polluters and end processing facilities since most of them were installed underground, thereby requiring a lot of time and money for the investigation.

Another thing we had learned from this audit is the importance of public involvement in formulating a water quality management plan. We found that it is one of the most critical factors for a successful environment plan to collect extensive opinions from the stakeholders and advice from environment experts from the early stage. Of course, it would be very hard to draw up a plan satisfying all the stakeholders with different interests, but that would be still better than not being able to carry out the plan at all due to the objection of some stakeholders – typically, the residents in the waterside -, or finding out any crucial defects during the execution afterward.

Lastly, we'd like to say that the water quality of Korea's four major rivers has been steadily improving thanks to the efforts of the Korean government and people.