

Cost-Benefit Analysis of the Project for Sewerage Construction at the Ise Bay Area

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Ise Bay, located in the middle of Japan, is a prominent bay in the country with a population of more than ten million living in its area. The bay covers an area of 2,342 km² but its mouth, with a width of about 20 km, is quite narrow, thus allowing for only a limited exchange with seawater outside the bay and tending to cause an accumulation of pollutants. Hence, it has been recognized that there exists a necessity to purify seawater in the area. The departments of sewerage management of the four local governments of Aichi, Gifu, and Mie Prefectures, as well as the City of Nagoya, being close to the bay, have come together and created a plan for the purification of seawater called “Specific Water Body Advanced Wastewater Treatment Master Plan for the Ise Bay Area,” sewerage facilities for which are already in the process of construction.

This report is meant to give a cost and benefit analysis of the above plan, paying careful consideration to the effectiveness of environmental preservation. Benefits are calculated as the difference between “with” and “without” the project’s implementation. The same method will be applied in calculating the costs. For our analysis, we will assume that the seawater quality “with” the project’s completion in about 30 years will be set as the target quality, and “without” the project be set at present level.

The total cost includes the cost of constructing sewerage facilities, a community wastewater treatment plant, and other water purification measures for wastewater from point and non-point sources. On the other hand, the benefit is estimated taking into account effects on the overall living environment and the preservation of water quality in Ise Bay.

The environmental value of the preservation mechanisms is divided into six categories; Use Value, Option Value, Vicarious Value, Bequest Value, Existence Value, and Ecosystem Value. We applied the Contingent Valuation Method (CVM) in measuring these values. By using CVM, all of these environmental values, including the unusable ones, can be measured, although some of the answers in the questionnaire were too vague in terms of their willingness to pay, thereby tending to cause a margin of error. Therefore, the Use Value is measured applying the Travel Cost Method (TCM) together with CVM, while each of the other environmental value is calculated by multiplying the Use Value measured by TCM by its ratio to each value measured by CVM.

In terms of the effectiveness of constructing sewerage facilities, the result of the analysis shows that the cost-benefit ratio exceeds 1.0 by far. Although we did not address the effectiveness of environmental preservation of rivers in our study, the overall effect on improving environmental values showed a total benefit of over 30%.