

Towards a new evolution for sewerage

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1. Sewerage approaches a turning point

Sewerage works in Japan are approaching a major turning point. Until now, the policy emphasis has been on diffusion and expansion as a matter of pressing concern. From now on, however, stress will steadily shift towards safety and environment, with demands for proper management and operation. The basic tasks facing sewerage amid this process may be outlined as follows.

- Immediate tasks in developing sewerage infrastructure
 - Eliminating areas that lack wastewater treatment facilities
 - Addressing the frequent occurrence of concentrated torrential rains and the expansion of flood damage associated with climate change
 - Improving water quality in closed water areas through high-grade treatment
 - Reducing risks to aquatic systems by improving and upgrading sewerage functions related to public hygiene (e.g. improving combined sewerage)
- Tasks in terms of stock management
 - Risk management related to facility dilapidation and systematic asset management facilitating sustainable management
 - Enhanced earthquake resistance of sewerage facilities and retention of functions in the event of an earthquake
- Tasks associated with demographic change
 - Dynamic revision of plans in response to population decline and aging, introducing efficient methods of development and management
 - Strengthening sewerage management infrastructure
 - Contributing to vibrant regional development by making effective use of sewerage facilities and recycled water
- Tasks concerning the contribution to new environmental problems
 - Creating positive water environments by increasing the soundness of water and substance circulation systems
 - Helping to solve problems of global warming, resources and energy by using the resources, energy, etc., provided by sewerage

2. Research areas subject to priority efforts

In the field of sewerage research, we undertake priority research with emphasis on the following areas. In this way, we provide technical support for policies

that will form a pillar of national sewerage administration in line with the basic directions of new sewerage technology.

(1) Areas related to sewerage stock management

Sewerage stock management is a field that is attracting attention internationally, as illustrated by the fact that reviews are in progress with a view to ISO standardization. On the other hand, against a spate of road collapses and other incidents, there is increasing concern over the proper management of sewer pipes. Although pipe renewal and repair technology has progressed tremendously in recent years, we need to accurately grasp the state of deterioration of pipes, in order to make effective use of these technologies. To this end, we are conducting research in various areas based on information from local authorities all over Japan. These include research to establish a formula for predicting soundness that will provide a foundation for estimating the volume of future modification works, and research on methods of deciding priorities for surveys and modification (Fig. 1).

(2) Areas related to sanitary safety of treated wastewater

With the spread of sewerage systems, the volume of water carried by them has steadily increased, and this has had a relatively large impact on water environments. Meanwhile, the roles of treated wastewater as a water resource are expanding, as illustrated by its reuse in urban landscaping, recreational water, and so on. On the other hand, there have been outbreaks of health hazards caused by waterborne infectious pathogenic microbes including protozoa and viruses. As a result, there are demands that sanitary safety also be guaranteed for treated wastewater, reflecting the role it plays in water environments. Therefore, we are currently drawing up measures to ensure sanitary safety in line with the state of water use and purpose of using recycled water at sites of treated wastewater discharge, in connection with the norovirus (Fig. 2). We have also started studies on measures to address new types of influenza virus that are feared likely to become prevalent in connection with sewerage.

(3) Areas related to wastewater treatment using membrane treatment technology

Treatment technology using membranes in the process of solid-liquid separation efficiently removes microbes and has a strong capacity for retaining activated sludge. This is therefore considered a promising technique that can not only improve water treatment performance but also make treatment

facilities more compact, make facility modification and renewal smoother, save resources in operational management, and so on, thereby solving a number of problems currently facing wastewater treatment facilities. Thus, as well as promoting objective evaluation of the water treatment performance of membrane bioreaction (a combination of the conventional activated sludge with membrane treatment technology), we are also looking into technical issues and matters for study when attempting to introduce it into actual facilities as a method of treating wastewater.

(4) Areas related to reducing the burden on the global environment

With the effectuation of the Kyoto Protocol, we are expected to take initiatives to meet targets for greenhouse gas reduction. While sewerage works are a source of greenhouse gas emissions, their rich potential as resources and energy (such as treated wastewater and wastewater sludge) could contribute to solving the depletion of resources and problems of the global environment. We are currently studying this dual relationship between sewerage and greenhouse gases, with respect to reducing emissions of nitrous oxide arising from the wastewater treatment process (mitigation measures), and the effect of reducing greenhouse gases through recycled use of treatment water (adaptation measures). Finally, we are also studying the LCA technique in relation to sewerage facilities, with a view to accurately assessing the environmental burden arising from sewerage and the effectiveness of countermeasures.

3. Further use of sewerage technology

Currently, activities designed to solve the world's water and sanitation problems and the problems of global warming using sewerage technology accumulated by Japan are being developed in the field of sewerage. The Global Center for Urban Sanitation (GCUS), a body representing the industrial, public and academic sectors, was established for this purpose. GCUS is now pursuing concrete studies based on the hypothesis of targeted countries and issues, and our Department is playing a positive part by contributing to technical aspects. Through this kind of initiative, we expect that steps will be taken to diffuse sustainable sewerage systems based on accumulated Japanese knowhow, from planning and construction to management and operation; and that this, in turn, will assist the further development of Japan's sewerage technology.

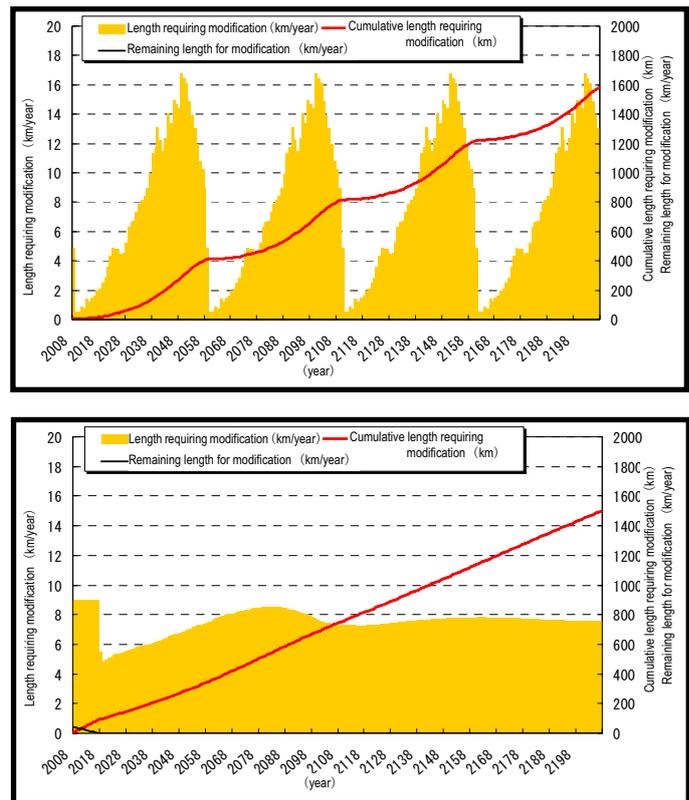


Fig. 1 Example of calculations for future works volume in a model city
(top: with simple modification after 50 years, bottom: when using the formula for predicting soundness)

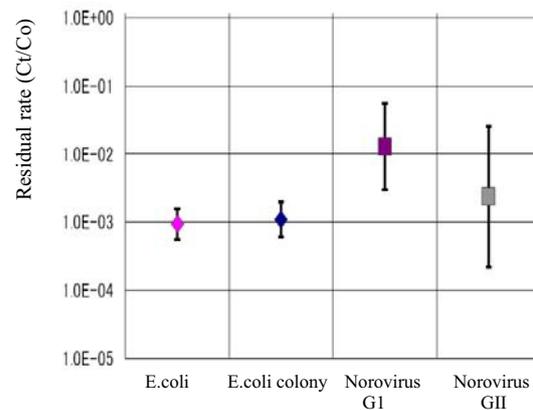


Fig. 2 Comparison of chlorine sterilization for norovirus and E.coli