

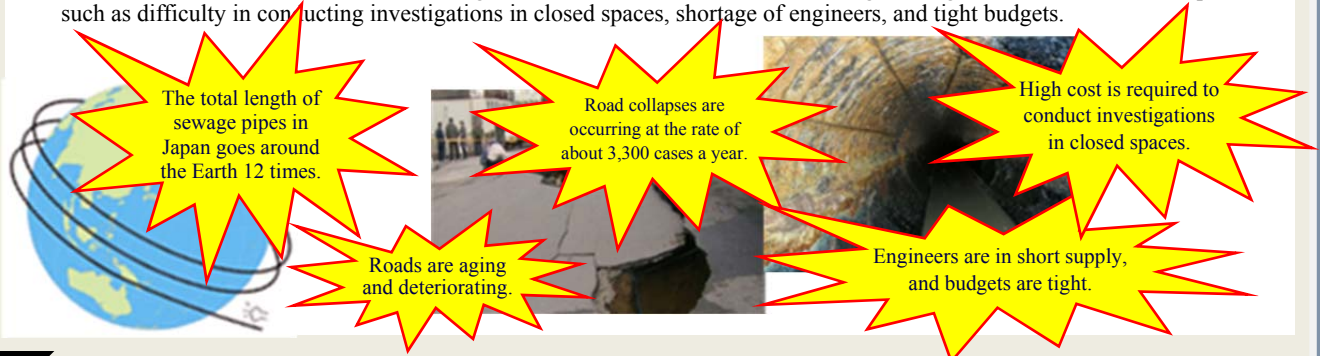
Support for improvement of the efficiency of sewage maintenance and management using the data of deterioration in 280,000 spans of pipes around Japan

Water Quality Control Department

Japan has extremely long sewage pipes where the total length is long enough to circle the Earth 12 times (about 470,000 kilometers). We are conducting research to support the efficient maintenance and management of pipes to prevent accidents, such as road collapse caused by defects in aging pipes (e.g. corrosion, crack, misaligned joints) with limited budgets and human resources.

Social background and problems

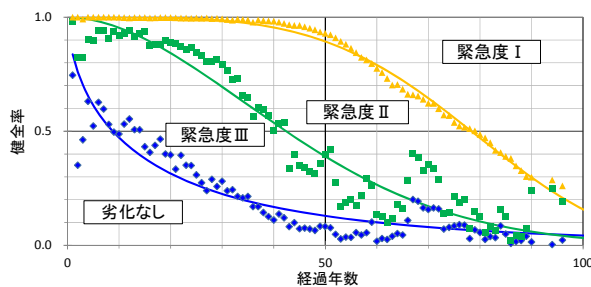
- The length of sewage pipes is now as long as about 470,000 kilometers. The number of road collapses caused by sewage pipes is occurring at about 3,300 cases a year.
- The revision of the Sewerage Act in 2015 included the establishment of maintenance, management, and repair standards and mandated inspections at the proper times.
- The use of efficient maintenance and management methods is needed because sewage management is associated with problems, such as difficulty in conducting investigations in closed spaces, shortage of engineers, and tight budgets.



Content of this study

Tool to support the improvement of the efficiency of sewage pipe maintenance and management—Soundness forecast formula 2017

Soundness forecast formula 2017 is prepared to express age-based changes in the ratio of deteriorating pipes based on the NILIM pipe investigation data (including pipe types, age, conditions of deterioration) covering about 280,000 spans of pipes around Japan. The soundness forecast formula is released to support the establishment of inspection and investigation plans by local governments and to improve the precision of forecasting the amount of renovation work.



The soundness ratio curve of all pipe types (concrete pipe, ceramic pipe, and PVC pipe)

- ◆ 劣化なし
- 劣化なし～緊急度Ⅲ
- ▲ 劣化なし～緊急度Ⅱ
- 劣化なし
- 劣化なし～緊急度Ⅲ
- 劣化なし～緊急度Ⅱ

区分	緊急度の区分	
緊急度Ⅰ	重度	速やかに措置が必要な場合
緊急度Ⅱ	中度	簡易な対応により必要な措置を5年未満まで延長できる
緊急度Ⅲ	軽度	簡易な対応により必要な措置を5年以上に延長できる
劣化なし	健全	—

Span refers to the interval between manholes.

Soundness ratio refers to the ratio of sound pipes among all pipes. The soundness forecast formula is the formula expressing the relationship between the soundness ratio and age.

Preparation of the pipe investigation as open data (Pipe Deterioration Database)

Pipe investigation data used to prepare the soundness ratio forecast formula (except for some data) is released as the Pipe Deterioration Database. The data from 56 organizations and about 250,000 spans of pipes are now released. The data are supporting local governments in the establishment of inspection and investigation plans, such as the preparation of soundness ratio forecast formulas based on regional conditions and the identification of prioritized sections for inspection and investigation. The data are available to the public to accelerate technological research and development by getting academia and industries involved.

Prevention of road collapse caused by sewage pipes and realization of sustainable sewage service
Promotion of technological research and development by making the data available to the public

Relevant article

- NILIM press release <http://www.nilim.go.jp/lab/bcg/kisya/journal/kisya20170627.pdf>