

The present conditions and existing problems of the public toilet in Changchun City, China

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Abstract: The public toilet is one of the main sanitary and environmental problems in developing countries. In our study, a survey was carried out in Changchun City to investigate the conditions and problems of local public toilets, being the primary stage of the bio-toilet application research project, which may solve the problem and achieve water saving, load reduction and organic waste resourcecelization.

1. Introduction

There are many sanitary and environmental problems caused by imperfect sanitation system in developing countries. In order to solve the problems, many of these countries are developing their conventional system that is comprised of water flush toilet, sewers and treatment plant, but Fig.1¹⁾, which shows the correlation between average GDP and sewer coverage ratio in Tokyo in recent 40 years, points out that it has to take a long term to complete their sewers as better as those in Japan.

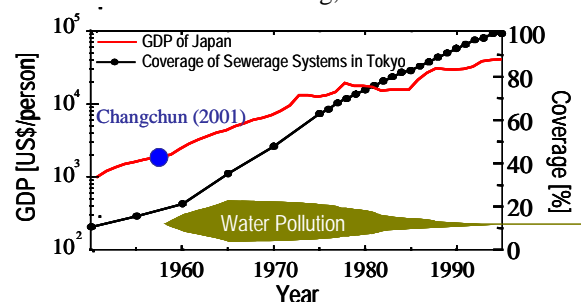


Fig.1 Development of sewerage in Tokyo Metropolis

Therefore many researches on the sanitation system pay attention to those economic ones. Our research is about sustainable sanitation system through the reform to traditional toilets. In order to carry out this research in Changchun City, China, it is necessary to do the survey on local toilet since different cities have their uniqueness on the toilet. Firstly, we did the public toilet survey because it was easier than those on household ones. Moreover, the survey on the public toilet could depict the real scenario of the sanitation system in developing countries since it stands for the common toilet level serving for poor groups.

2. Survey

The survey was carried out in two typical areas of downtown and countryside of the city, including type, management and sanitary equipment as well as other associated aspects such as excretes disposal, etc.

(1) Type and condition of public toilet

Total 41 public toilets, which were comprised of three types of water flush, latrine and temporary toilet, were investigated in our survey. Fig.2 shows the categorization of the toilets, from which we can see that it can also be categorized into pay toilet and charge free toilet.

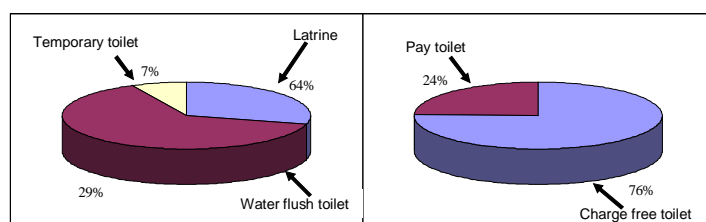


Fig. 2 The categorization of investigated public toilet

Fig. 3 shows the appearance and inside of the typical latrine, which accounts for the biggest portion among the investigated toilets. Our survey reveals that except for a few pay-toilets, the conditions of most toilets are not satisfied. The common problems are malodorous, leakage and not-in-time feces collection, caused by three factors of facility level, management level and users' manner. Sometimes the manhole connecting to the toilets overflows due to insufficient maintenance.

(2) Public toilet management

Most of the investigated public toilets are owned by local Environment and Sanitation Bureau, the others are owned by individual institutions. Environment and Sanitation Bureau also gets responsible for the maintenance of all septic tanks in the city. The routine cleaning and maintenance of the charge free toilet is undertaken by the staff who is paid by the owners, but

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the pay toilet is managed by so-called contractor who signs the contract with the owner. In this case, the contractor has to pay US\$ 1000 to 1500 per year to the owner besides paying labor and operating cost by his own. The charge level of the pay-toilet is US\$ 0.03 to 0.06 per person. Sometimes the staffs who station on the pay-toilet manage a small shop to make extra money.

(3) Feces disposal

Except for a small portion that to be treated in wastewater treatment plant, most of the feces in the city retain in the septic tanks and latrines which have to be collected periodically. Now all the collected night soils are conveyed to a disposal site on the suburb by tank-lorries. It seems no other methods are available to dispose these feces except to be dried in the nature.

3. Problems and discussions

(1) Surface water pollution

Due to a considerable portion of wastewater directly discharge into the rivers without any treatment, the organic waste pollution in the city is very serious, which is very common in most developing countries.

The eutrophication is very serious as well. In some river sections, the monitored TN and TP concentrations are as higher as 200 and 40ppm, which are 100 times of Chinese standards. Human excretes is thought to be the main sources of organic waste and nutrients in the river, because the traditional sanitation system that is comprised of water flush toilets, sewers and treatment plants in the city is imperfect by far.

(2) Sanitation problems

The common sanitation problems caused by toilets are odor and epidemical risks. In many places where domestic water is not available, people have to drink ground water drawn from local shallow aquifers. Obviously they have to use latrine rather than water flush toilet, thus the epidemic risk could be very high since shallow aquifer is very easy to be contaminated. Besides by threatening drinking water, the diseases can also be disseminated by the fly that is easy to be bred in the toilets.

Our survey also reveals that the centralized feces disposal system in the city is not good enough. Local ground water is easy to be contaminated because there is no waterproof system to be laid underneath the tanks. Moreover, in case of heavy rain, the water overflowed from the tank will contaminate everywhere it flows through.

(3) Sustainable sanitation system

The uniqueness of our research is the recycling of organic waste since the traditional 'one-way' system is considered to be no longer appropriate in the world. In our research the sustainable sanitation system is realized through bio-toilet, which is a flush-water-free device to decompose the organic waste such as feces and garbage by sawdust without adding any other materials. Being the organic fertilizer, the composed waste from the bio-toilet can be directly applied into the cropland.

Through the survey on public toilets, we found that our research is suitable for solving local sanitary and environmental problems by achieving load reduction, water saving, epidemical risks minimization and organic waste resourcelization.

But it should be noticed that cold weather, high equipment price and users' behavior would affect the application and popularization of the bio-toilet in the city. Our further research will focus on the way to minimize these influences.

4. Conclusion and further research

To sum up, through our survey we obtained the basic knowledge about the type, condition, management, feces disposal as well as some other aspects of public toilet in Changchun City.

Our further co-research in Changchun aims at site and lab experiments of the bio-toilet and questionnaire survey to the publics and users. This research is under the cooperation with China Northeastern Normal University.

Reference

(1) Tadaharu Ishikawa, Toru Nakanishi and Xin Qian, Metro Manila-in search of a sustainable future, University of the Philippines Press, 2002, pp.243-251.



Fig. 3 Typical latrine in the city