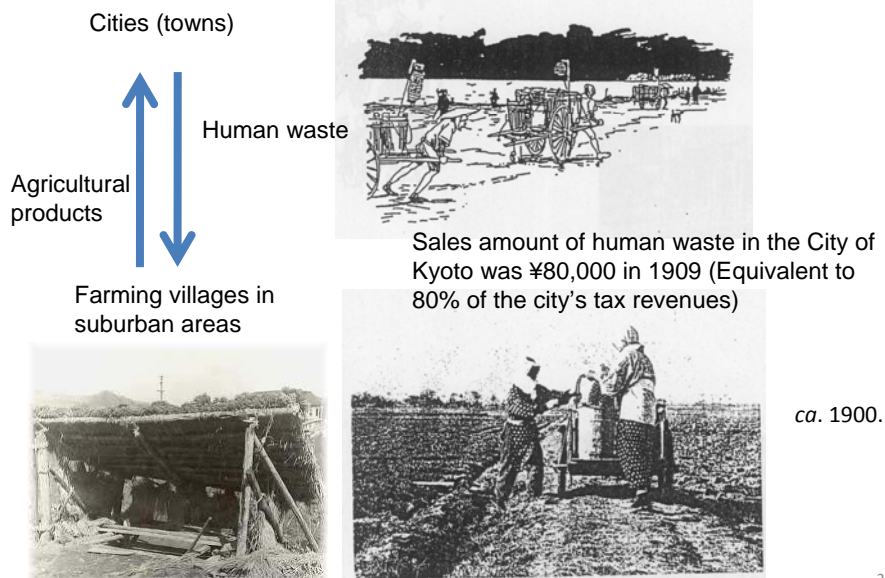


Strategy for extending sanitation services by an integrated coverage with on-site and off-site systems in Japan

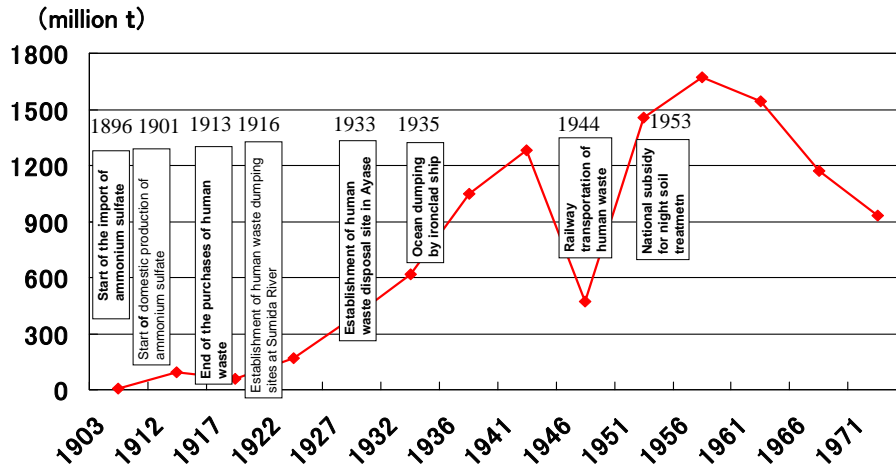
Professor Satoshi Takizawa

Department of Urban Engineering, Graduate School of Engineering, the University of Tokyo

Human waste (night soil) in cities was a valuable fertilizer in Japan until 100 years ago



Increase of chemical fertilizer (ammonium sulfate) consumption and changes of human waste disposal methods

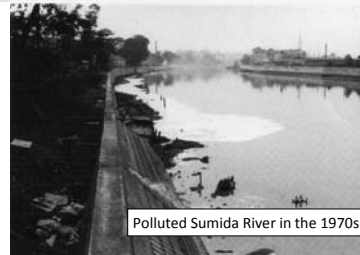


(Dictionary of Plant Nutrition and Soil Fertility: published by Yokendo, 1980)

3

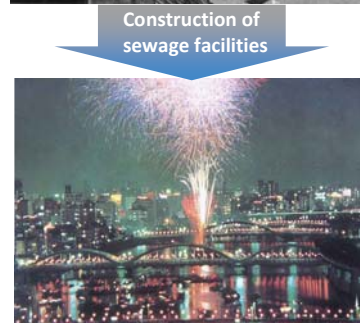
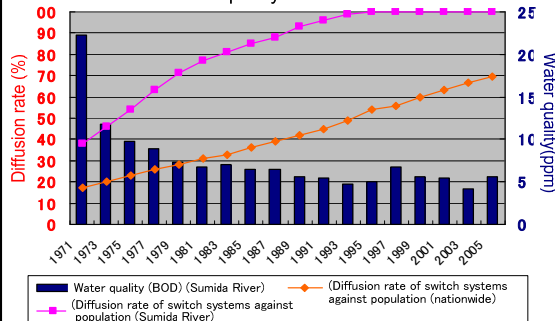
Pollution and clean-up of Sumida River

- ✓ In Japan, legal and institutional improvement, in addition to technological development in the 1970s, has enabled the rapid increase of sewerage coverage, leading to the improvement of river water quality and urban environments.



Polluted Sumida River in the 1970s

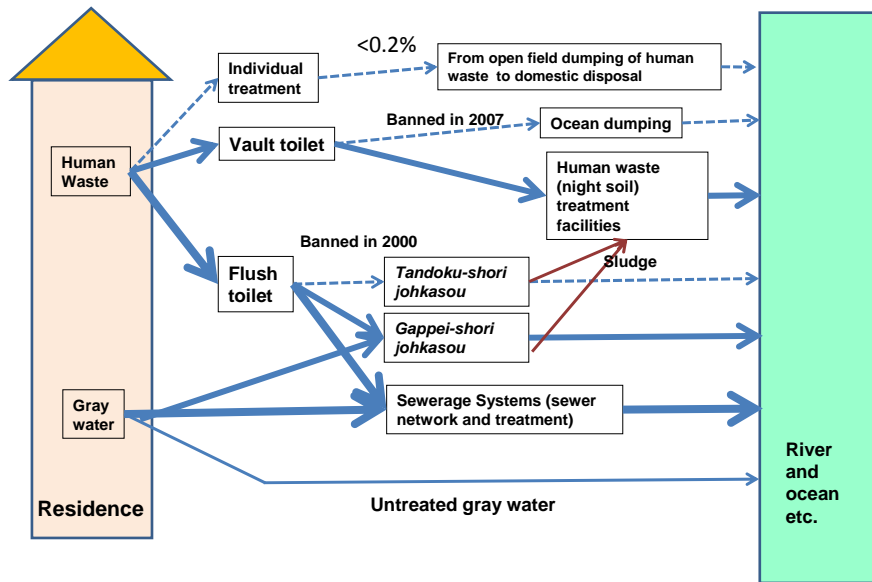
Diffusion of sewage systems and change in water quality of Sumida River



Water quality improvement resulted in the restoration of a fireworks show on Sumida River

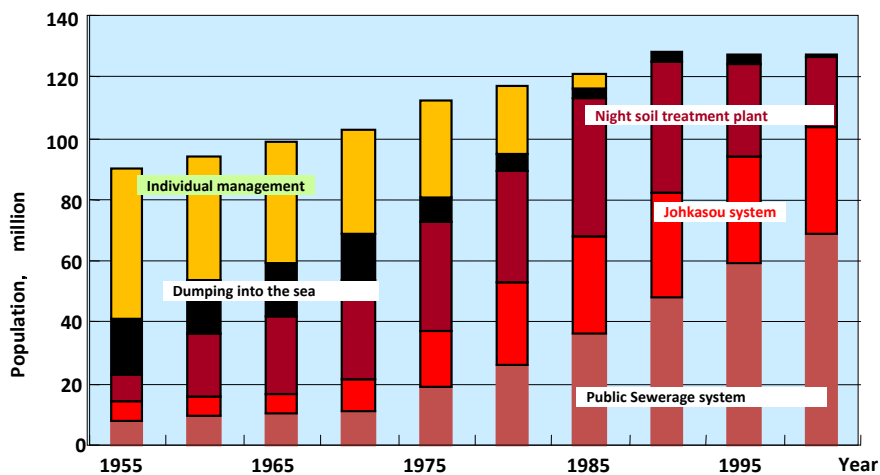
4

A Variety of Types of Sanitation Facilities in Japan



5

History of Domestic Wastewater Management in Japan



Changes of treatment and disposal methods of domestic wastewater in Japan(1955-2000)

6

Inception of sewerage in Japan

Construction of the modern sewerage systems started about 130 years ago in major cities in Japan, as a countermeasure against flooding and for prevention of epidemics.

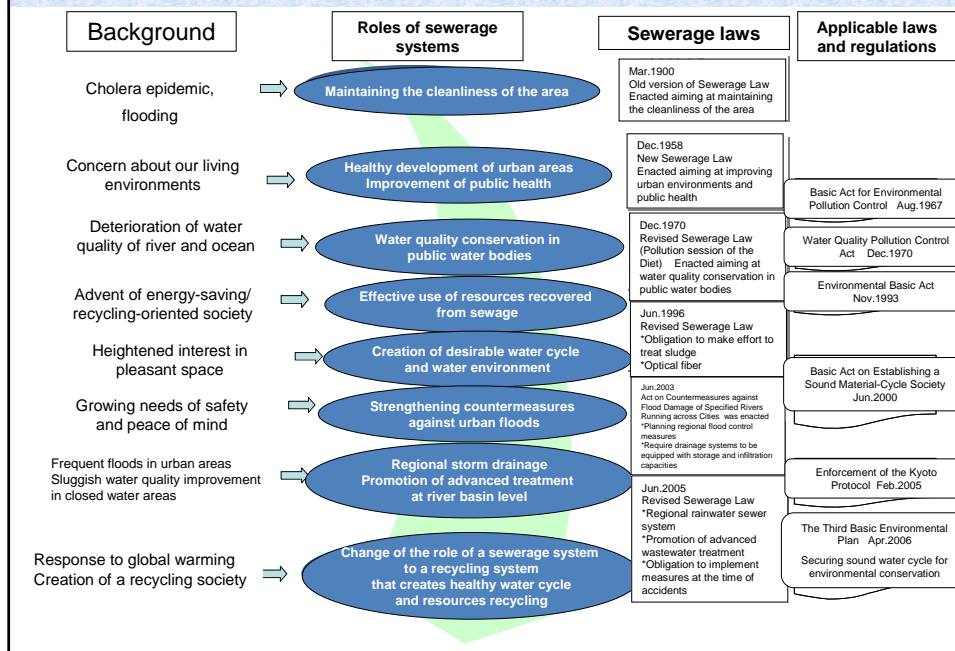


Mikawashima wastewater treatment plant, Tokyo
(the first plant of this kind in Japan:1922)

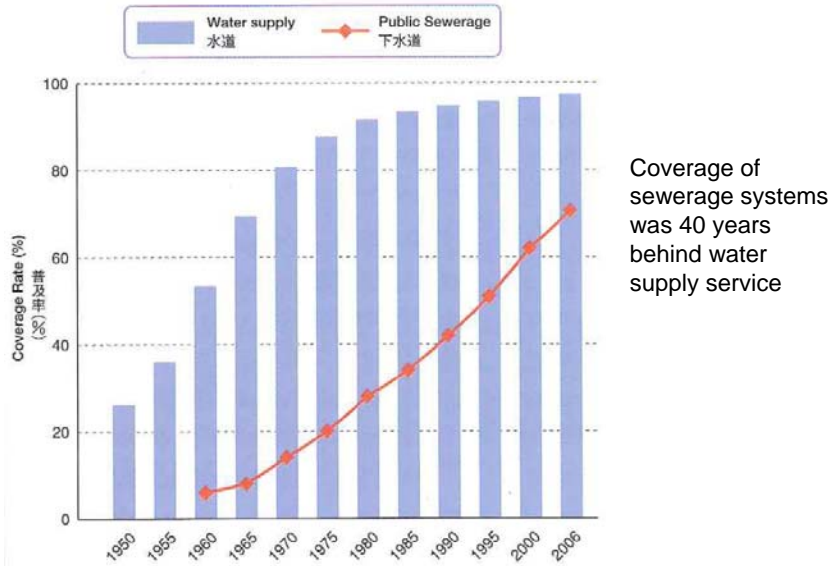


Brick-made sewer, Yokohama
City (1881)

Changing roles of sewerage systems



Extension of water supply and sewerage systems



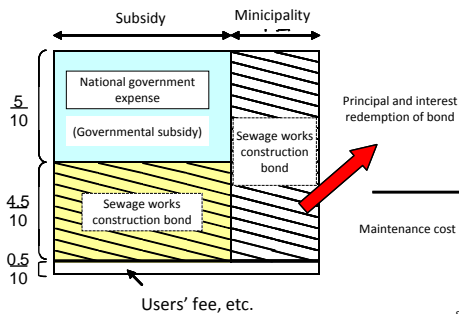
9

Financial system supporting evolution of sewerage service

In view of personal benefits, such as flushing of toilets, and public policy objectives including water quality conservation of public water area and control of flood, the national government expenses, local expenditure, and charges have been properly combined to promote the sewerage service.

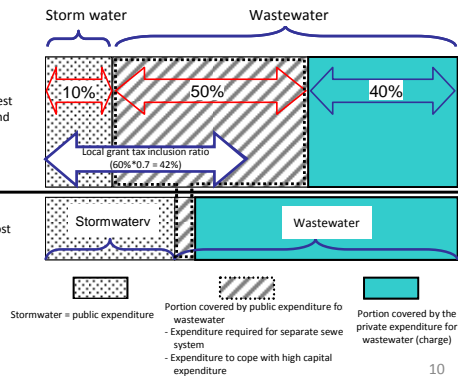
Fund composition for construction costs

Example: Separate sewer system



Fund composition for sewerage maintenance costs

Example: Treatment area with the internal population density of 25 – 50 people/ha

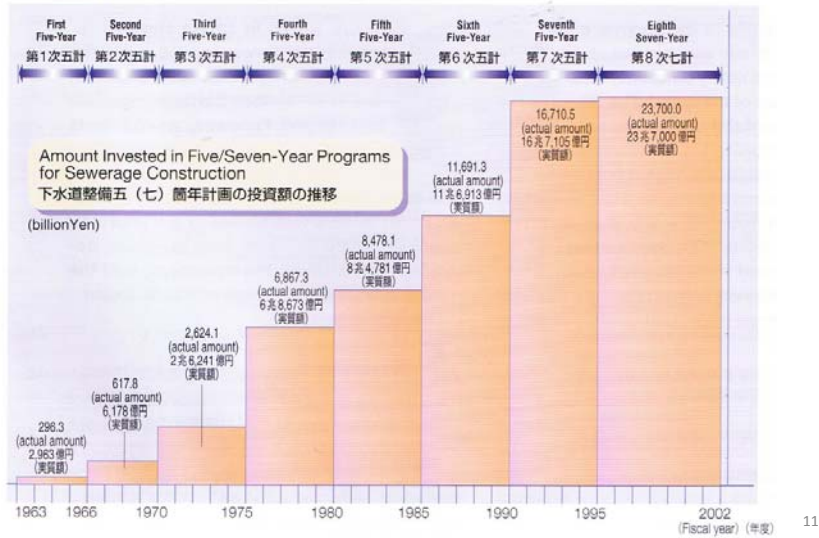


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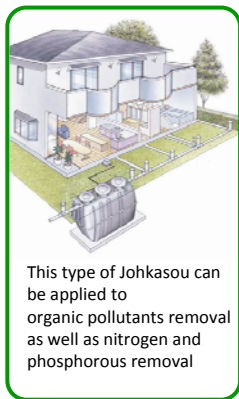
Expanding coverage through well-planned investment in sewage works

Progress of Investment in Sewage Works in Japan at a Glance 下水道投資額の推移



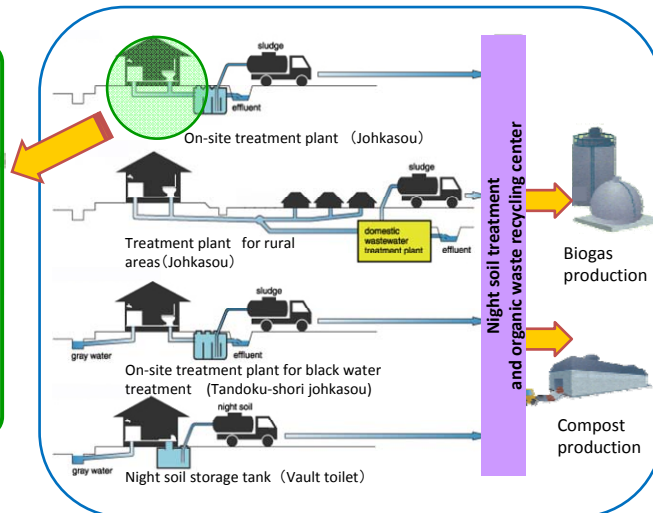
11

On-site Sanitation Systems (Johkasou) and night soil treatment



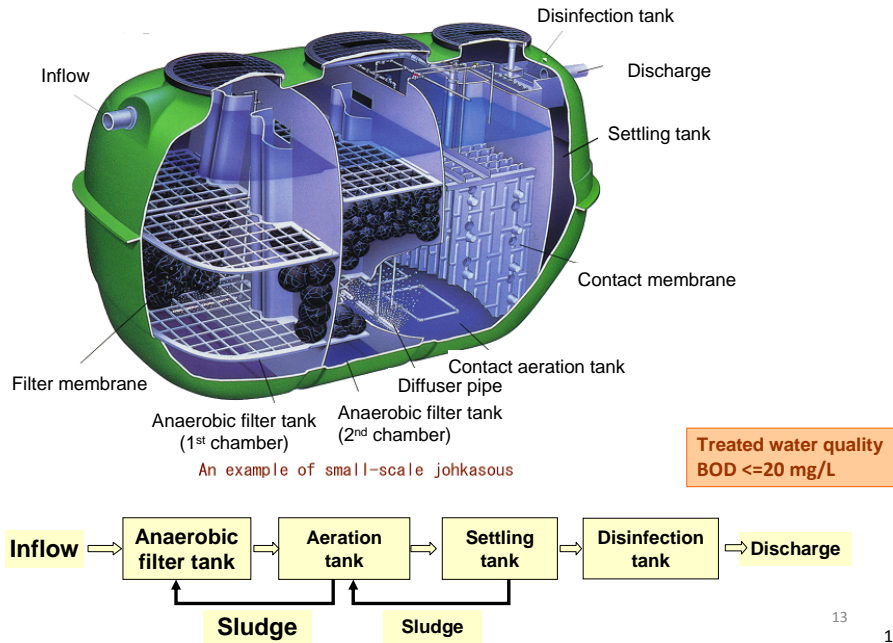
This type of Johkasou can be applied to organic pollutants removal as well as nitrogen and phosphorous removal

On-site treatment plant for individual houses (Johkasou)



12

On-site treatment facilities (johkasou) in Japan

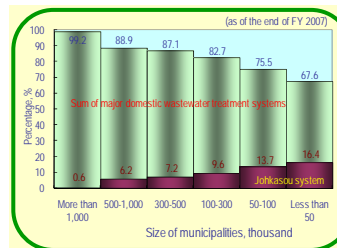


13

13

Advantages of On-site Sanitation Systems (Johkasou)

- Low initial investment cost, high treatment performance
- Little topographic limitation, short installation time and early realization of the effects
- Invaluable contribution to maintaining sufficient water in small rivers and aquatic environments near inhabited areas
- Johkasou-treated water and sludge are easy to reuse
- Be flexible enough to respond to depopulation society
- Less vulnerable to earthquakes and other disasters



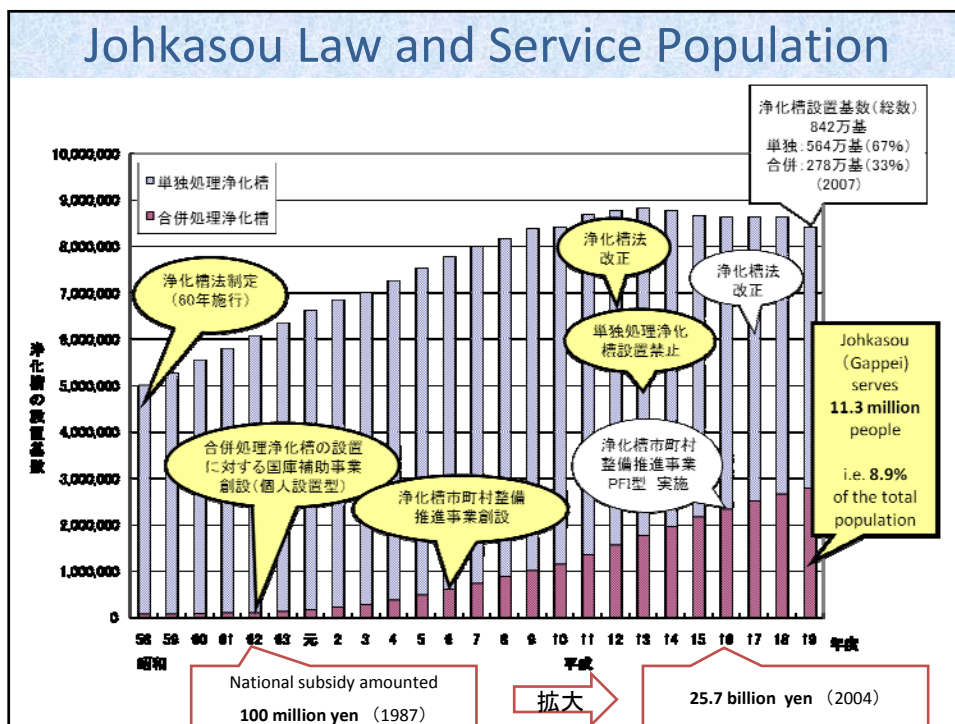
14

Johkasou Law and Service Population

- 1983: Johkasou Law, 1985 set into effect.
 - Regulating manufacturing, installing, operating and sludge-disposal of johkasou.
- 1987: National subsidy program for individuals, 100 million yen.
- 1994: Subsidy to municipalities for promotion of gappei-johkasou
- 2000: Revision of Johkasou Law, banning tandoku-shori johkasou.
- 2004: National subsidy amounted 25.7 billion.
- 2008: Johkasou serves 11.3 million people, i.e. 8.9% of the total population.

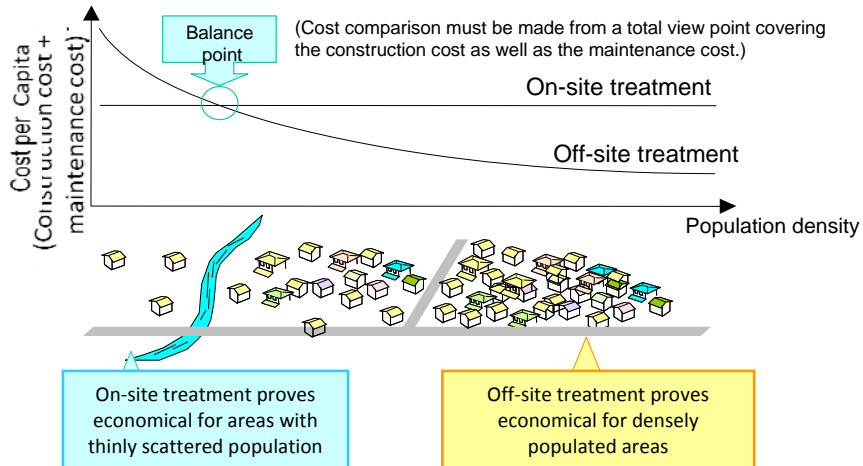
15

Johkasou Law and Service Population



Sanitation systems based on population density and the cost

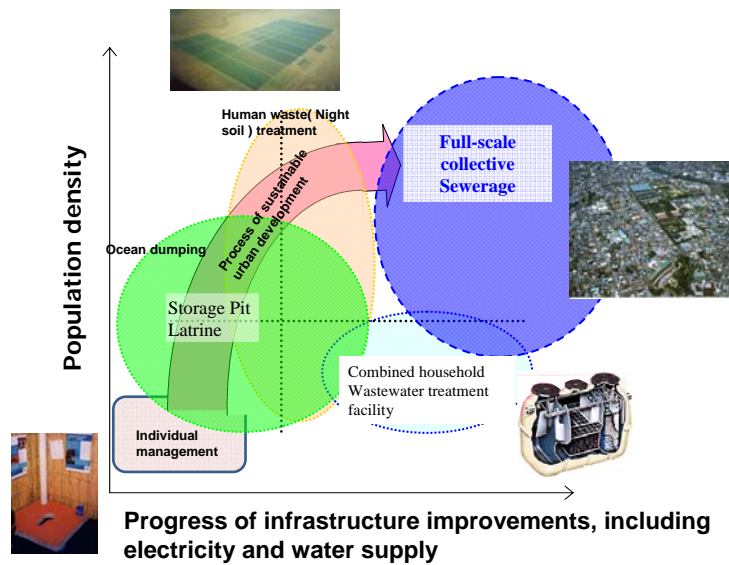
Conceptual diagram of cost comparison



※In comparing the cost per person between centralized treatment (sewerage systems, rural sewerage systems etc.) and individual treatment (*gappei-shori johkasou*), there is an equilibrium point, which is determined by the characteristics of the region.

Choice of appropriate sanitation systems considering degree of urbanization (population density) and social overhead capital investment into account

Human waste (Night soil) treatment



JSC: Japan Sanitation Consortium

- In June, 2009, Japan was internationally recognized as a knowledge hub in the sanitation sector in Asia-Pacific region
- The Japan Sanitation Consortium (JSC) was launched by sanitation-related organizations (October 16, 2009). It aims to make use of Japan's experience in order to overcome sanitation problems in Asian countries.

※Japan Sanitation Consortium

○ JSC will work in cooperation with ADB as a base for sanitation-related activities in Asia-Pacific region

○ Member Organizations

- Sewerage Business Management Center
- Japan Environmental Sanitation Center
- Japan Sewage Works Association
- Japan Education Center of Environmental Sanitation

Asia-Pacific Water Forum KnowledgeHubs

※Excerpt from the webpage of APWF

GCUS (Global business development of Japan's advanced sewage technology)

- In Japan, the Global Center for Urban Sanitation (GCUS), government and academia work together in supporting the global business development of Japanese companies through the promotion of their advanced technologies and assistance of their project formulation
- ※Japan Global Center for Urban Sanitation

International hub for the resolution of global sanitation issues

Global Center for Urban Sanitation

This international center is aimed at enhancing the international cooperation in the sewerage sector that has been undertaken by Japan, gathering every piece of know-how of industry, government and academic community from planning and construction to management and operation, and disseminating sustainable sewerage system in the overseas.

Secretariat
Japan Sewage works Association

Japan's advanced sewage technology

Membrane process Technology

Technology to make sewage sludge a source of energy

Technology to lay pipes without open cutting

Achievements have been made in Taiwan, China, U.K. and Singapore

Conclusion

- History of sanitation in Japan: custom of storing
 - Cause less environmental pollution
 - From ocean dumping to night soil treatment
- Spread of flush toilets: further improvement of living environments
 - Sewerage systems cover densely-populated areas and work as storm-water drainage facilities in urban areas
 - (*Tandoku-shori/gappei-shori*) *Johkasous* cover thinly-populated areas
- Japan's experience: key to the improvement of sanitation
 - High coverage rate of Japan's sanitation services was realized by an ideal combination of on-site and off-site systems
 - Financial support
 - Regulations and standards / standardization
 - Hygiene education