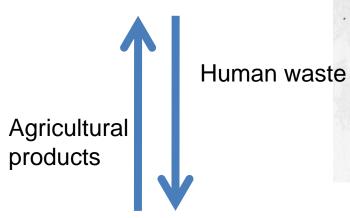
Awareness Workshop in Aizawl 28/02/12

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

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Human waste (night soil) in cities was a valuable fertilizer 100 year ago

Cities (towns)



Farming villages in suburban areas





Sales amount of human waste in the City of Kyoto was ¥80,000 in 1909 (Equivalent to 80% of the city's tax revenues)



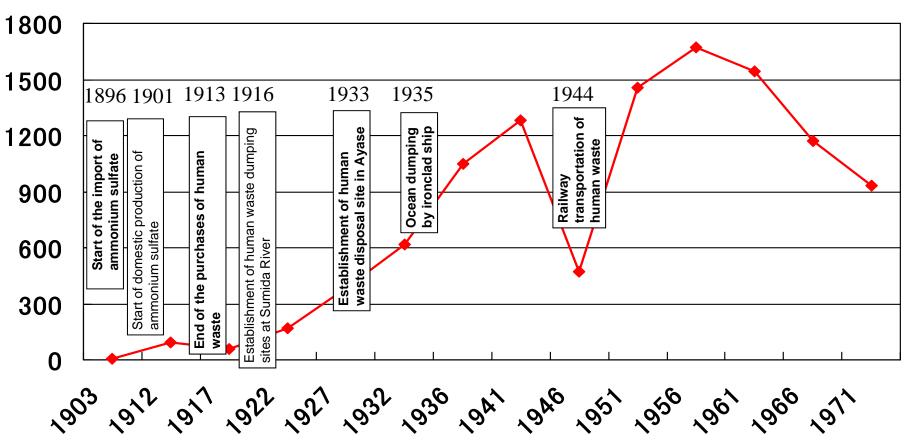
ca. 1900.

Impact of Cholera outbreaks

- The first priority was set to prevent Cholera outbreak
- Water supply was under focus since V. Cholera isolation by R. Koch (1884).
- Water supply was first developed also in Japan, followed by sewer systems after World War II.

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



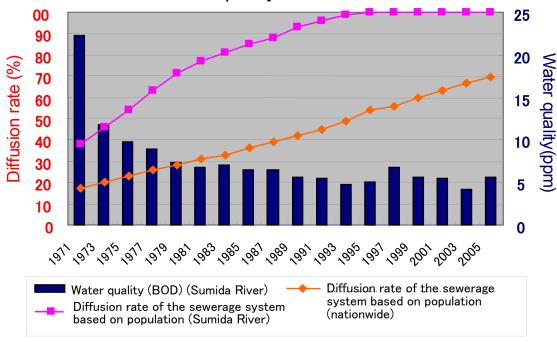


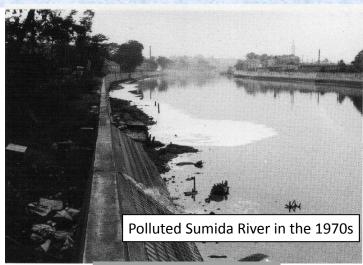
(Dictionary of Plant Nutrition and Soil Fertility: published by Yokendo, 1980)

Pollution and clean-up of Sumida River

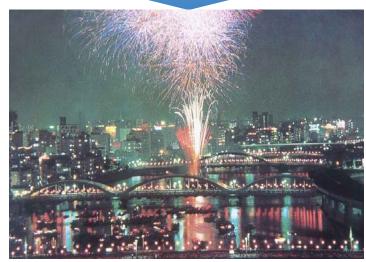
✓ In Japan, legal and institutional improvement, in addition to technological development in the 1970s, has enabled the rapid increase of sewerage coverage, leading to the improvement of river water quality and urban environments.

Diffusion of the sewerage system and change of water quality in Sumida River



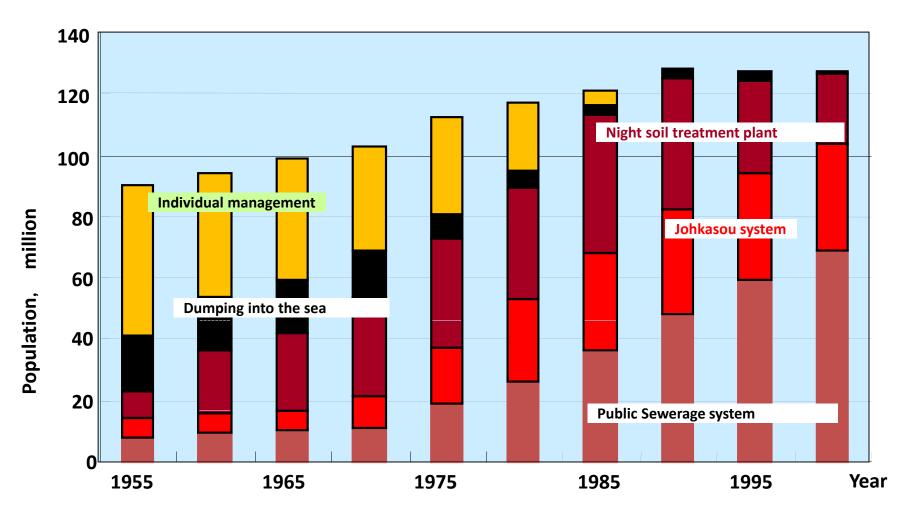


Construction of sewerage facilities



Water quality improvement resulted in the restoration of firework displays along Sumida River

History of Domestic Wastewater Management in Japan



Development of domestic Wastewater management in Japan(1955-2000)

Wastewater Law

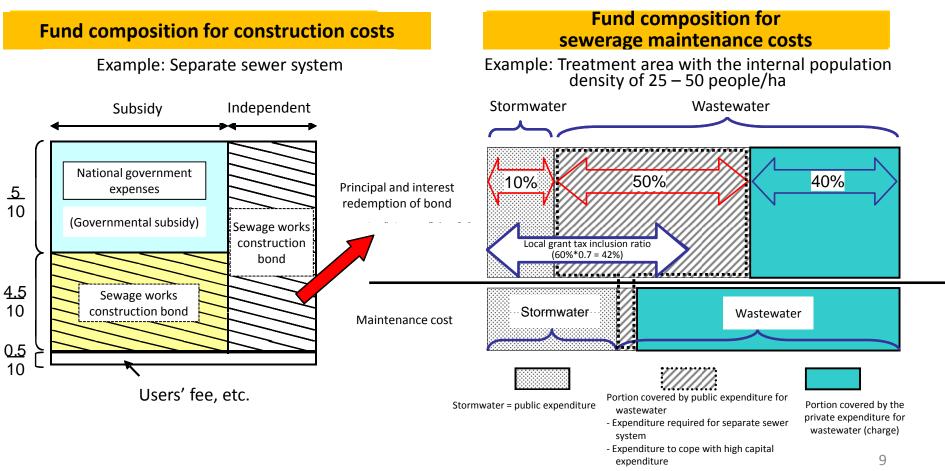
- Local governments are primarily responsible for public health and the promotion of a sound city environment as well as the protection of public water bodies.
- To ensure water quality, local governments have the responsibility for the planning, construction and operation of wastewater treatment systems.
- Rainwater management is also included in local governments' responsibilities.

Changing purposes of sewerage systems

Purposes of sewerage Applicable laws Background **Sewerage Laws** systems and regulations Mar.1900 Old version of Sewerage Law Cholera epidemic. Maintaining the cleanliness of the area Enacted aiming at maintaining the cleanliness of the area flooding Dec.1958 New Sewerage Law Enacted Heightened interest in Healthy development of urban areas aiming at improving urban Improvement of public health living environments environments and public Basic Act for Environmental health Pollution Control Aug.1967 Deterioration of water Dec.1970 Water quality conservation in Revised Sewerage Law Water Quality Pollution Control quality of river and ocean (Pollution session of the Act Dec.1970 public water bodies Diet) Enacted aiming at water quality conservation in **Environmental Basic Act** public water bodies Advent of energy-saving/ Effective use of resources recovered Nov.1993 recycling-oriented society from sewage Jun.1996 Revised Sewerage Law *Obligation to make effort to Heightened interest in Creation of desirable water cycle treat sludge *Optical fiber and water environment pleasant space Basic Act on Establishing a Sound Material-Cycle Society Jun.2003 Act on Countermeasures against Jun.2000 Growing needs of safety **Strengthening countermeasures** Flood Damage of Specified Rivers Running across Cities was enacted against urban floods and peace of mind *Planning regional flood control measures drainage systems to be equipped with storage and infiltration capacities Frequent floods in urban areas Regional storm drainage Enforcement of the Kyoto Sluggish water quality improvement Promotion of advanced treatment Protocol Feb.2005 Jun.2005 in closed water areas at river basin level Revised Sewerage Law *Regional rainwater sewer system The Third Basic Environmental *Promotion of advanced Plan Apr.2006 Change of the role of a sewerage system wastewater treatment Response to global warming Securing sound water cycle for *Obligation to implement to a recycling system environmental conservation Creation of a recycling society measures at the time of that creates healthy water cycle accidents and resources recycling

Financial system supporting the evolution of sewerage services

In view of personal benefits, such as flush 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.

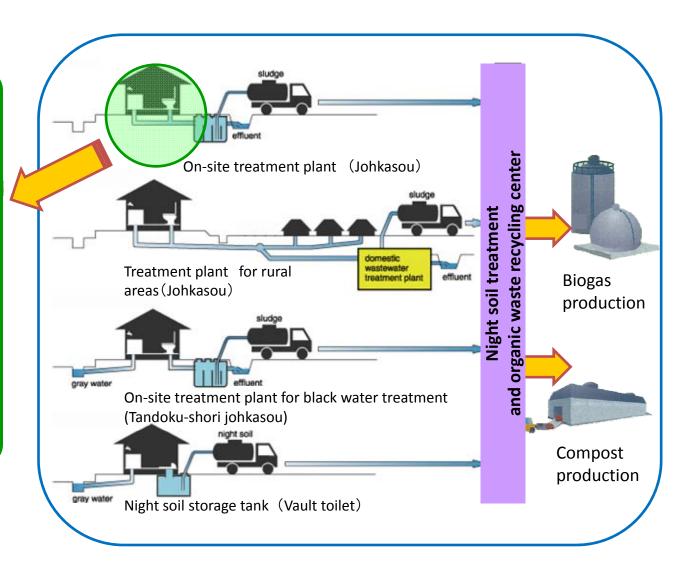


On-site Sanitation Systems (Johkasou) and night soil treatment



This type of Johkasou can be used for organic pollutants removal as well as nitrogen and phosphorous removal

On-site treatment plant for individual houses (Johkasou)

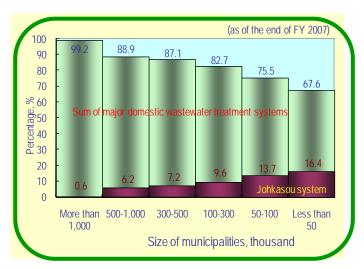


Advantages of On-site Sanitation Systems (Johkasou)

- 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 population decrease
- Less vulnerable to earthquakes and other disasters



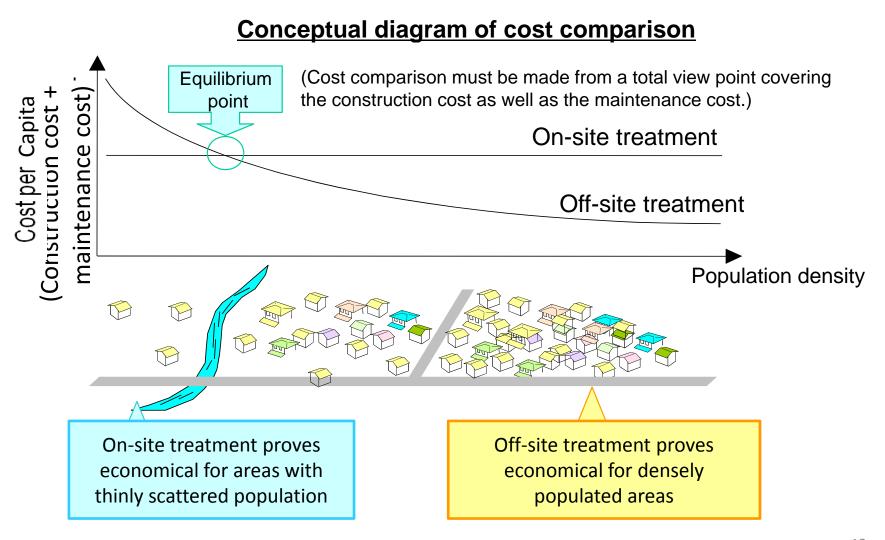




Johkasou Law and Service Population

- 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.

Sanitation systems based on careful study of population density and the cost



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 thinlypopulated 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

Thank you

Thank You for Your Attention

Data on sewerage charge

User's charge per month
 (average water consumption amount from typical family: 20m3/month)

(USD/20m3/month)

year	1996	1997	1998	1999	2000
Major Cities	14.6	15.3	15.9	16.5	17.2
General Cities	21.0	22.0	22.7	23.3	24.3
Average of Nation	20.9	21.9	22.6	23.2	24.2

International charge comparison

(USD /20m3/month)

	Sewerage	Water supply	Sewerage/ water supply
Tokyo	16.9	25.8	0.65
Hamburg	57.4	32.3	1.78
Berlin	41.8	29.2	1.44
New York	11.3	7.1	1.58
Paris	13.9	32.4	0.42
London	17.8	18.7	0.95

Researched in December 1994