

[Short Lecture]

Water and Sanitation

Hiroaki Furumai

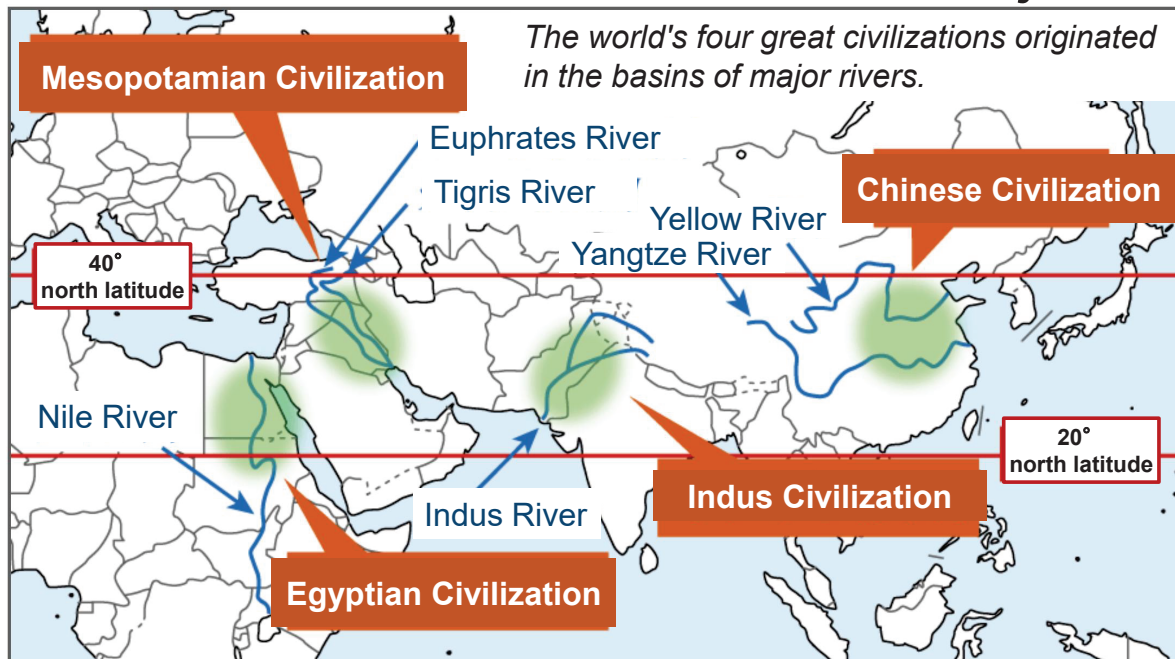
*Institute Professor, Research and Development Initiative,
Chuo University, Japan*

*Professor Emeritus, The University of Tokyo
Chair of the Board of Trustees, WaterAid Japan
IWA Distinguished Fellow*

Outline

- *Four Great Civilizations in the Basins of Major Rivers*
- *SDG and Water, Sanitation and Hygiene*
- *Floods and Diarrheal Epidemics/Outbreaks*
- *Water and Sanitation Issues in Light of Climate Change*

Four Great Civilizations in the Basins of Major Rivers



Water supported *irrigation for agriculture*, *the supply of drinking water*, and *trade via water transport*, functioning as an essential foundation for the formation of cities and states.

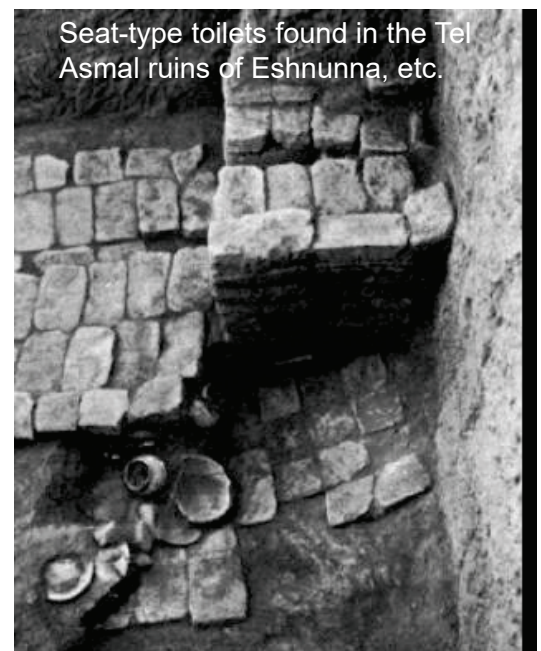
ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

3

3500 BC ~ Toilets in Mesopotamian Civilization



Squat toilets and seat-type toilets were popular in brick and stone houses, and it is thought that there was a method that was directly connected to the cesspool and a method of connecting to culverts through clay pipes.



ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

4

2500 BC ~ Drainage in Indus Civilization



As the number of villages increases and urbanization progresses, it becomes essential to develop facilities not only to secure irrigation water, but also to ensure the supply of safe water necessary for daily life, wastewater treatment, and sanitation management after water use.

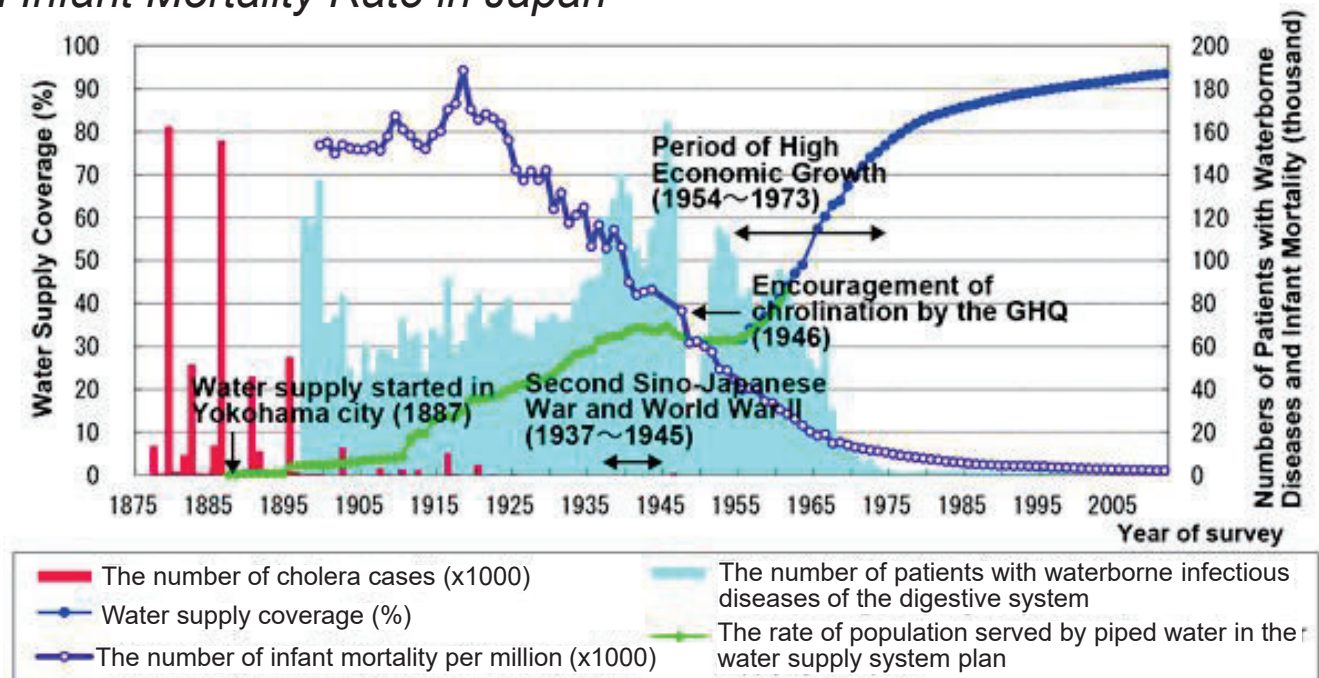
In ancient Indian cities (such as Mohenjo Daro), there are ruins of drainage ditches that served to collect used water from each household and flow it into the river.

Water and Sanitation

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

5

Water Supply Coverage Rate, Number of Waterborne Disease Patients, and Infant Mortality Rate in Japan



<https://www.jica.go.jp/english/activities/issues/water/overview.html>

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

6

SDG and Water, Sanitation and Hygiene

Sustainable Development Goals



SDG6 Clean Water and Sanitation

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

7

Goal 6: Ensure access to water and sanitation for all

- Rapid population growth and increased water use in agriculture, industry, and energy are driving a **continuous rise in water demand**. Water demand increase rate is outpacing population growth rate.
- **Global water stress** (Ratio of freshwater extraction to freshwater resources) has held at **18 %** since 2015, with **10% people now living under high or critical stress and several regions exceeding 75 % stress**.
- **Water scarcity** is projected to increase with global temperatures rise caused by **climate change**.

Access to safe water, sanitation and hygiene is the most basic human need for health and well-being.

<https://www.un.org/sustainabledevelopment/water-and-sanitation/>

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

8

Goal 6: Ensure access to water and sanitation for all

The following measures are necessary to ensure that all people have access to safe and affordable drinking water and proper sanitation facilities, to eliminate water pollution, and to improve hygiene practices,

- Investment in water supply infrastructure and sanitation facilities
- Protection and restoration of water resource and aquatic ecosystems
- Hygiene education, etc.



Goal 6: Ensure access to water and sanitation for all

<https://www.un.org/sustainabledevelopment/water-and-sanitation/>

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

9

Water, Sanitation and Hygiene (WASH) Program

WASH programs are international development and humanitarian interventions aimed at providing safe drinking water, proper sanitation facilities, and promoting hygiene practices to communities.

Key Components of WASH Programs

Water: Accessing safe, clean, and reliable drinking water sources, including infrastructure improvement and water quality testing.

Sanitation: Implementing infrastructure and systems for safe disposal of human waste, such as toilets, latrines, and sewage management.

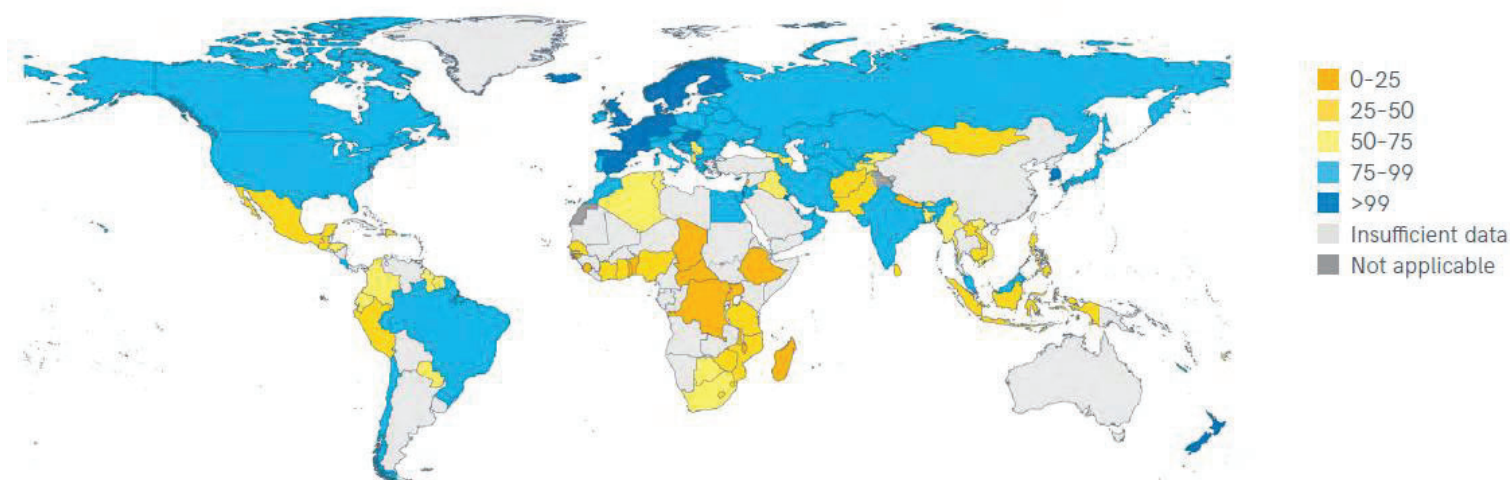
Hygiene: Promoting behaviors that reduce disease, notably handwashing with soap, menstrual hygiene management, and safe food handling.

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

10

Proportion of population using safely managed drinking water services, 2024 (%)

160 countries had estimates for safely managed drinking water services. Australia and New Zealand has already achieved universal access to basic drinking water services. Latin America and the Caribbean region is on track to achieve universal access by 2030

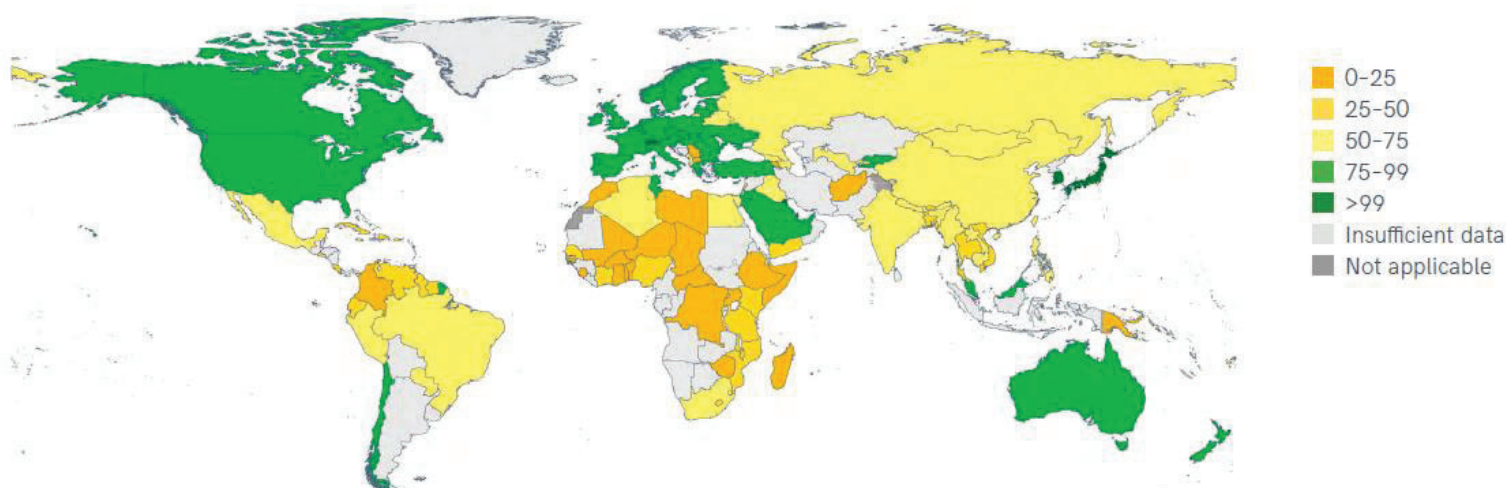


Progress on household drinking water, sanitation and hygiene 2000–2024: special focus on inequalities
ICCHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

11

Proportion of population using safely managed sanitation services, 2024 (%)

145 countries had estimates for safely managed sanitation services. Australia and New Zealand has already achieved universal access to basic sanitation services, and the Eastern and South-Eastern Asia region is on track to achieve universal access by 2030.

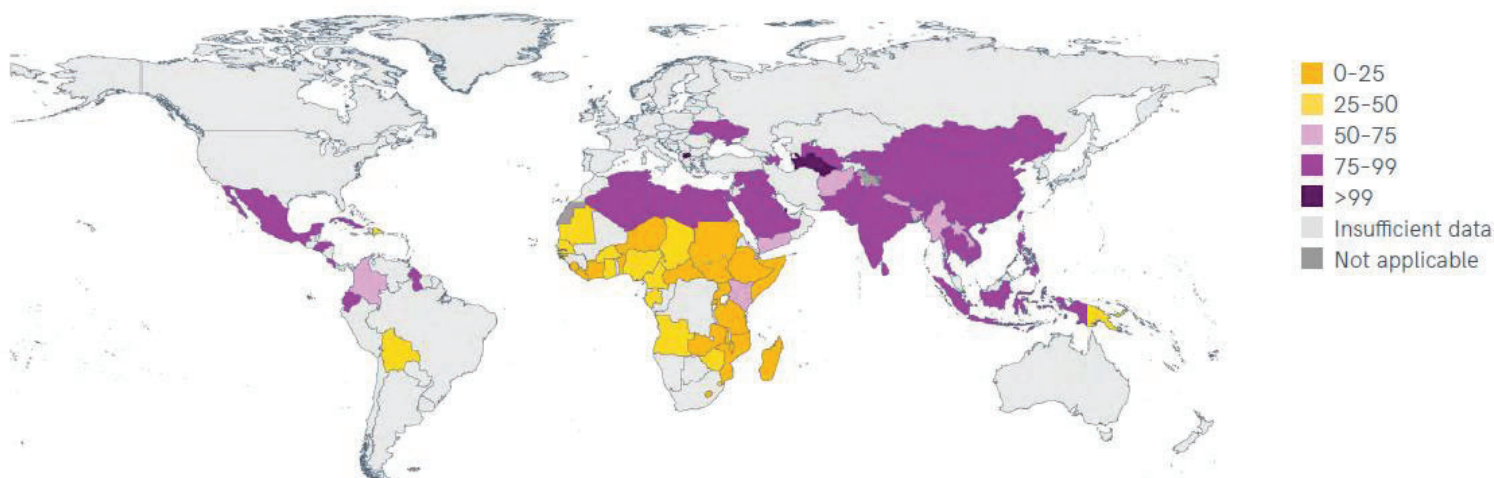


Progress on household drinking water, sanitation and hygiene 2000–2024: special focus on inequalities
ICCHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

12

Proportion of population with basic hygiene services, 2024 (%)

91 countries had estimates for basic hygiene services. Central and Southern Asia is on track to achieve universal access to basic hygiene services by 2030 but the overall rate of progress will need to double.

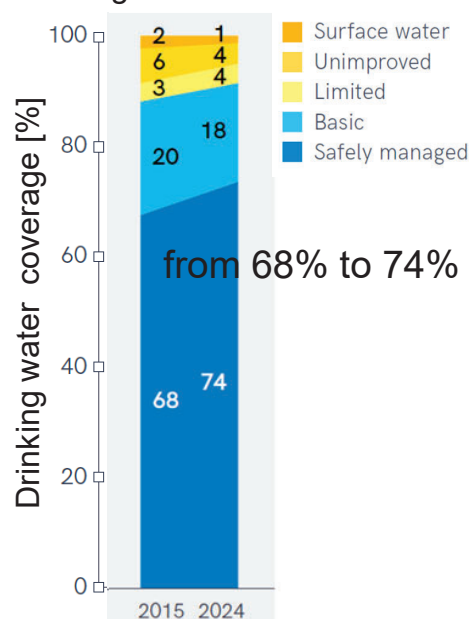


Progress on household drinking water, sanitation and hygiene 2000–2024: special focus on inequalities
 ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

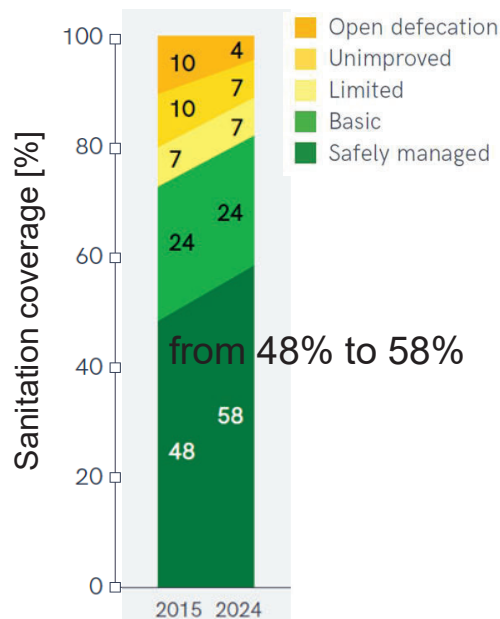
13

Global coverage of WASH services, 2015–2024 (%)

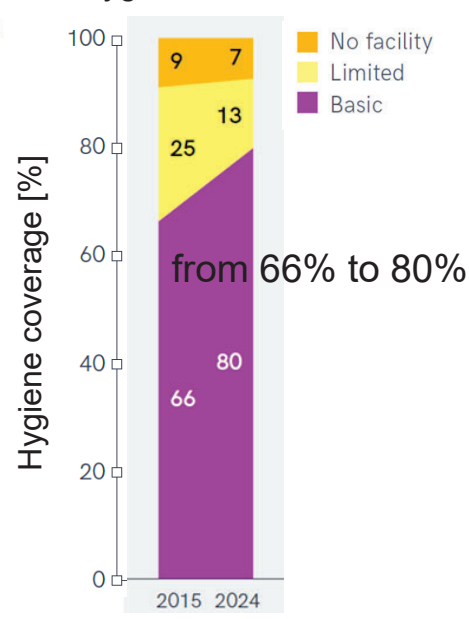
Drinking water services



Sanitation services



Hygiene services

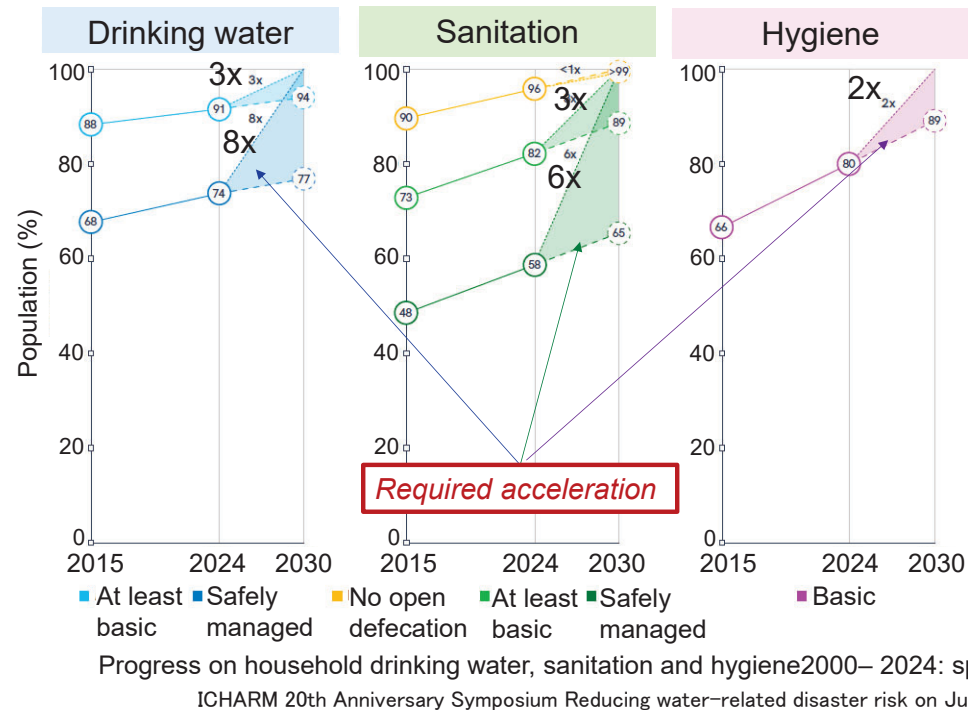


Progress on household drinking water, sanitation and hygiene 2000–2024: special focus on inequalities
 ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

14

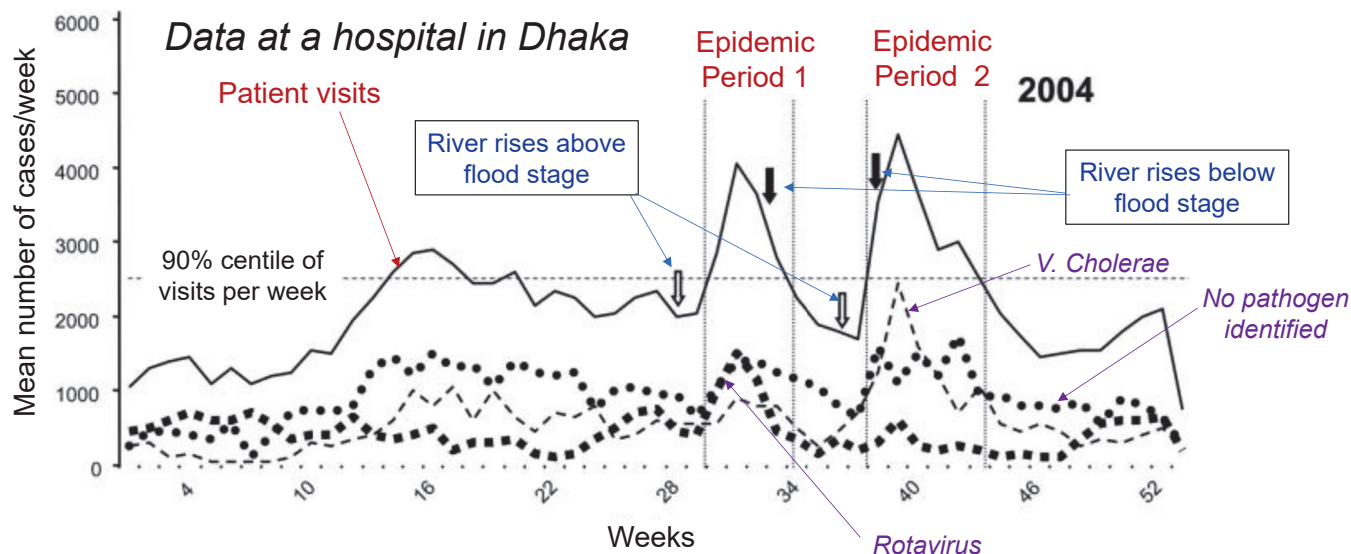
Acceleration required to reach universal coverage (>99%) by 2030

The world is still not on track to achieve universal coverage of basic WASH services by 2030.



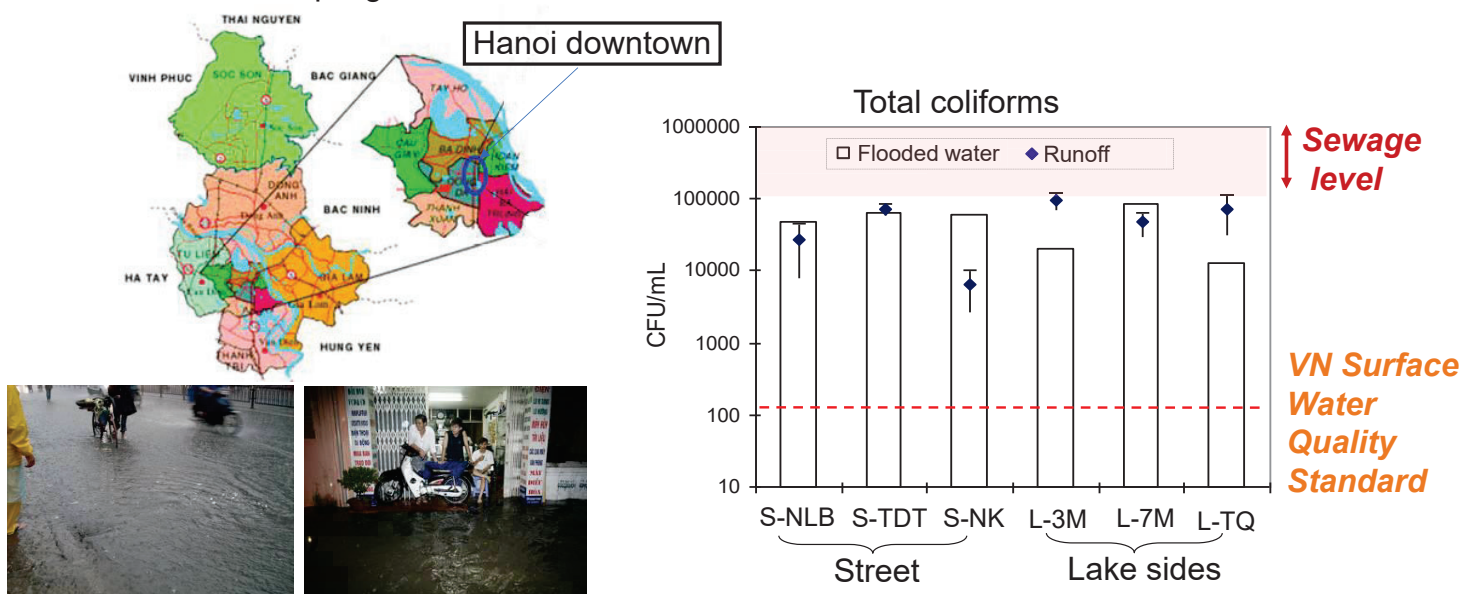
Flood-related diarrheal epidemics in a developing country

There were two flood-related diarrheal epidemics: July 20 to August 21 and September 16 to October 24, 2004



Water quality of urban runoff and flooded water in Hanoi

Wet weather sampling at urban streets and inlets of lakes in October 2008



Quan et al. (2010) Water Pollution Characterization by Pathogenic Indicators in Water Runoff in the Downtown of Hanoi, Vietnam, Journal of Water and Environment Technology, Vol. 8, No.3, 259-268

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

17

Current Status and Challenges of Water and Sanitation Issues Associated with Droughts and Flooding

<Droughts>

- **Limited access to safe drinking water:** Depletion of water resources leads to a shortage of drinking water and water for daily life.
- **Spread of infectious diseases:** Lack of water for daily life prevents handwashing and body washing, leading to the.

<Floods>

- **Damage and disfunction of sanitation infrastructure:** Contamination of water sources and wells, pathogen-containing water into living spaces
- **Gastrointestinal infection and skin infection:** Contamination of water for daily life, and unsanitary water use

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

18

Water and Sanitation Issues in Light of Climate Change

During droughts and floods, the deterioration of water and sanitation conditions progresses in developing countries.

Therefore, the increased frequency of droughts and floods due to climate change poses a direct threat to achieving SDG Goal 6, "Clean Water and Sanitation for All."

- Vulnerability of water supply and sanitation infrastructure
⇒ **Improving the resilience of sanitation infrastructure**
- Loss of access to safe water and unsanitary water use
⇒ **Providing emergency water and sanitation kits during disasters**
- Public health crises (outbreaks of infectious diseases)
⇒ **Promoting sanitation awareness, human resource development**

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

19

ICHARM 20th Anniversary Symposium
Reducing water-related disaster risk
to build a sustainable society

17th June 2026 @ Sokairo Hall, GRIPS

Thank you for your attention

[Short Lecture]

Water and Sanitation

Hiroaki Furumai

*Institute Professor, Research and Development Initiative,
Chuo University, Japan*

*Professor Emeritus, The University of Tokyo
Chair of the Board of Trustees, WaterAid Japan
IWA Distinguished Fellow*

e-mail: hfurumai756@g.chuo-u.ac.jp

ICHARM 20th Anniversary Symposium Reducing water-related disaster risk on June 17, 2026

20