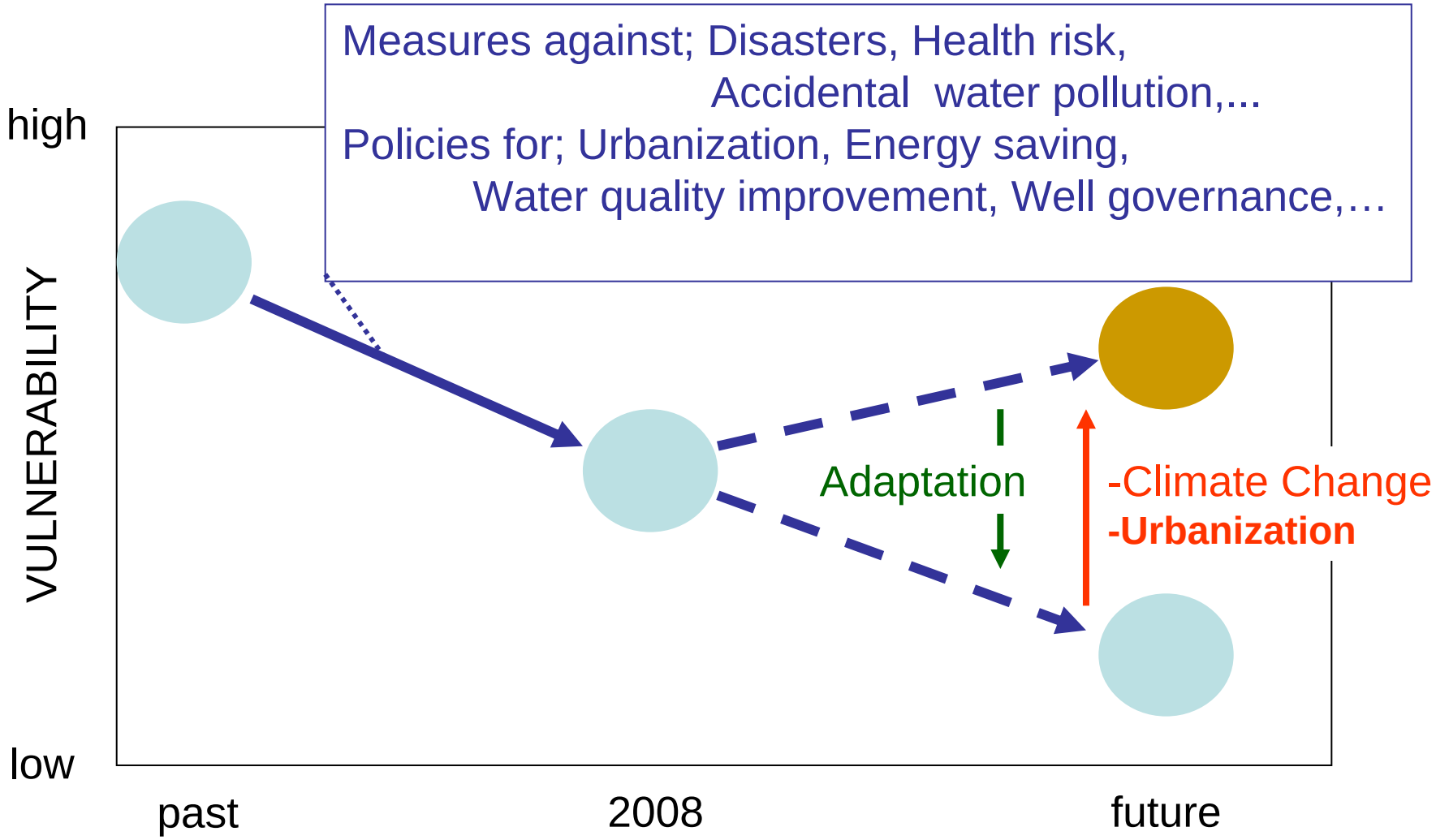
The 8th SCA Conference
29 May 2008
Qingdao, China

Water Resources Management under Climate Change and Urbanization

OHGAKI, Shinichiro

Change of Vulnerability and Adaptation



Climate Change :

complicated impact to water supply

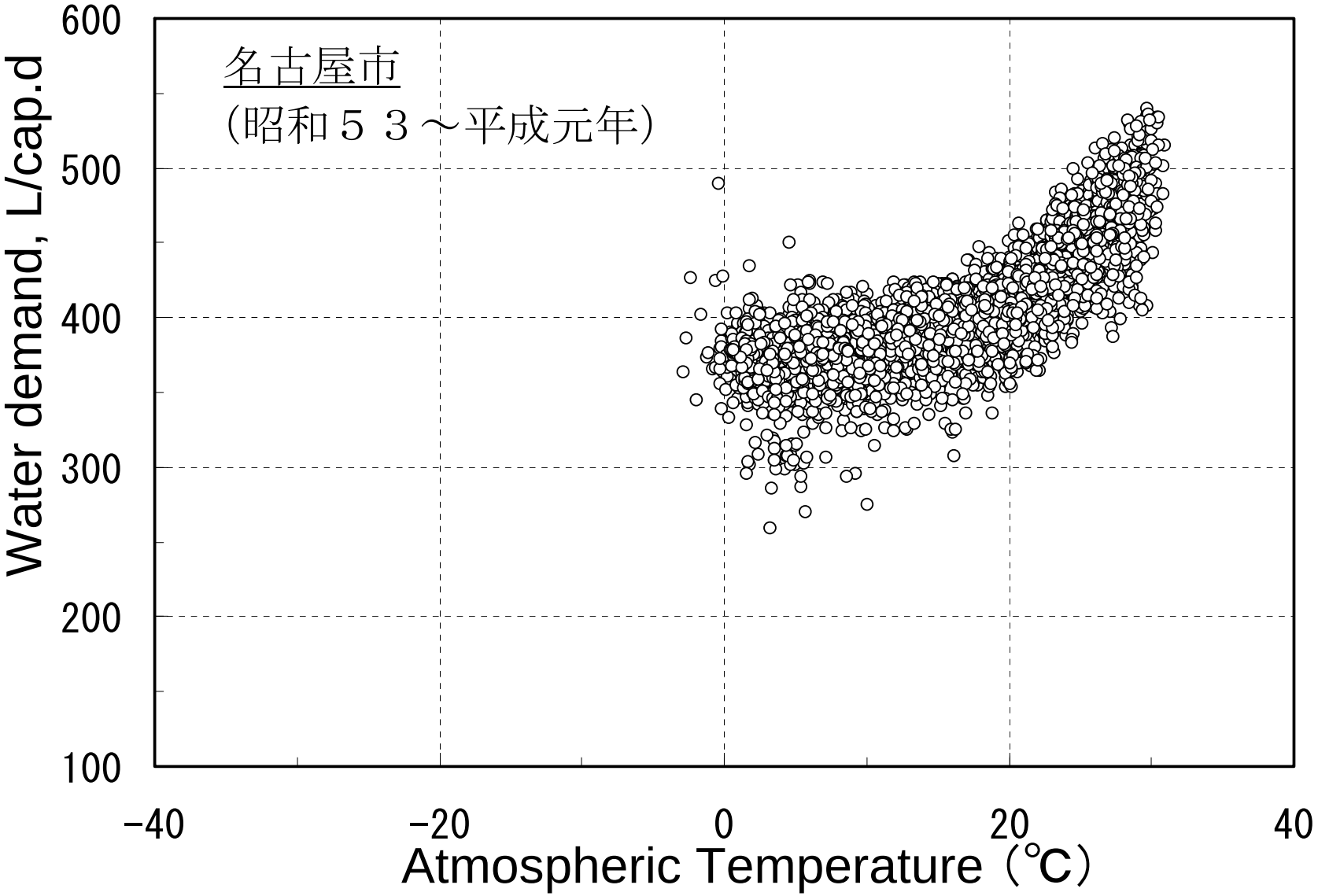
example:

1. Polluted water supply + high temperature
   = outbreak (*Cryptosporidium)*

2. Drought = Land subsidence

Water Demand vs. Atmospheric Temperature

(Nagoya City, 1978-1989)

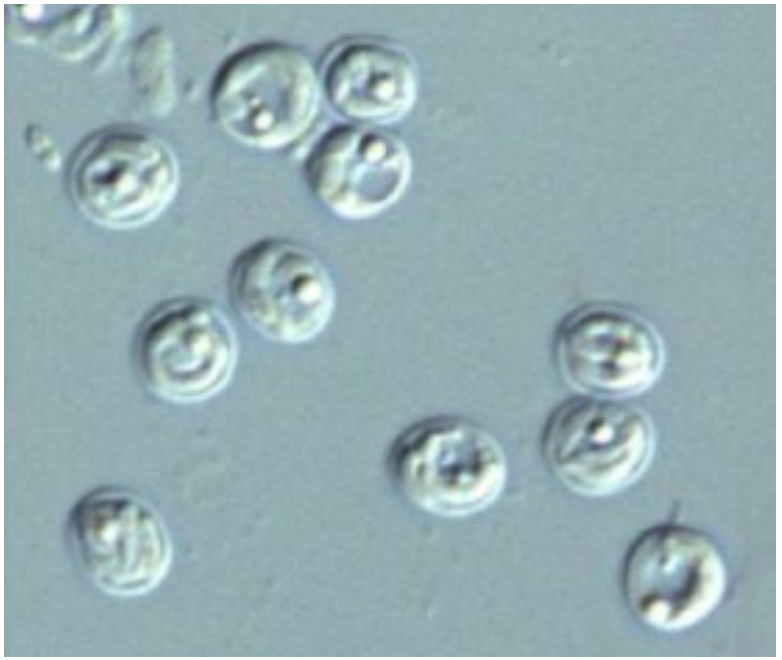


出典:建設省土木研究所「平成6年度地球温暖化が水需要に及ぼす影響に関する検討業務」

クリプトスポリジウム
（Cryptosporidium parvum）

- USA, Wisconsin Milwaukee（1993）:
  about 400,000 cases

- Ogose City, Saitama Pref. (1996）:
  about 8800cases



（diameter about 5μm）

（国立感染症研究所寄生動物部ホームページより）

Is 25℃ a trigger for outbreak under contaminated water supply? (Endo; Ogose Survey Report, National Institute of Public Health,Japan,2006)

(Another social vulnerability)

Various scale of Water Utilities in Japan (as of March 31, 2006)

Utility scale	No. of utilities	Population served
More than 5000 people	1,602	117,790,000
Less than 5000 people	7,794	5,790,000
Small scaled	7,611	550,000
Total	17,109	124,120,000

(Ministry of Health, Labour and Welfare, Japan)

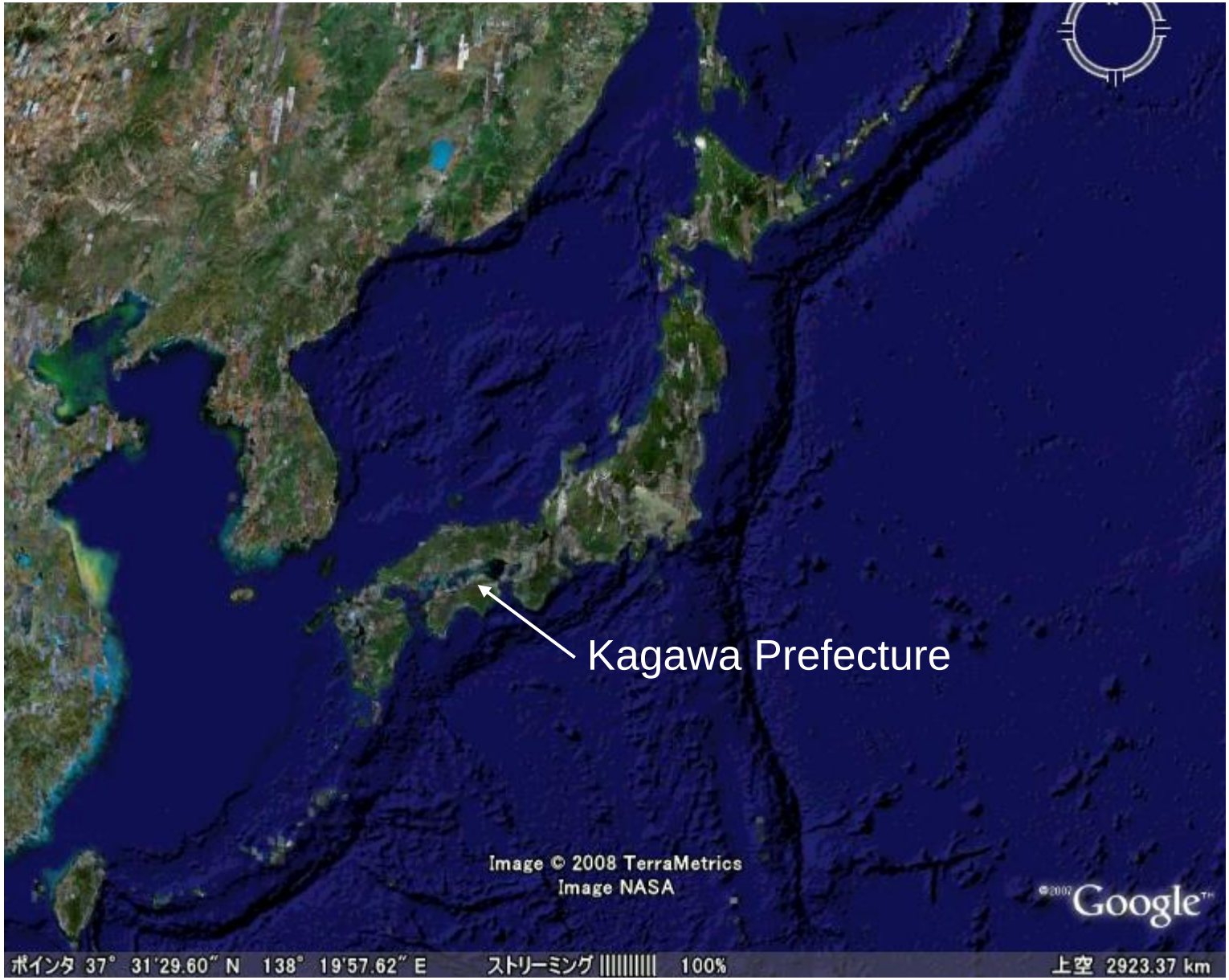
Impacts due to 1994 Drought in Japan

- 11.8 million people suffered reduced pressure and intermittent water supply in west Japan.
- Around 80% of water environment quality monitoring station data became worse than 1993.
- Land subsidence due to increased groundwater use:

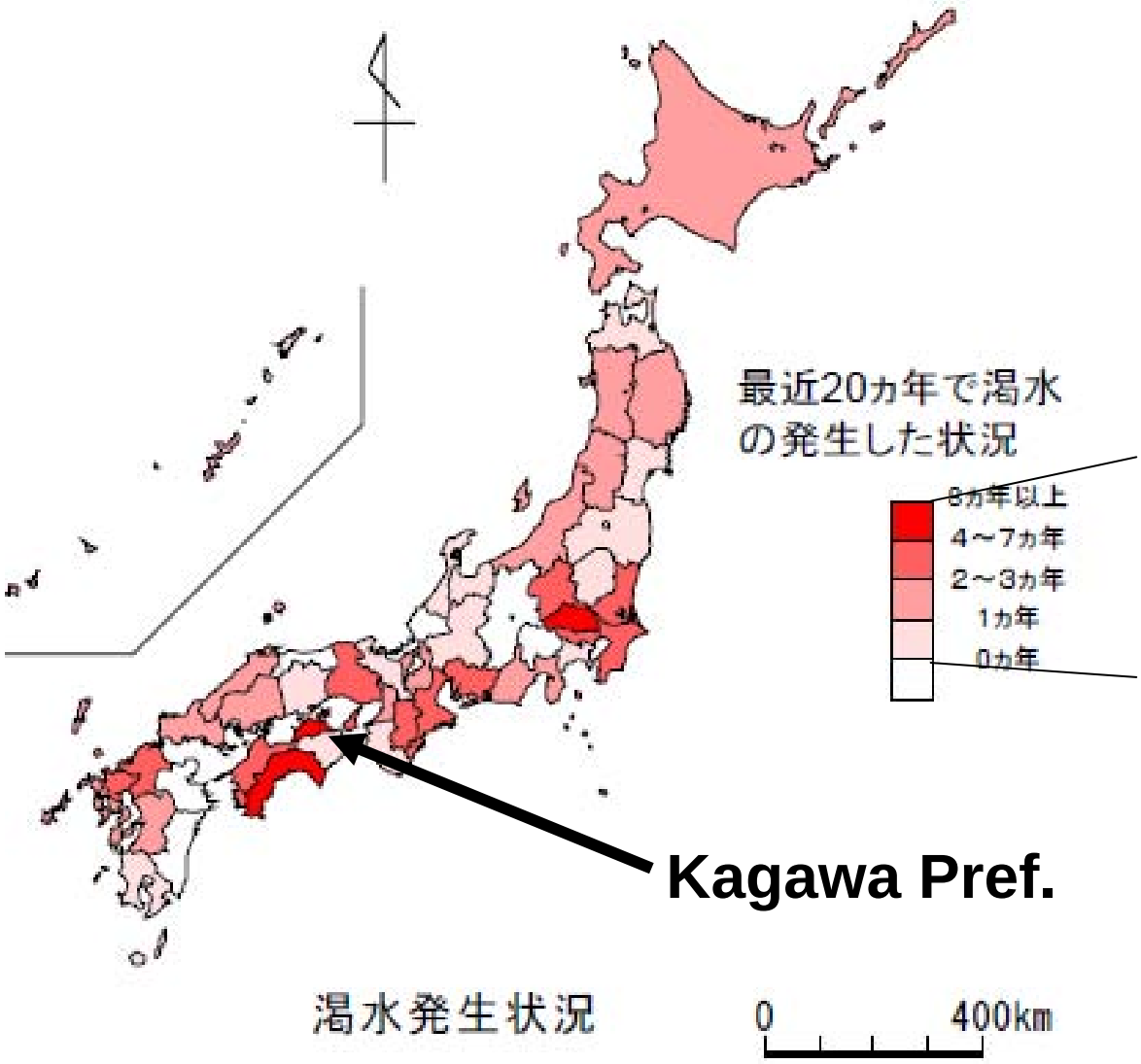
Noubi Plains (Nagoya and surrounding area)			
subsidence	>2cm	1-2cm	
1992	*2*	*76*	(unit: monitoring
1993	*0*	*0*	points No. out of
1994	*69*	*545*	around 1500)
1995	*1*	*19*	
1996	*3*	*36*	

（Source; 原沢・西岡編著、地球温暖化と日本、古今書院、2003）

Wastewater reuse in agricultural area



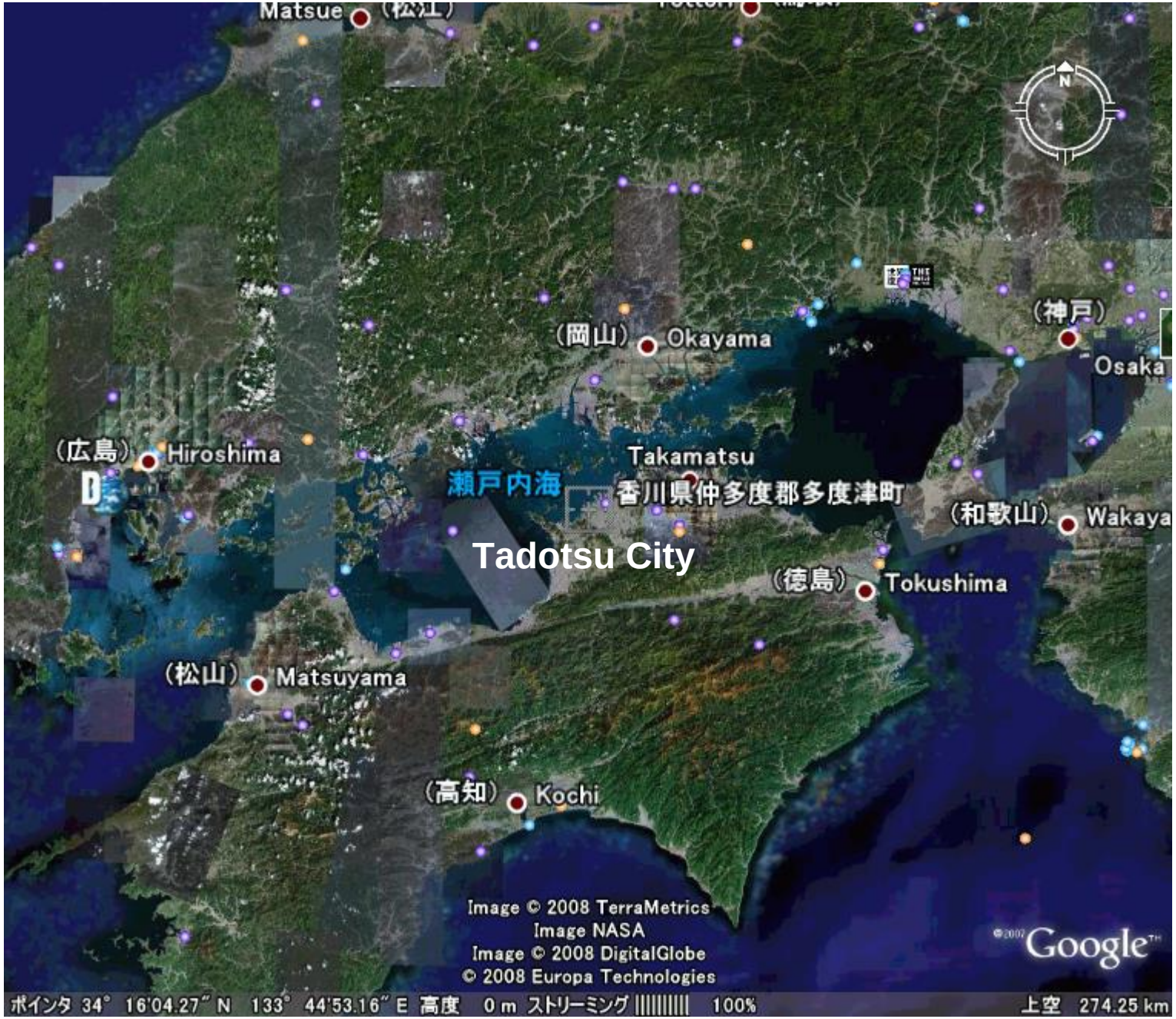
Drought events in Japan



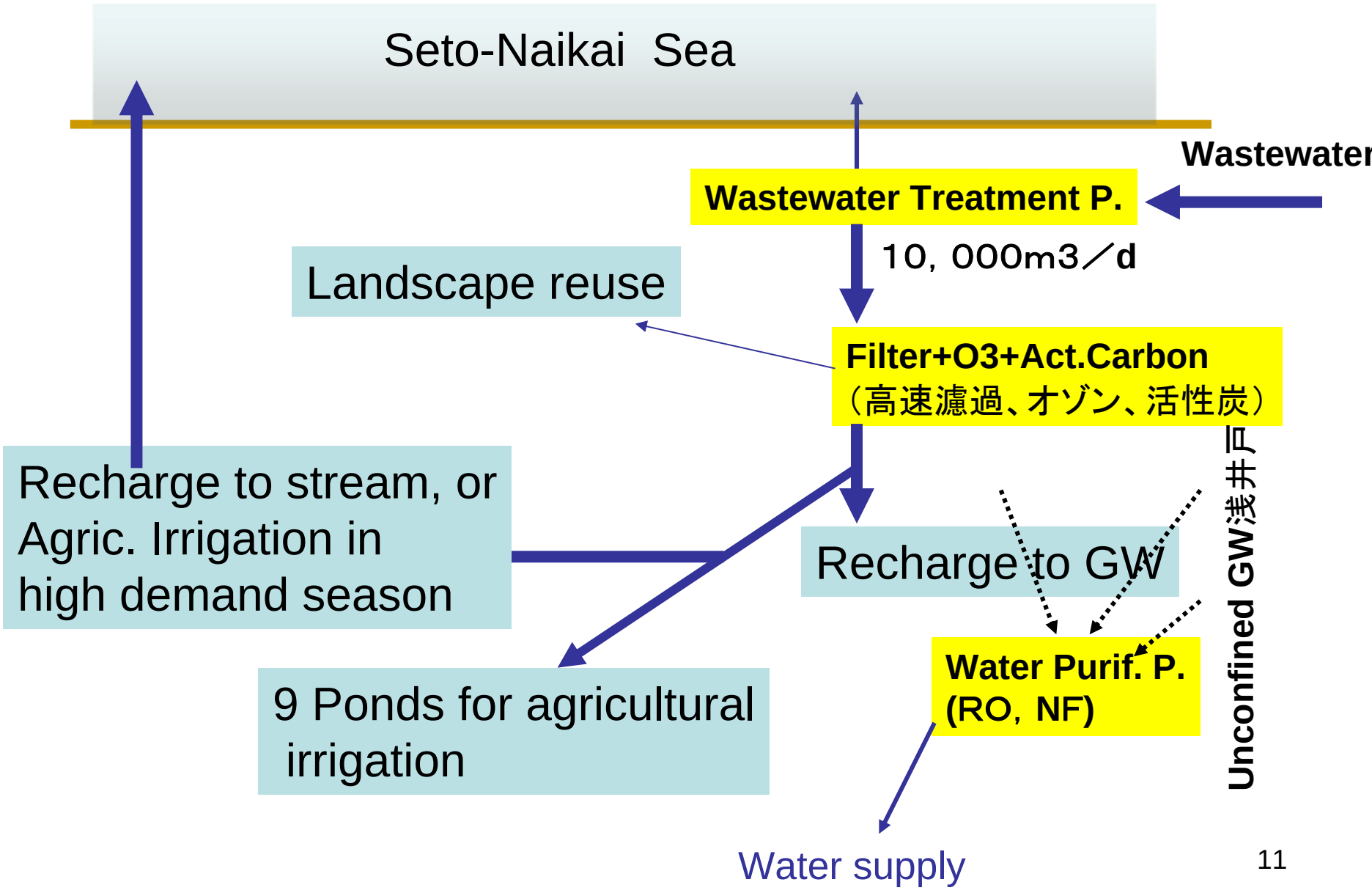
More than 8 years
4-7year
2-3year
1year
0

In last 20years

(出典)下水処理水の再利用のあり方を考える懇談会(国土交通省下水道部)資料をもとに水資源部で作成


Matsue
(松江)
(岡山) Okayama
(神戸)
Osaka
(広島) Hiroshima
Takamatsu
瀬戸内海
香川県仲多度郡多度津町
(和歌山) Wakaya
Tadotsu City
(徳島) Tokushima
(松山) Matsuyama
(高知) Kochi
Image © 2008 TerraMetrics
Image NASA
Image © 2008 DigitalGlobe
© 2008 Europa Technologies
©2007 Google
ポインタ 34° 16'04.27" N 133° 44'53.16" E 高度 0 m ストリーミング 100%
上空 274.25 km

Wastewater reuse system in Tadotsu City



Small landscape reuse

Wastewater Reclamation Plant (Filter+O3+Activated Carbon)

Groundwater Recharging Point

Agricultural Irrigation Pond

another Agricultural Irrigation Pond

Irrigation Channel


Water Purification Plant (RO and NF)
raw water : unconfined groundwater
2008/ 1/15 11:49

Urbanization:

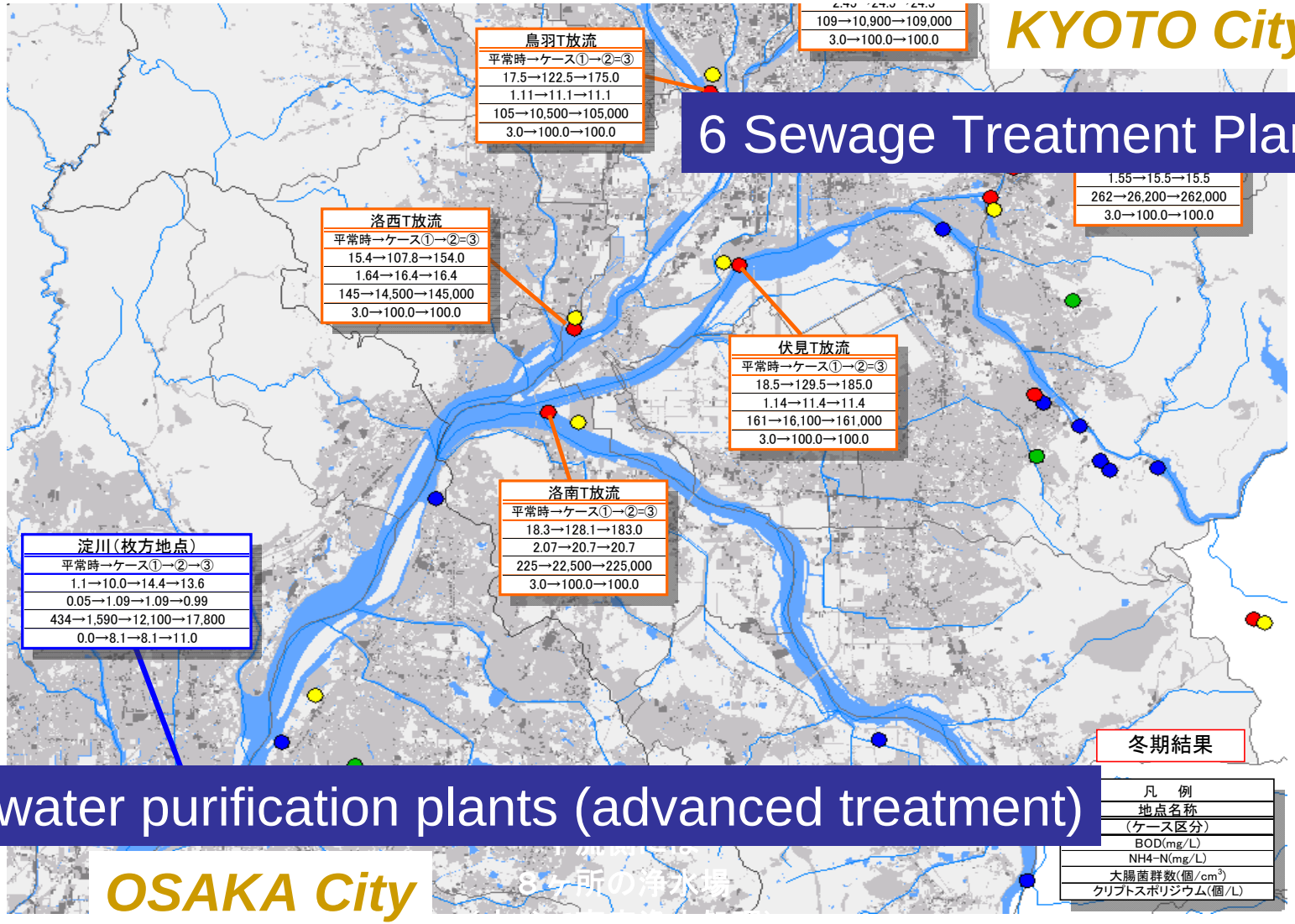
possible threat on health risk

In case of

Disaster (earthquake, fire,)
Fails of operation of treatment plant,
Drought,
Flooding

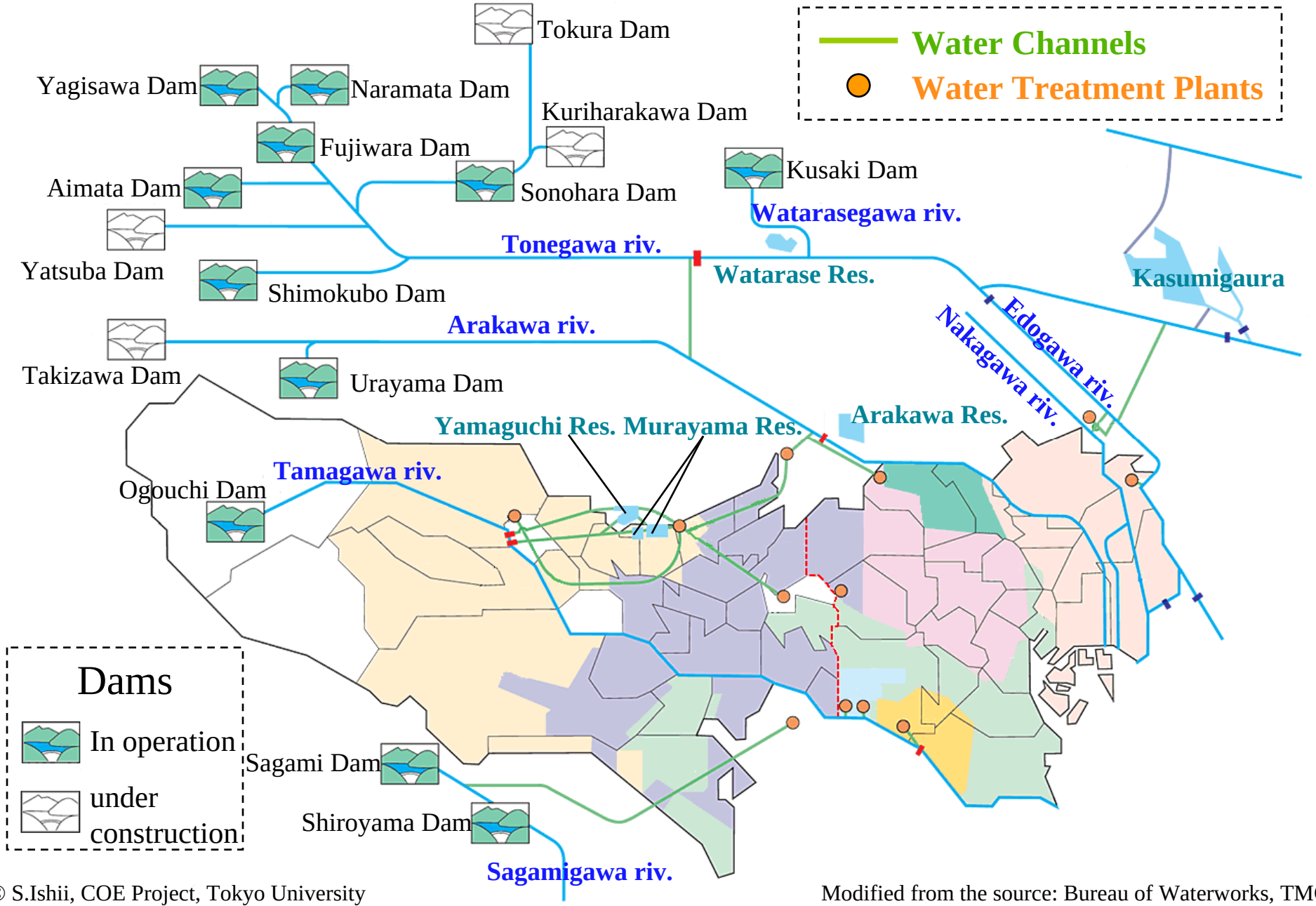

Tokyo Area
Kyoto and Osaka
Image © 2008 TerraMetrics
Image NASA
©2007 Google
ポインタ 37° 31'29.60" N 138° 19'57.62" E
ストリーミング 100%
上空 2923.37 km

Yodo river: an example of unintended wastewater reuse for drinking water

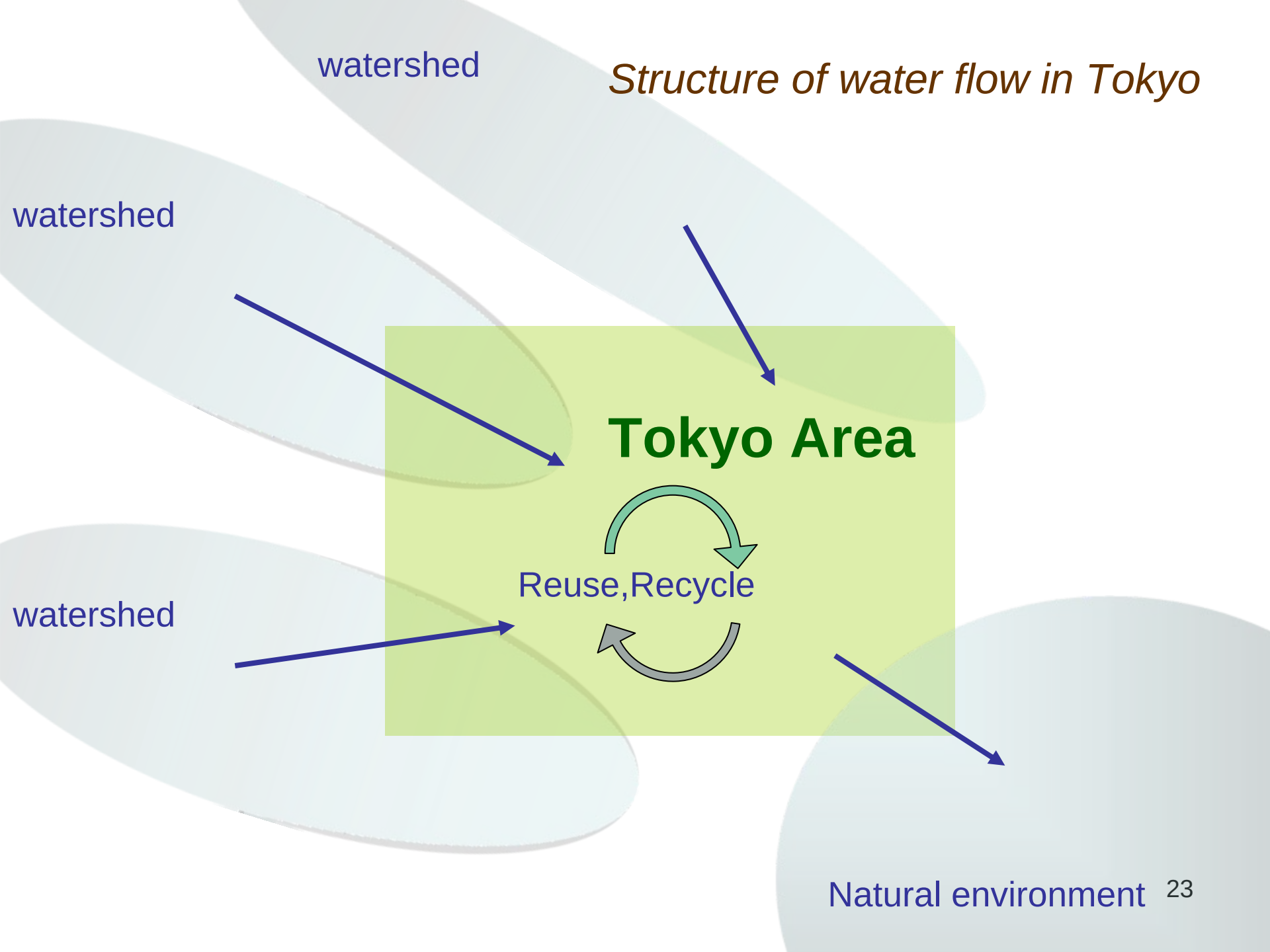


（出典：藤木修ほか；京都大学環境衛生工学研究会第28回シンポジウム、に加筆）

Water Network in Tokyo

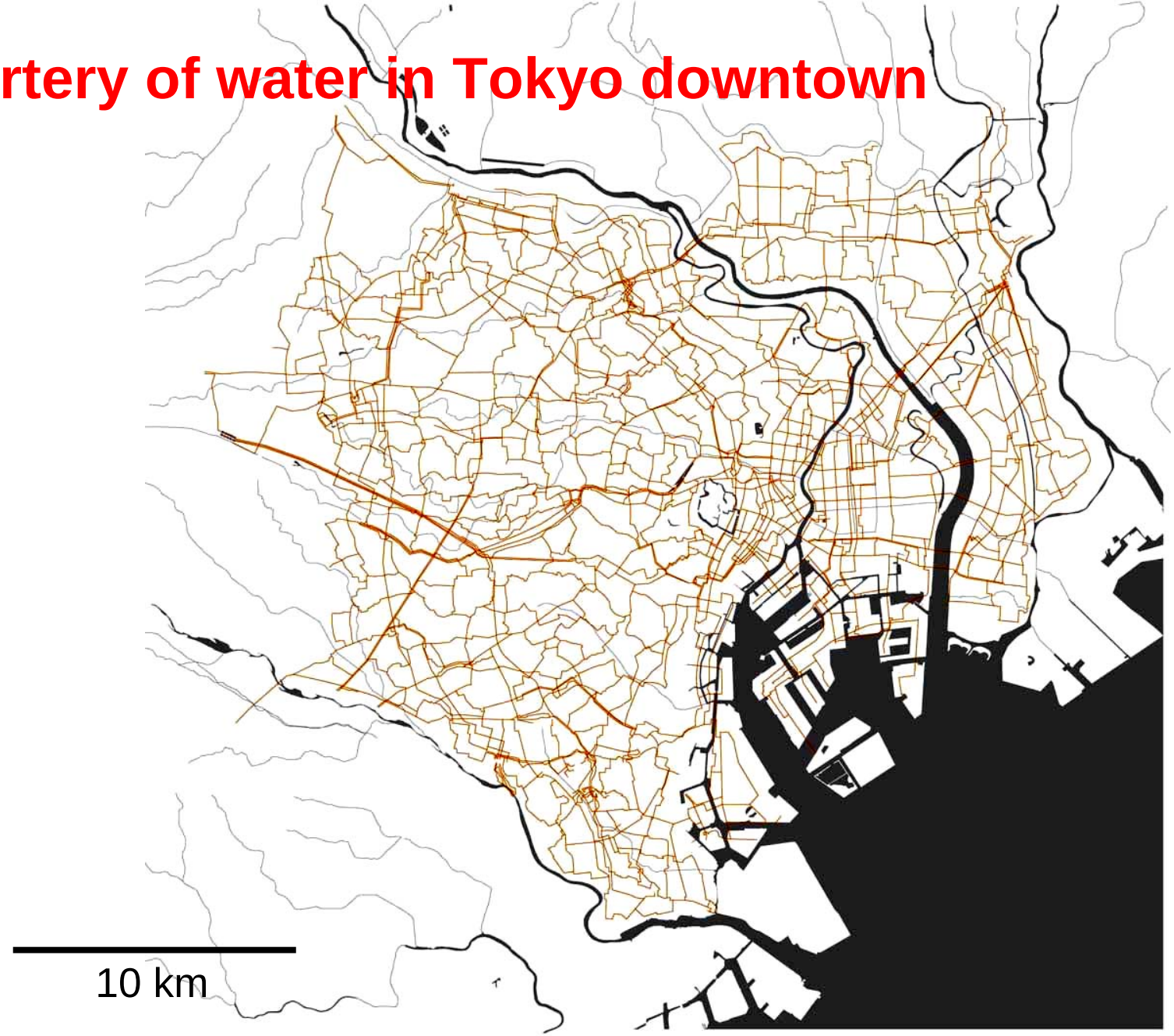


Modified from the source: Bureau of Waterworks, TMG



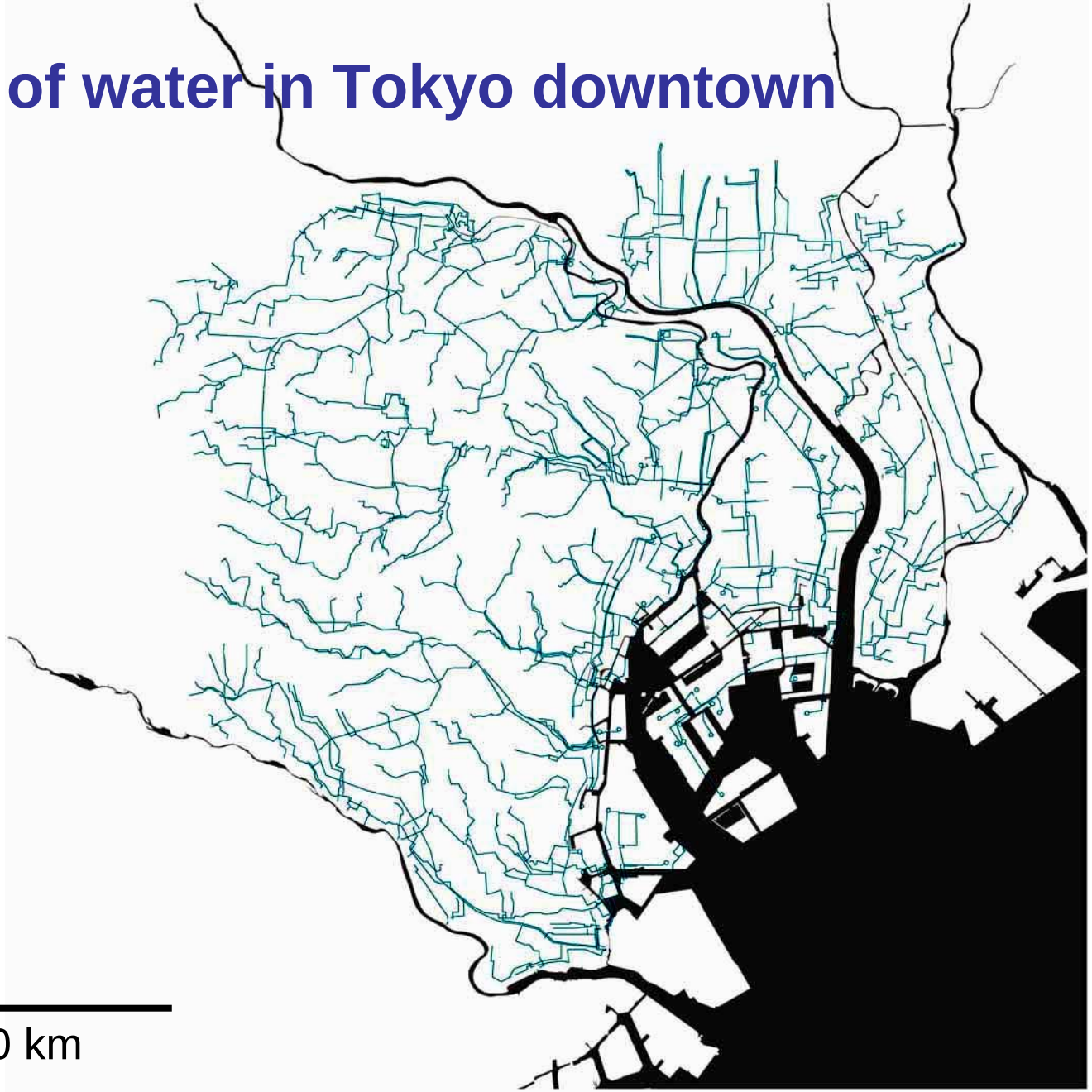
Structure of water flow in Tokyo

Artery of water in Tokyo downtown

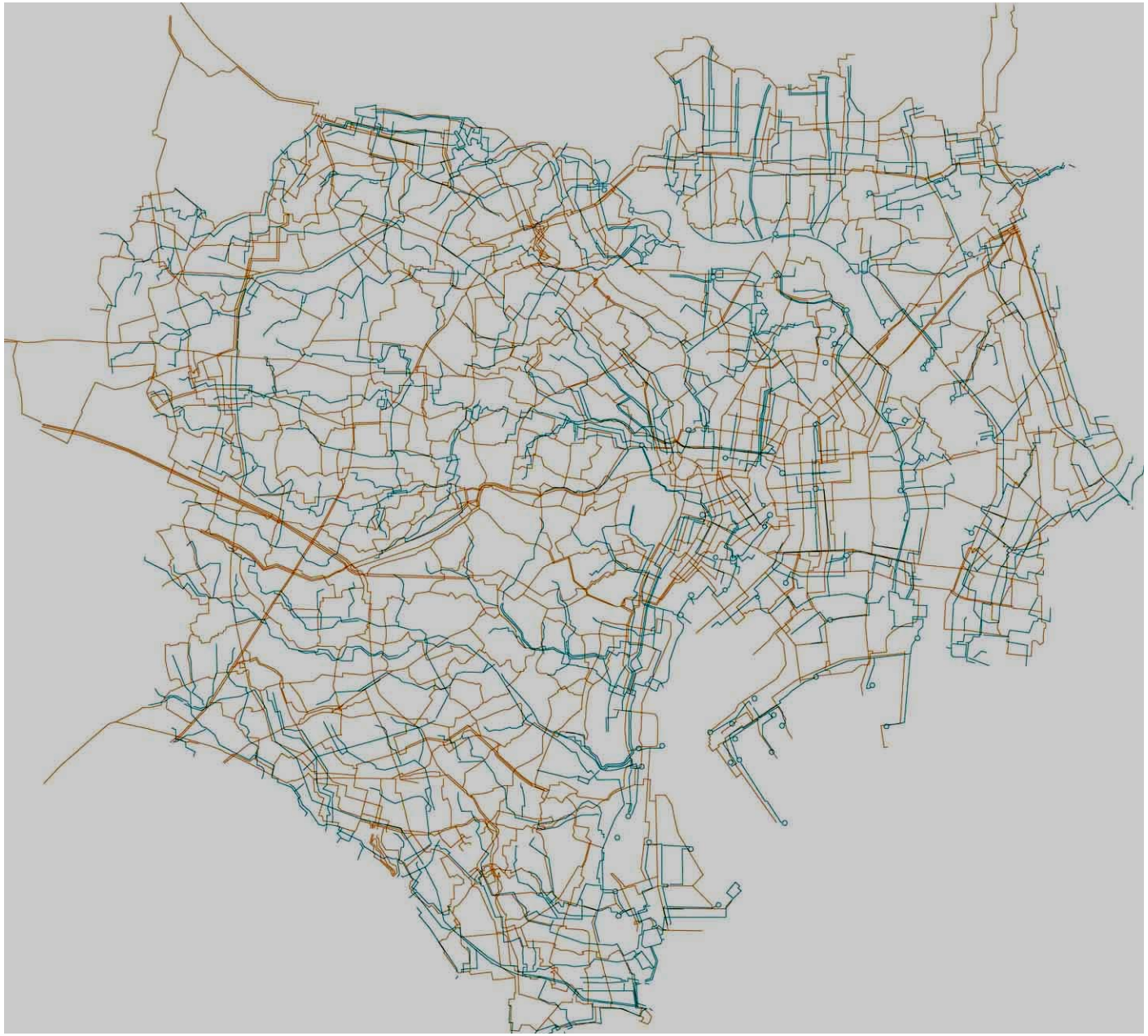


上水本管の配置

Vein of water in Tokyo downtown



下水本管の配置



Reclaimed Wastewater Use for Toilet Flush in Skyscrapers and Tokyo City Hall, Shinjuku, Tokyo

(Tokyo Metropolitan Government)

Supply Destinations of Reclaimed Water
from Shibaura Wastewater Treatment Plant

Osaki

Shinagawa

Shiodome

Miscellaneous Water Use

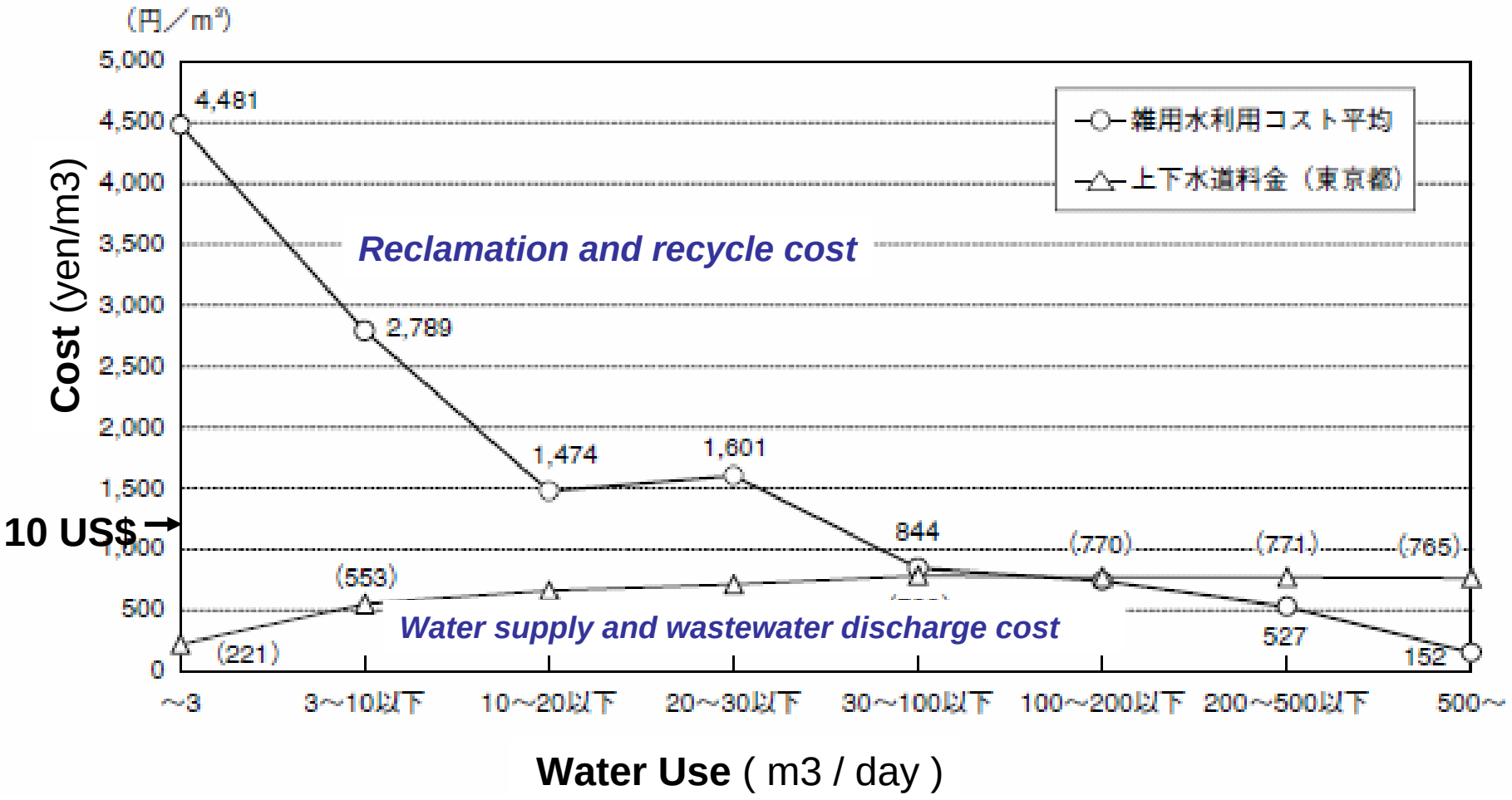
Shibaura STP

(Ministry of Land, Infrastructure, Transport and Tourism, Japan)

Ozone Tolerance Membrane Separation System

for Reclamation of Effluent from Sewage Treatment Plant (Shibaura STP)

Cost of reclamation and recycle



(Ministry of Land, Infrastructure and Transport Japan; Water Resources in Japan,2005ver.)

Thank you

謝　謝