

What makes the changes in Japanese water resources?

Backgrounds of Changes in Japanese Water resources

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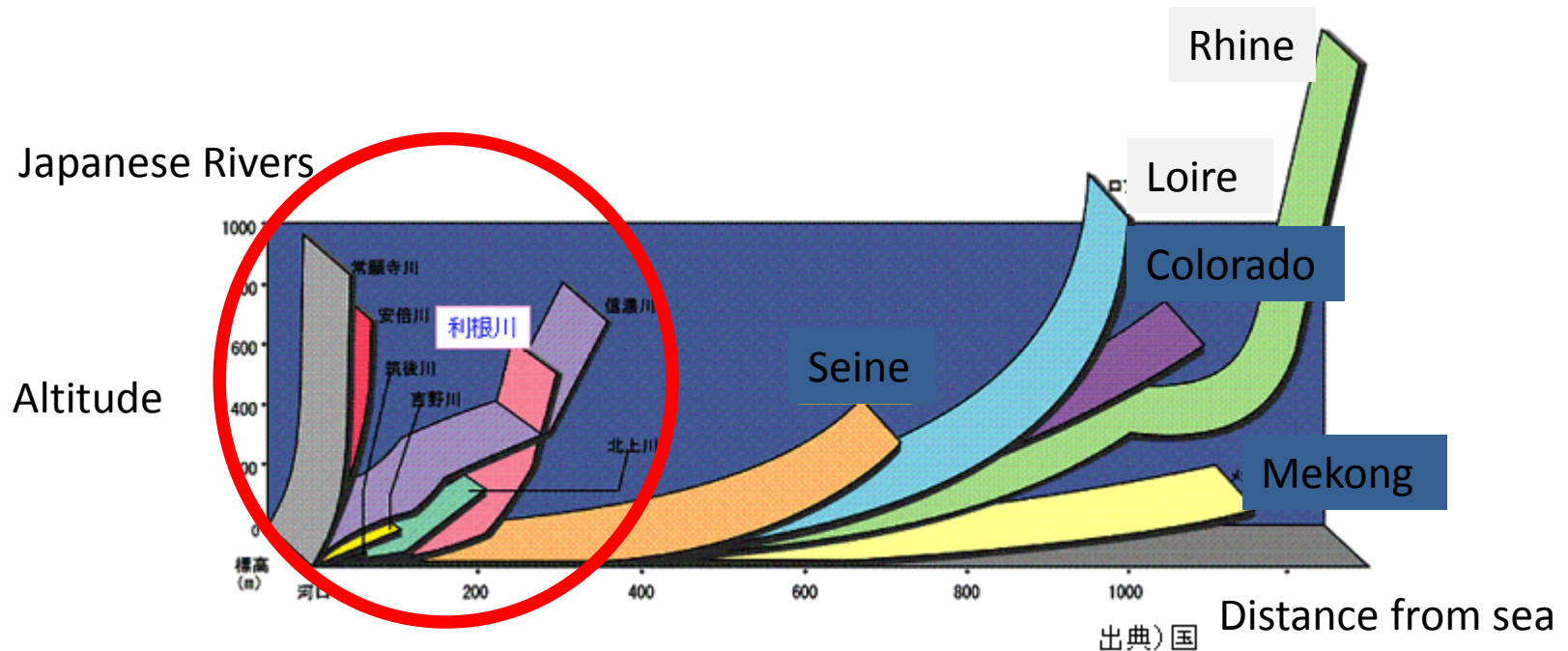
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The Characteristics of Japanese River

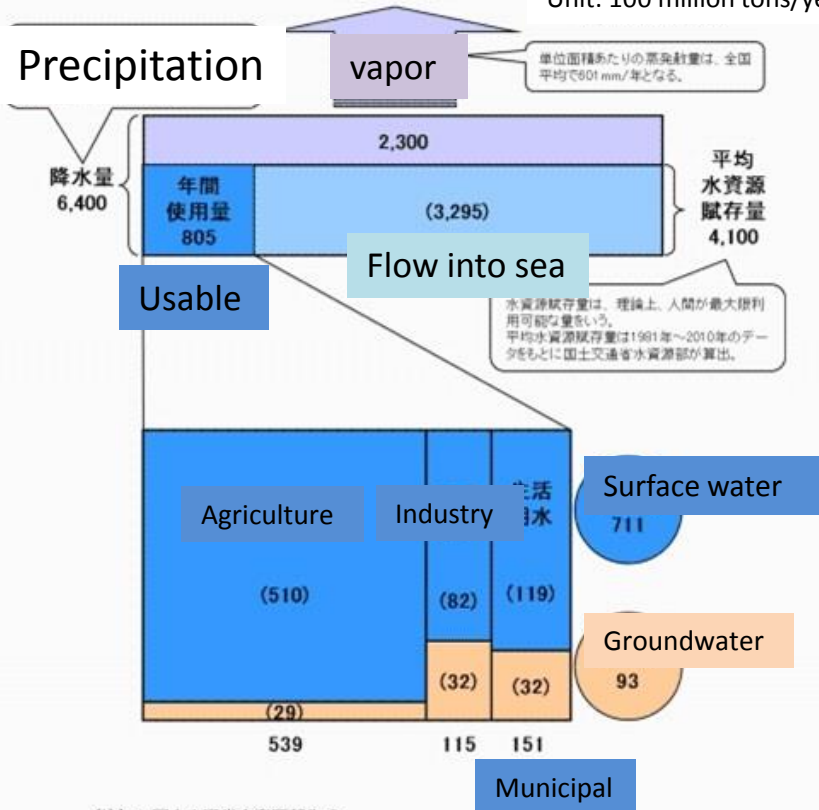
In Japan, mountainous island country, rivers are short and steep.

Therefore rainfall rapidly runs into sea and the flow of rivers largely fluctuate seasonally.



Water Use in Japan

Unit: 100 million tons/year



(注) 1.国土交通省水資源部作成
 2.生活用水、工業用水で使用された水は 2012 年の値で、国土交通省水資源部調べ
 3.農業用水における河川水は 2012 年の値で、国土交通省水資源部調べ。
 地下水は農林水産省「第 5 回農業用地下水利用実態調査」(2008 年度調査) による。
 4.四捨五入の関係で合計が合わない場合がある。

日本の水資源賦存量と使用量

As a monsoon country, annual precipitation reaches 640 billion tons/year in Japan. But 230 billion tons in rainfall vaporize into air and due to geographical condition, 329.5 billion tons flow into sea in vain. We can use only remaining 80.5 billion tons per year.

Even today, Agriculture uses 53.9 billion tons (approx. 67%) among available 80.5 billion tons. Industry uses 11.5 billion tons (14%) and urban waterworks use 15.1 billion tons (19%).

Governmental institutions related to water resource

- There are many governmental institutions related to water resources.

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



Establish basic guideline on water resource policy
License new water intake from river
Construct and maintain large scale dams
Construct and maintain large scale sewage system

Ministry of Health, Labor and
Welfare (MHLW)



Regulate drinking water quality
Subsidize municipal waterworks
Subsidize small scale sewage system in urban area

Ministry of Environment (MoE)



Regulate ambient water quality

Ministry of Economy, Trade and
Industry (METI)



Regulate groundwater pumping to prevent ground
subsidence
Subsidize industrial waterworks
Regulate hydropower generation

Ministry of Agriculture, Forestry
and Fishery (MAFF)



Subsidize agricultural waterworks
Subsidize small scale sewage system in rural area

Municipalities



Operate waterworks and sewage system

Agricultural Improvement District

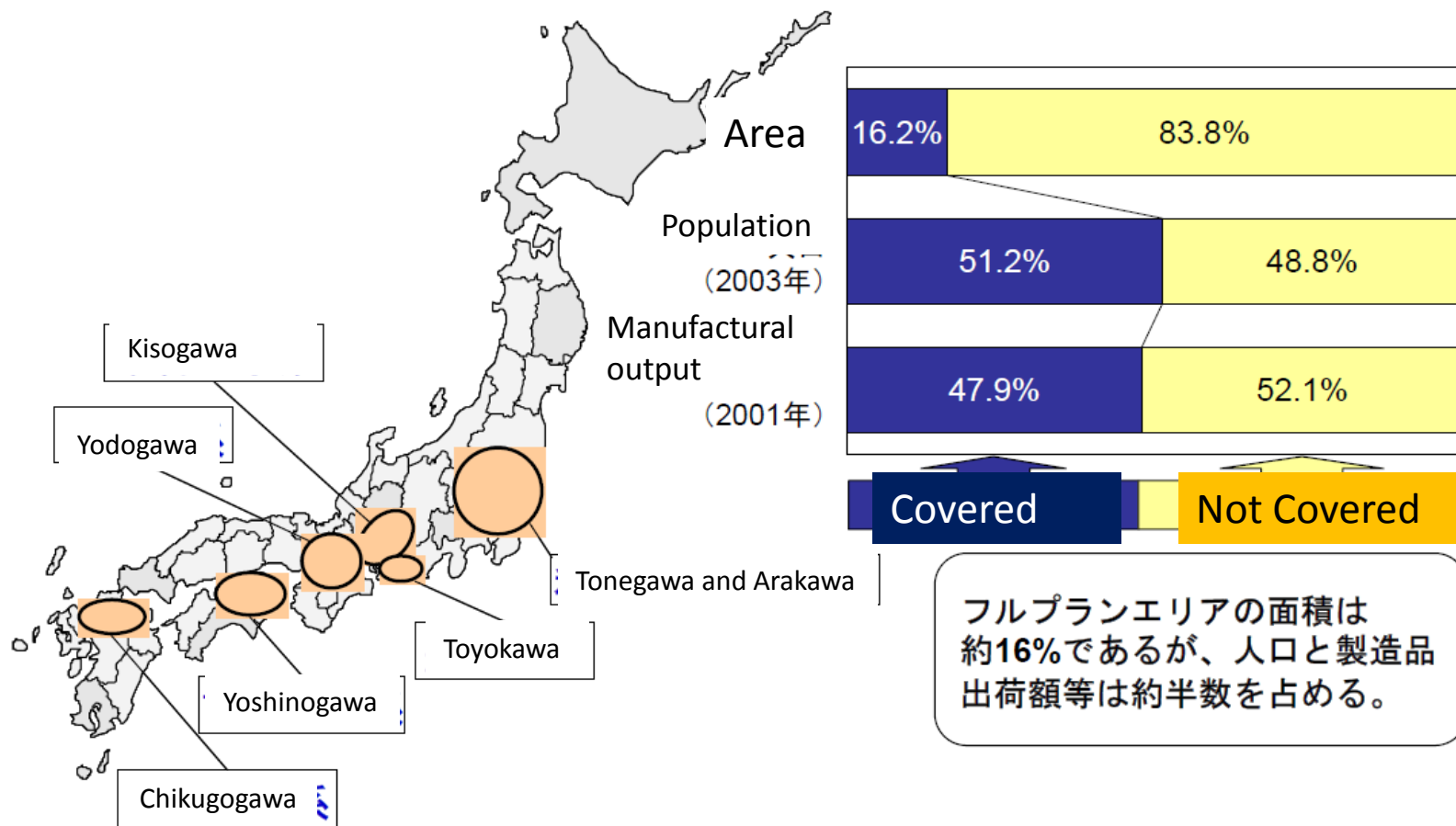


Operate agricultural waterworks

Water resources Development Public Corporation (水資源開発公団, WARDEC)

- In 1961, Ministry of Construction (now MLIT), MAFF, Ministry of International Trade and Industry (now METI) and Ministry of Health and Welfare (now MHLW) jointly established “Water resources Development Public Corporation (WARDEC)” to decrease the demarcation dispute among Ministries.
- WARDEC was responsible for water resource development in seven major "Full Plan" rivers.
- WARDEC withdrawn from dam construction and was reorganized to Japan Water Agency(水資源機構) in 2000.

Seven “Full Plan” rivers



資料: 水資源部作成

※フルプランエリア: 将来の水需給の検討対象地域(原則として市町村単位)

Basic Water Act of 2017

(水循環基本法)

- July 1 of this year, “Basic Water Act” was promulgated.
- The purpose of this new law is to integrate now fragmented water related policies and authorities, including water resource development, water supply and waste water treatment, into an unitary scheme under the Cabinet.
- For this purpose, this law provides to establish Water Policy Headquarter in the Cabinet. The chief of Water Policy Headquarter is Prime Minister (now Abe Shinzo). The Headquarter determines “Basic Water Plan” and arranges policies of each Ministries.

Basic Water Act of 2017

(水循環基本法)

- Actually until 2000 government reform, there was National Land Agency in Prime Minister's Office to integrate water related policies. But the Agency has no authority on other Ministries and could not control Ministries (National Land Agency was nicknamed as "Kuge" (公家, "Noble") because the documents they made were magnificent but they had few real influence).
- Today high-rank bureaucrats in Ministries are appointed by Cabinet therefore Cabinet can control these Ministries. Some bureaucrats are frustrated by this scheme because they think the appointments by Cabinet (Abe Shinzo administration) is unfair. They leaked some secret documents to throw Abe administration into scandal mess.

[トップ](#) > [週刊朝日](#) > [記事](#)

政治

安倍政権さらに窮地 加計学園の獣医学部新設「設計関連文書」全文を入手

[f おすすめ 4,441](#)
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2017.8.18 18:14 週刊朝日 #加計学園

PR 外貨だからこそ実現可能な米ドル建ての魅力的な高利貸とは?

PR 【漢方で妊活】妊娠力を高める身体づくりのポイントとは?

PR 【純金積立で満足ですか?】余裕のあるリスクテイクで2倍の投資効率



愛媛県今治市の岡山理科大学獣医学部の建設予定地 (C) 朝日新聞社

Q 拡大

(仮称) 岡山理科大学 獣医学部 今治キャンパス 新築工事及び周辺工事
獣医学部棟

平成29年 3月

Abe in predicament:

Documents about building plan of new veterinarian school owned by Abe's close friend were leaked

< (仮称) 岡山理科大学 獣医学部 今治キャンパス >

治キ <https://dot.asahi.com/wa/2017081800074.html>

獣医学部棟> というタイトルの図面の作成者は、加計学園関連グループ会社のSID創研と大建設計。平成29年3月という日付が記されている。

【画像】入手した資料はこちら

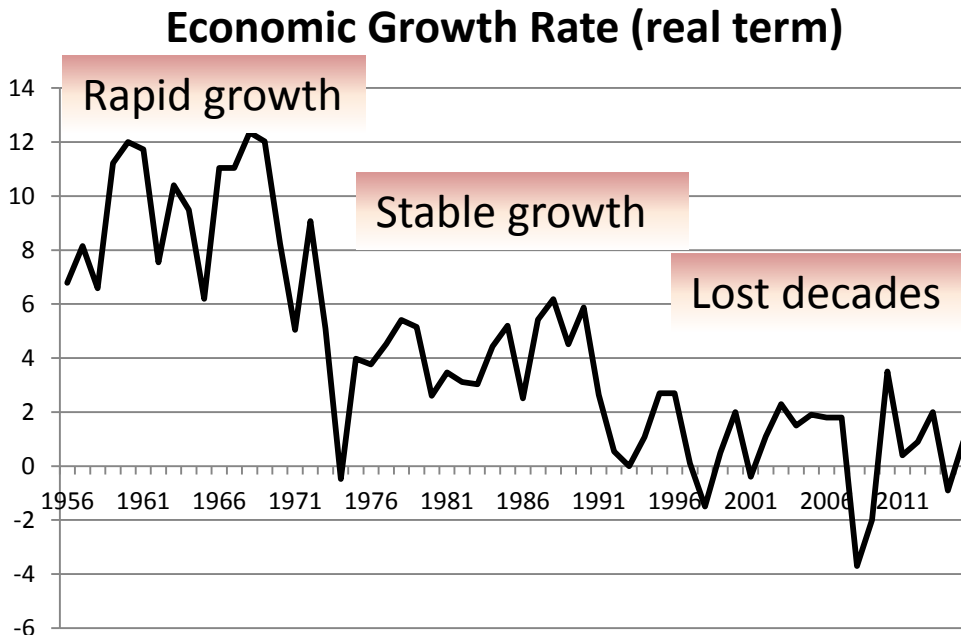
開校予定地、愛媛県今治市は、加計学園に対し、最大96億円（愛媛県負担分も含む）の補助金拠出をたった1日の審議で決めた（3日31日） その巨額補助金

Background:

Japanese economic growth after world war II

Japanese government disclosed economic growth rate from 1956. The period from 1956 to today can be divided into three or four stages.

1. Rapid growth (1954 - 1973 oil crisis)
 - other indicators than growth rate shows Rapid growth started in 1954
2. Stable growth (1974 - 1991)
 - 1986-1991 might be separated as “bubble boom period”
3. Stagnant, “lost decades” (1991 - today)

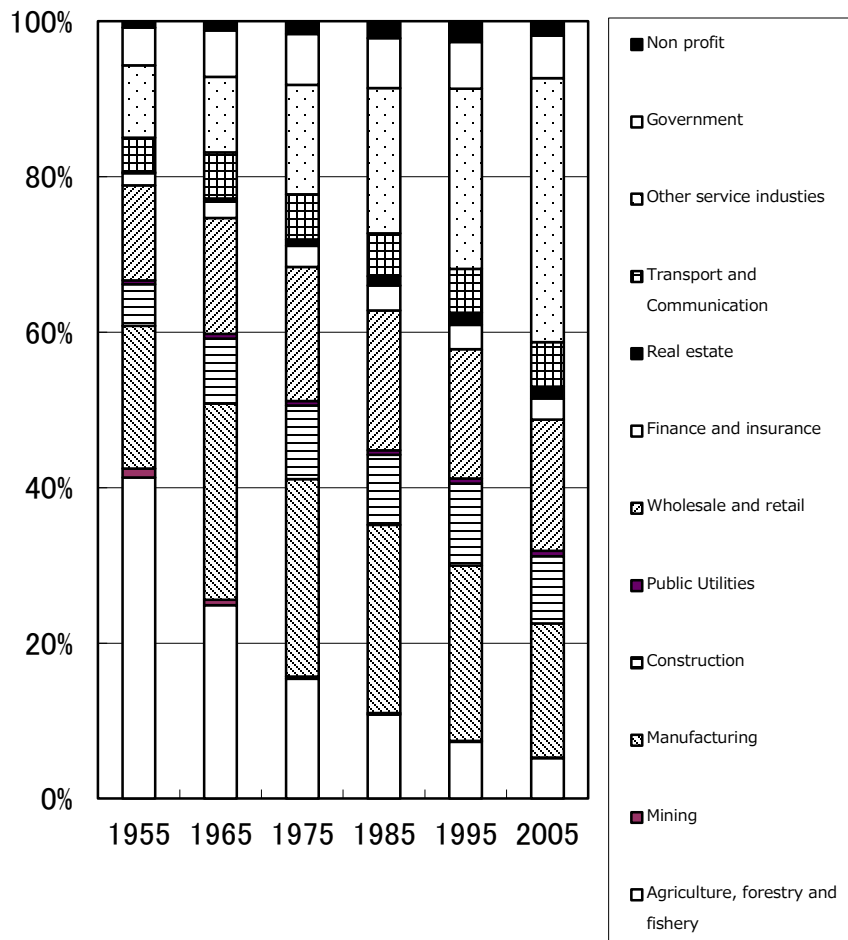


In rapid growth period, Japanese economy enjoyed about 10% growth rate. Even stable growth period after oil crisis, more or less 5% growth continued. But after 1991 “bubble collapse” nearly zero growth continues so far.

Background:

Change in Industrial Sector

Changes in workforce distribution by sectors



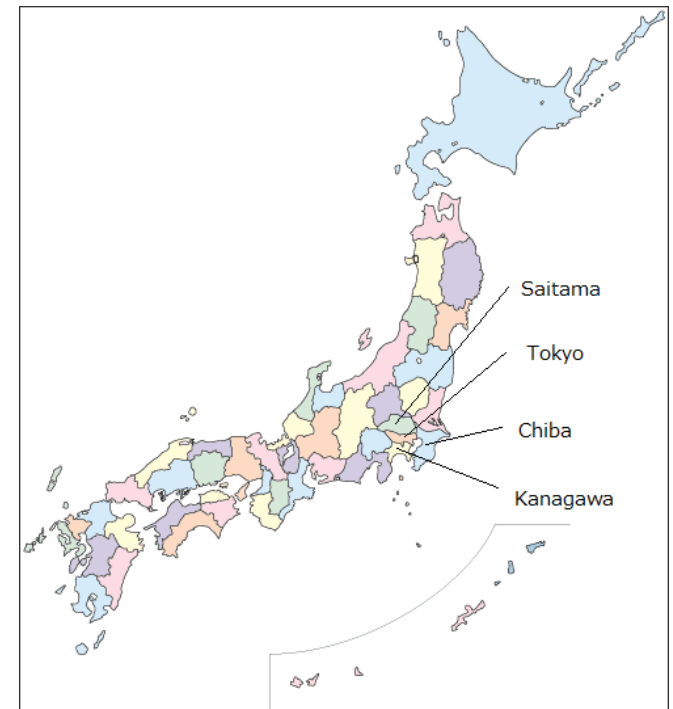
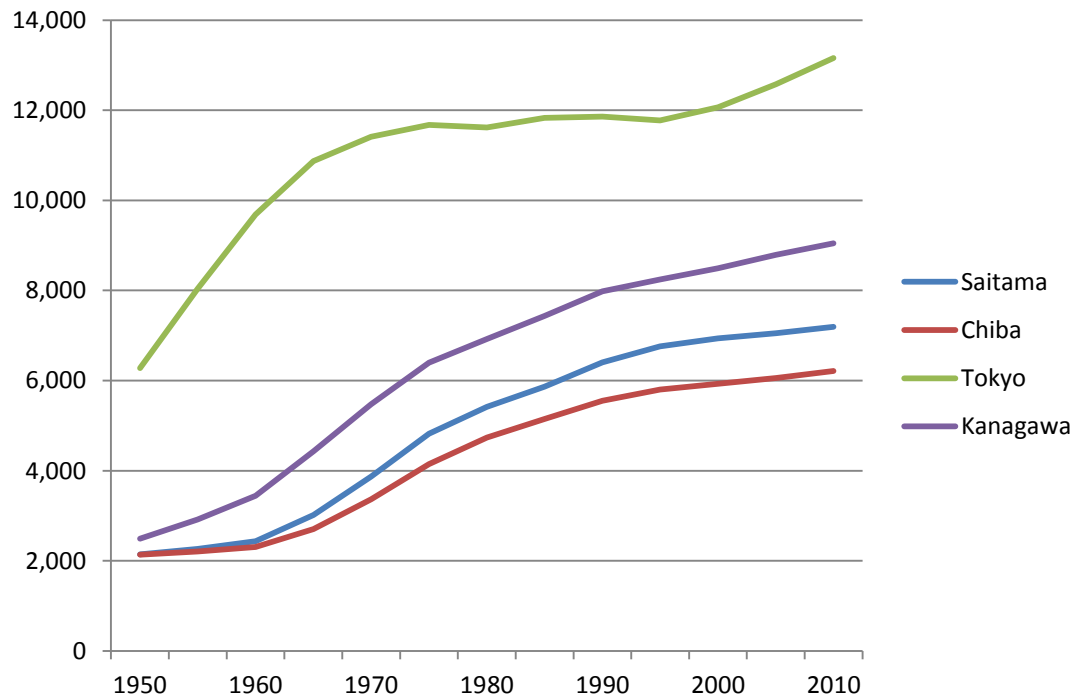
Source: National Population census

- In 1955, Agriculture occupied about 40% of workforce. The portion have continued to decline and become less than 10% in 2005.
- Manufacturing expanded by 1985 but after “Plaza Acord” fierce appreciation of yen (from 1\$ = 248.95yen at June 1985 to 167.82yen at June 1986), manufacturing also started to shrink.

Background:

Urban population increase

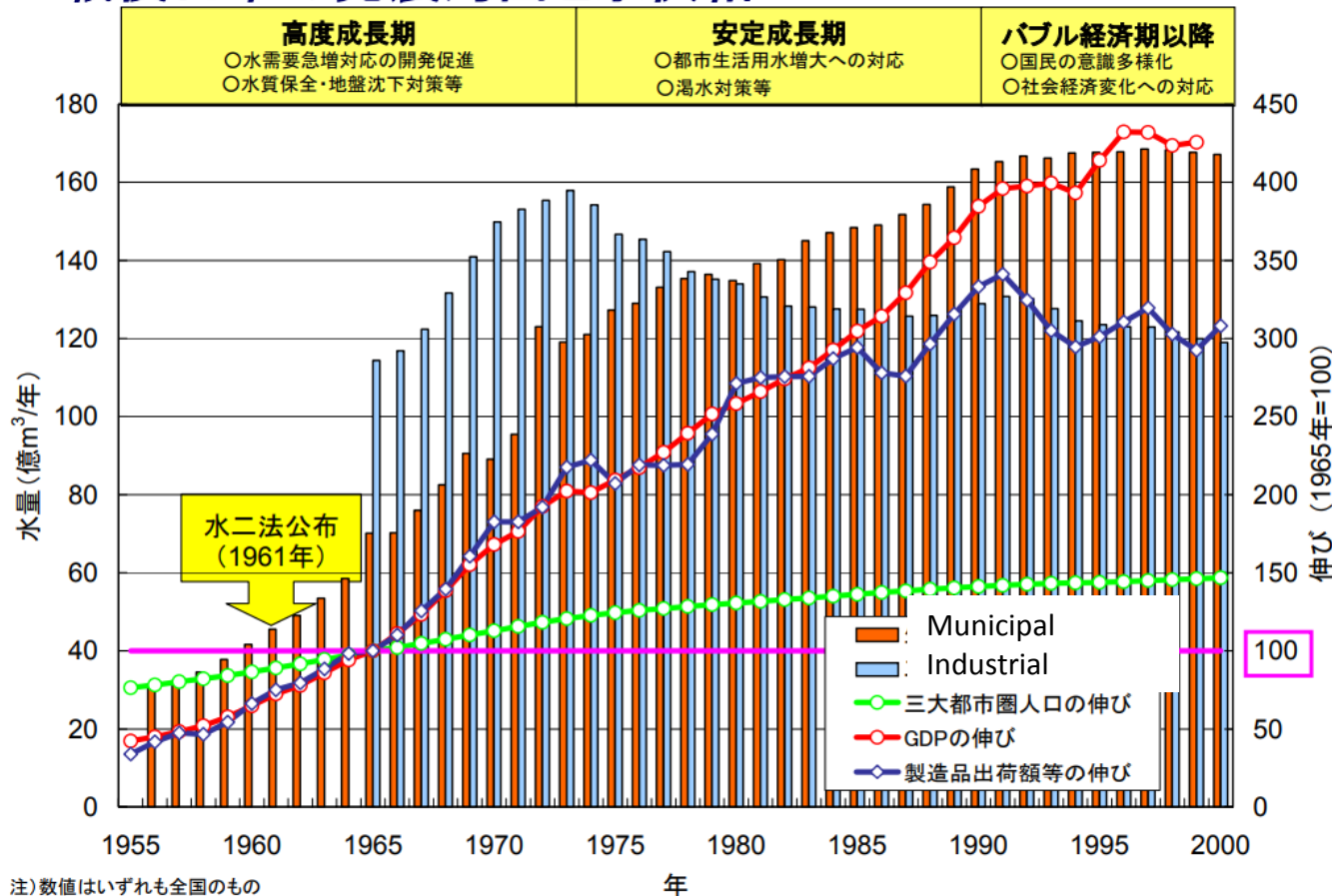
- In the rapid growth period, urban population also rapidly increased.
- More detail, while in 1950s the population in the large city like Tokyo or Osaka largely increased, but after 1960s the population in large city had reached to a ceiling and the population in satellite areas started to increase.
- Recently, Tokyo's population began to increase again.



Increase of Industrial and Municipal water demand

戦後日本の発展局面と水供給

(1) フルプラン



注) 数値はいずれも全国のもの

三大都市圏: 東京圏(埼玉県、千葉県、東京都、神奈川県)、大阪圏(京都府、大阪府、兵庫県)、名古屋圏(愛知県、三重県)

GDPは実質値(1990暦年基準)によるもの、製造品出荷額等は1995暦年基準の総合物価指数を乗じて補正し、実質値として算定したもの

資料: 水道統計、工業統計表、国勢調査及び人口推計年報、国民所得統計年報及び国民経済計算年報

Source:
<http://www.mlit.go.jp/common/001020288.pdf>

Traditional Rules of Water Distribution

- Japanese traditional rules of water distribution were roughly established in Edo Era (Tokugawa Shogunate, 1603 – 1868).
- Then farmers believed that abundant water supply assures rich harvest. Hence they struggled to seize so much water as possible.
- As a result, many water dispute occurred between farmers or villages. Even today, the word “mizukakeron” (水掛け論, “water dispute”) is used as synonym of “endless dispute”.

Traditional Rules of Water Distribution

- Traditional rules of water distribution were:
 - Closeness to political authority is definitive.
 - Tokugawa Shogunate divided land into pieces (which was sometimes very small) and designated different vassal as lord of each land piece (similar system to European feudalism). The closer to Tokugawa the lord of the land was, the more privileged the land was.
 - Of course, the lands Tokugawa shogun directly rules (“Tenryo(天領)”, highest territory) were most privileged.
 - Existing user is privileged over new comer.
 - Upstream is privileged over downstream.
- These rules are remaining influential even today.

Note: Edo Era

- Edo Era Japan (1603 – 1868) shared many coincident features with European feudalism and in this period manufacturing was developed to a considerable level.



- These conditions made the premises of Japanese rapid industrialization and imperialist expansion after Meiji Restoration of 1868.

Archer boy doll in Edo Era. This doll is powered by coil spring, turns face and shoots arrows.

Photo: <http://karafro.com/zasiki/zasiki.html>

Multi purpose dam

- Under traditional water distribution rules, industrial waterworks and municipal waterworks couldn't get water resource which they needed because they were new comer.
- Ministry of Construction (MoC) prohibited water resource trading i.e. agricultural sector "selling water" to industrial or municipal waterworks.
- Instead of water resource trading, MoC chose "multi purpose dam" construction to provide water to municipal and industrial waterworks.

Multi purpose dam

- Multi purpose dam was constructed by WARDEC (in seven “Full Plan” rivers), MoC or prefectural government (other rivers).
- The owner of Multi purpose dam sold “dam rights” to collect construction cost to the expected water users. (municipalities, industrial waterworks, agricultural improvement district, electric companies and so on)
- The price of “dam rights” was different according to the value of the benefit which each water user would obtain from water use. The “dam rights” for agriculture or municipalities was cheaper than “dam rights” for industrial waterworks.

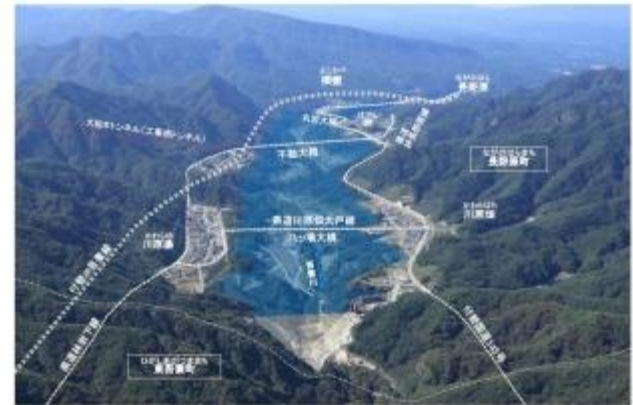
Multi purpose dam

- The river authority (MoC for 1st-tier rivers and prefectural government for 2nd-tier rivers) shared dam construction cost for flood prevention and environmental benefit (stabilizing flow in river).
- Of course, this cost allocation is ambiguous in reality and there is much room for political bargaining.

Cost allocation for Yamba dam project (2008)

Total: 460 billion yen

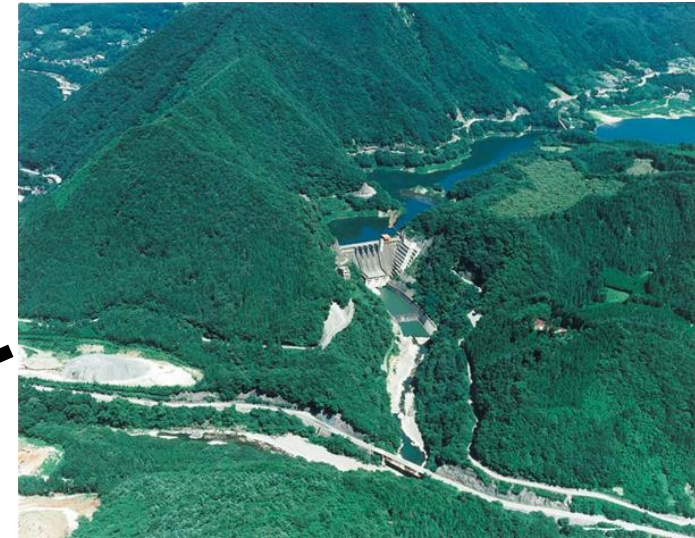
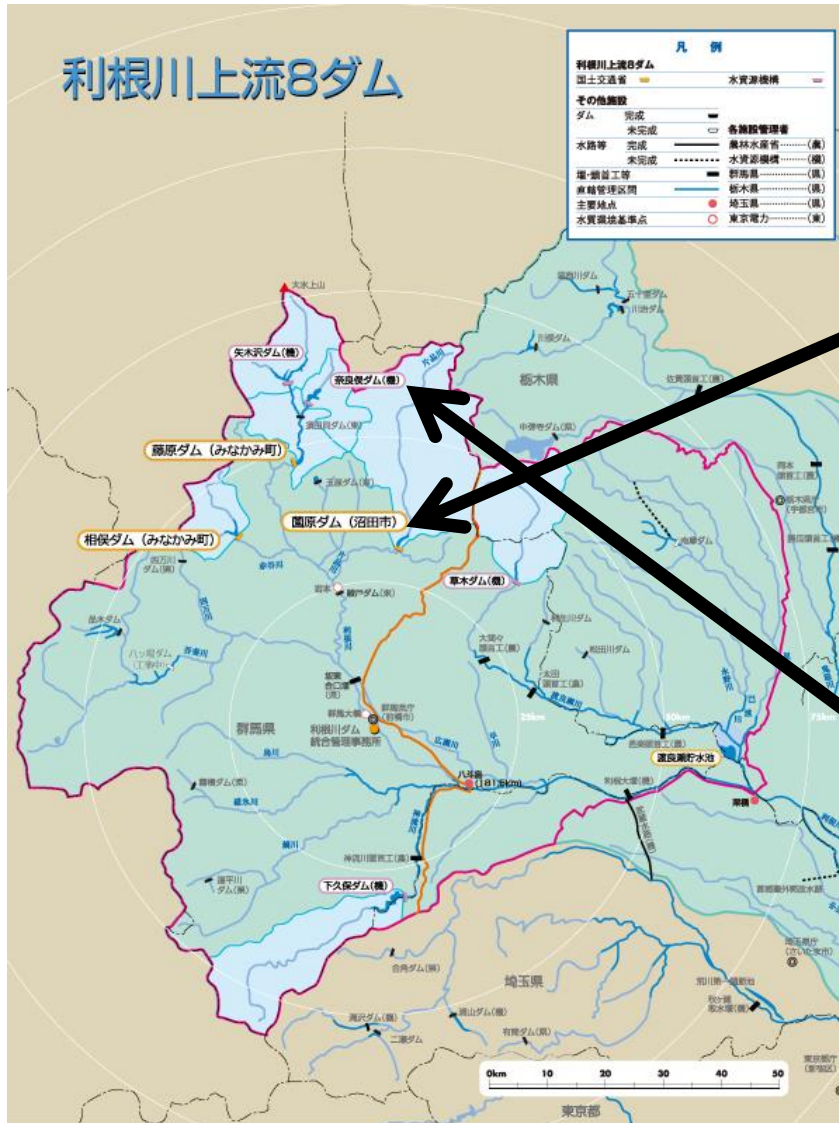
Water Authority (MLIT*)	54.5%
Municipalities	43.6%
Industrial waterworks	1.8%
Hydropower generation	0.1%



http://www.ktr.mlit.go.jp/yanba/yanba_index003.html

* Yamba dam is constructed in tributary of Tone river. Tone river is one of the “Full Plan” rivers but WARDEC withdraw from new dam construction in 2000.

Dams upstream of Tone river



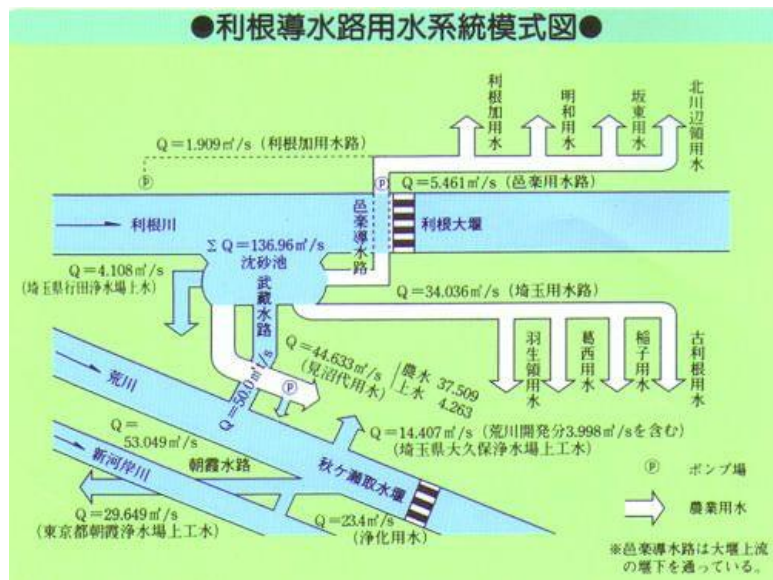
Sonohara Dam



Naramata Dam

http://www.water.go.jp/kanto/numata/12_photo/photo.html

Tone Great Barrage



- From left to right in this photo,
 - Minumadai waterway (mainly agricultural)
 - Musashi waterway (municipal)
 - Saitama waterway (agricultural)
- The width of waterways are proportional to the amounts of “dam rights” each waterway have.

利根川水系水資源開発基本計画を一部変更(1963年3月)し、利根川の水を荒川を経由して東京まで導水する**利根導水路建設事業(武蔵水路、朝霞水路等)**を追加

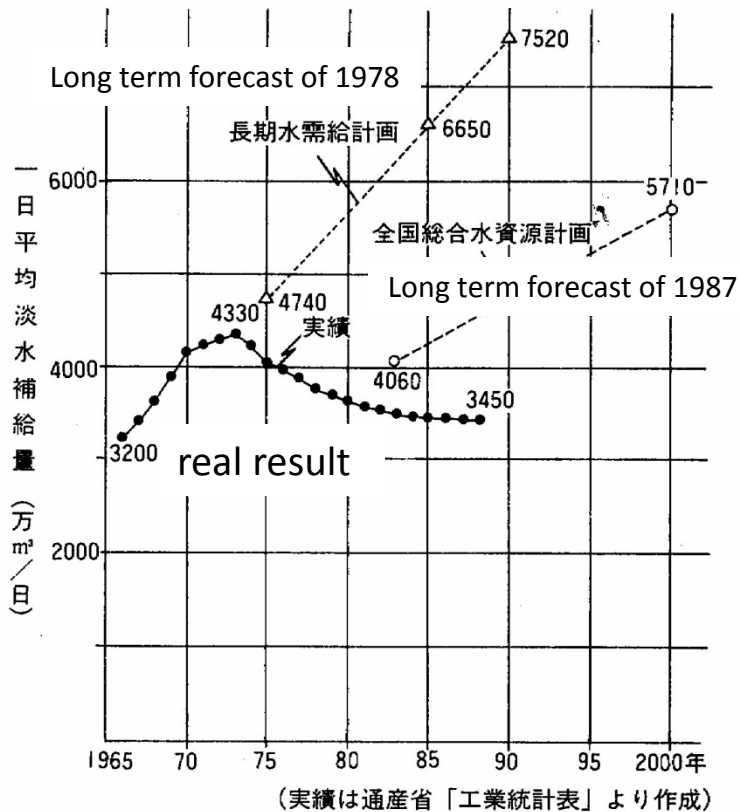
朝霞水路による荒川の水の東村山浄水場への緊急暫定通水(1964年8月25日)の同日に給水制限率が50%から30%に緩和



資料:水資源機構広報誌「水とともに」、東京都水道局ウェブサイト「東京水道の歴史」より水資源部作成

Decrease of industrial water demand

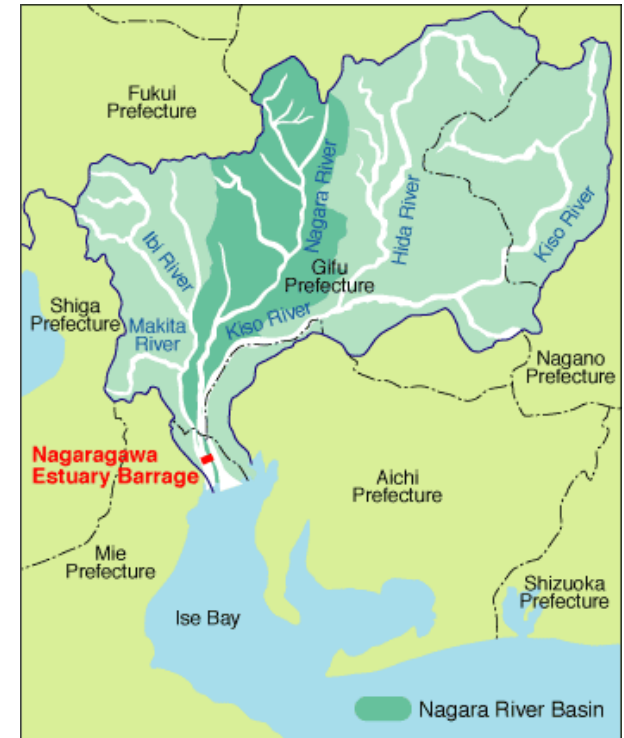
Comparison forecast and real result of industrial water demand



- The industrial water demand rapidly increased until oil crisis of 1973.
- After oil crisis, water price increased and manufacturers made vast effort to economize water use.
- As a result, industrial water demand began to decrease. But Japanese government persisted unrealistic enormous water demand forecast.

Source: Shimazu Teruyuki (嶋津暉之), "Introduction to Water Problem (水問題原論)", p.16, Hokuto Press, 1991.

Nagaragawa Estuary Barrage



Source:
http://www.water.go.jp/chubu/nagara/27_english/index.htm

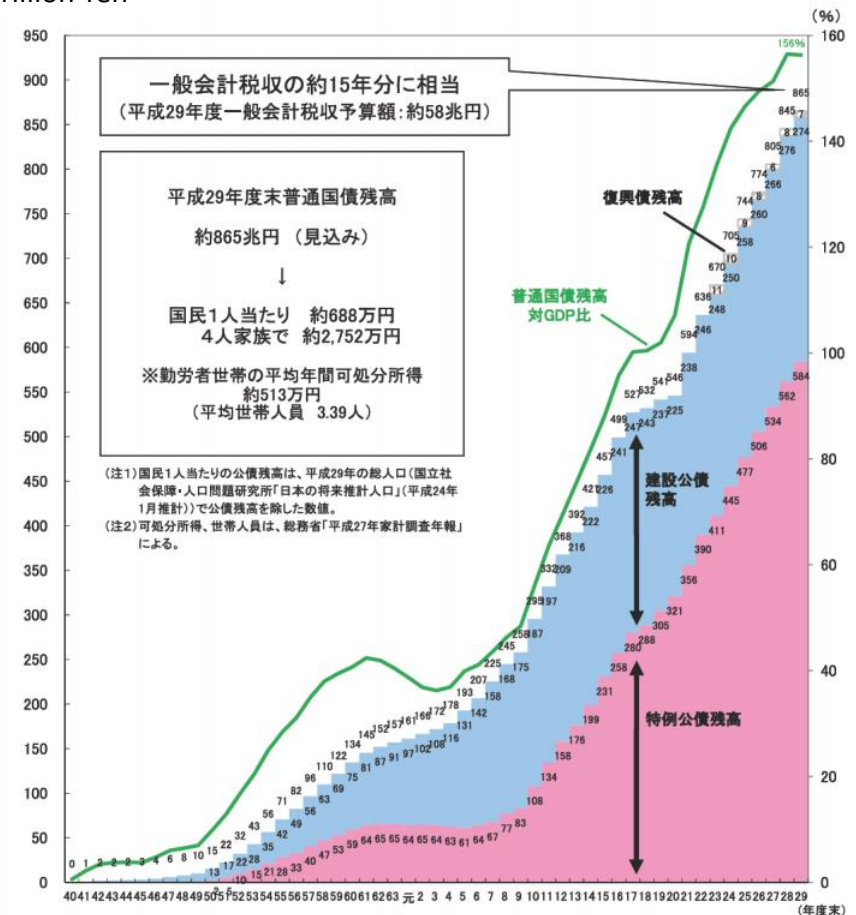
- Nagaragawa Estuary Barrage was constructed against strong opposition and completed in 1995.
- The dam developed $22.5 \text{ m}^3/\text{s}$ of water resource. But even today the real demand is limited only $3.592 \text{ m}^3/\text{s}$.

Withdrawal from Construction Projects

- Facing lack of water demand and strong opposition, Japanese government eventually decided to withdraw from more than 100 dams in late 1990s.
- After 1991 “bubble collapse”, tax revenue, especially corporate tax, decreased and governmental debt begin to increase. This is another reason to withdraw inefficient construction projects.

Accumulation of central government debt in Japan

Trillion Yen



Source: Ministry of Finance, “State of the public finance”

http://www.mof.go.jp/budget/fiscal_condition/related_data/201704_01.pdf

Waterworks managerial crisis

- Many municipal waterworks suffered a loss by overdevelopment of water resource and increasing unsold water.
- Japanese waterworks law provides waterworks should be run by its own revenue. But actually many municipalities has been forced to subsidize its waterworks.
- This means that complete privatization of waterworks is difficult even if privatization is not impossible. Although there are some exceptions, most of current waterworks is not a profitable business and not attractive for investors.

Water price divergence

- Due to natural condition or other factors, water prices of each municipalities are largely different.
- Especially because of the increase of dam construction cost, the water prices of the municipalities in which water demand recently increased is prone to be higher.
- On the other hand, water prices of the municipalities in which water demand suddenly decreased also is prone to be higher.

High water price municipalities

Yubari City	6841
Fukaura Town	6588
Rausu Town	6360
Esashi Town	6264
Oyano Town	6264

Cheap water price municipalities

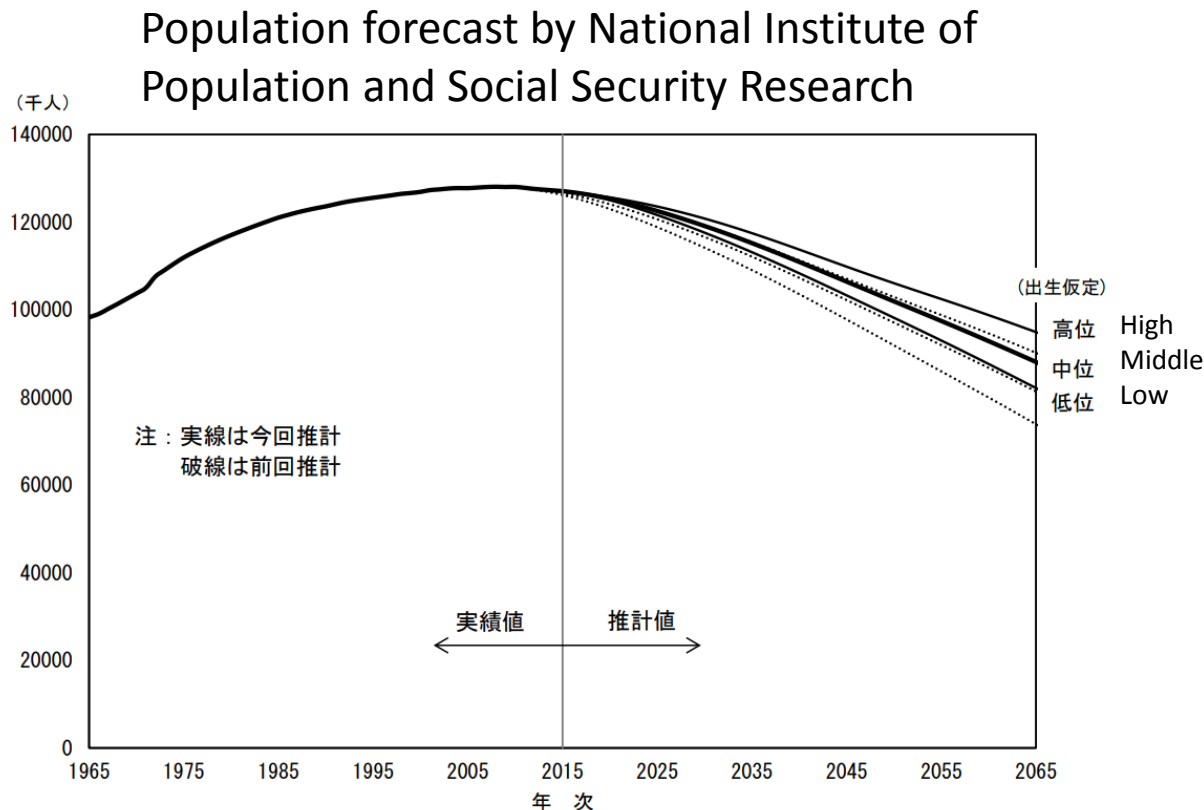
Fujikawaguchiko Town	835
Ako City	853
Nagaizumi Town	1120
Oyama Town	1130
Shirahama Town	1155

Water price for 20ton/month as of April, 2014

Source: Japan Water Works Association

Future of waterworks in Japan

- National Institute of Population and Social Security Research forecasts continuous population decrease in Japan in this century.



Future of waterworks in Japan

- Water demand also is forecasted to decrease. The demand decrease will bring revenue decrease.
- This means that the “water resource development era” has been ended. Hereafter proper maintenance and replace will be more important for waterworks.
- Future waterworks will be required to operate more effectively to adapt these conditions and to supply safe and stable water.

Thank you very much.

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