Water Supply of Sendai City
~From suffering to rehabilitation~

◆About Sendai City

- **Mild climate**
  average temperature
- **Rich nature**
  surrounded by the pacific ocean and Ohu Mountains

◆About Sendai City

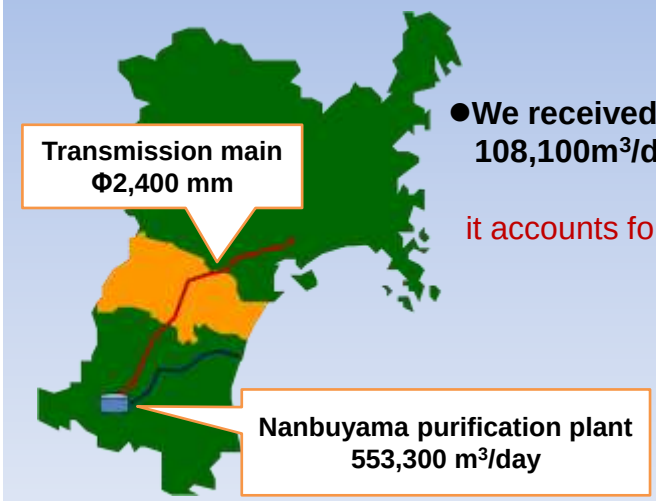
- More than 400 years' history

- Center of economical activities in the eastern part of Japan

◆Sendai Waterworks Bureau

Service area	approx. 363 km^2
Total length of pipeline	approx. 3,781 km (including 3,343 km of distribution pipe)
Number of Purification plants	4 main and 4 small plants
Population served	1,016,440
Percentage served	99.5 %
Average distribution per day	335,936 m^3/day
Effective rate	96.0 %
Beginning of supply	March, 1923
Number of the staff	420

◆Miyagi Prefectural Balk Water Supply

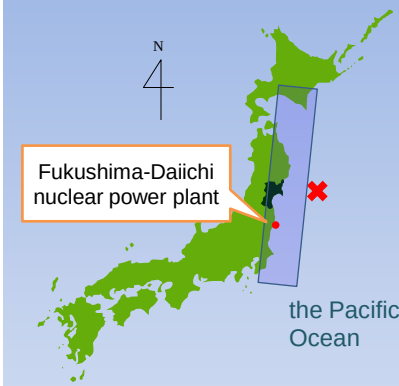


- **We received 108,100m^3/day of treated water**

it accounts for 1/3 of our total distribution volume

The outline of suffering from the Great East Japan Earthquake

◆The Great East Japan Earthquake



Human loss (the whole Japan)	
Dead	15,853
Injured	6,013
Missing	3,286

●**Primary Quake**

2:46 pm on March 11, 2011
Magnitude 9.0
at the Pacific coast of Eastern Japan

●**Tsunami**

Over 10 meter high tsunami was hit in various part of eastern Japan.
561 km^2 of land were flooded.

●**Accident of the nuclear power plant**

level 7 serious nuclear accident (IAEA level)
Over 80,000 people have evacuated from near the plant.

◆Suffering from the disaster in Sendai

Land slides damage to hillside areas of Sendai

Tsunami damage to the coastal areas of Sendai

◆Suffering from the disaster in Sendai

●**Damage from tsunami**

over 10 meter-high tsunami wash away everything in the coast areas.

◆Suffering from the disaster in Sendai

●**Damage from landslides**

occurred at 1950~60s' development areas in the western part of the city

◆Suffering from the disaster in Sendai




Emergency reaction of Sendai Waterworks Bureau

1. Damage Status

① Water purification plants
② Distribution reservoirs
③ Water quality inspection center and office
④ Transmission and Distribution Pipelines

① Water Purification Plants

There were damage in our purification plants,
but they weren't so large to influence supplying water.

Damage to
the sedimentation inclined basin plates.

Damage to
the sedimentation baffle boards.

② Distribution reservoirs

Some distribution reservoirs experienced slope failure and the collapse of flow arrangement wall.

Collapse of flow arrangement wall in Anyoji Distribution Reservoir

Slope failure in Fukuoka Water Purification Plant

However, normal service was provided by using other facilities.

③ Water quality inspection center and offices

↑Analyzing instruments such as GC/MS were damaged due to falls.

It is difficult to keep working→ at the office while a time because of falling down of various things.

④ Transmission and Distribution Pipelines

Transmission and distribution main pipes

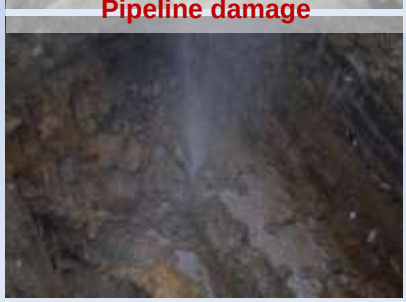
DIP-K φ800 repairing

SP φ600 leakage

But there were no damage in DIP,
which had earthquake resistant joints.

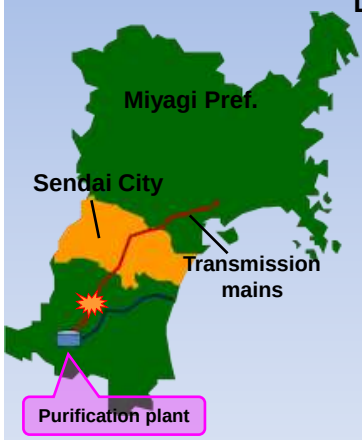
④ Transmission and Distribution Pipelines

Pipeline damage



Air valve damage

Damage Status of the Miyagi Prefectural Balk Water Supply



Damage to transmission main Φ2400 pipeline

←leakage

Repairing→

Damage to Water Supply

Shortage of fuel

- Limited accessibility to gasoline, light oil, and kerosene.
- Difficult to obtain fuel for electric generators, water trucks, official vehicles, and specialized task vehicles etc.

Water Purification Plant	Electric Generator Operation Hours	Return of Electricity	Type of Oil	Tank Capacity (L)	Operational Hours/ Tank Capacity
Moniwa	98	March 15	Kerosene	6,500	28.7
Kunimi	58	March 14	Light Oil	950	13.1
Nakahara	54	March 13	Kerosene	12,000	29.4
Fukuoka	68	March 14	Kerosene	10,000	29.9

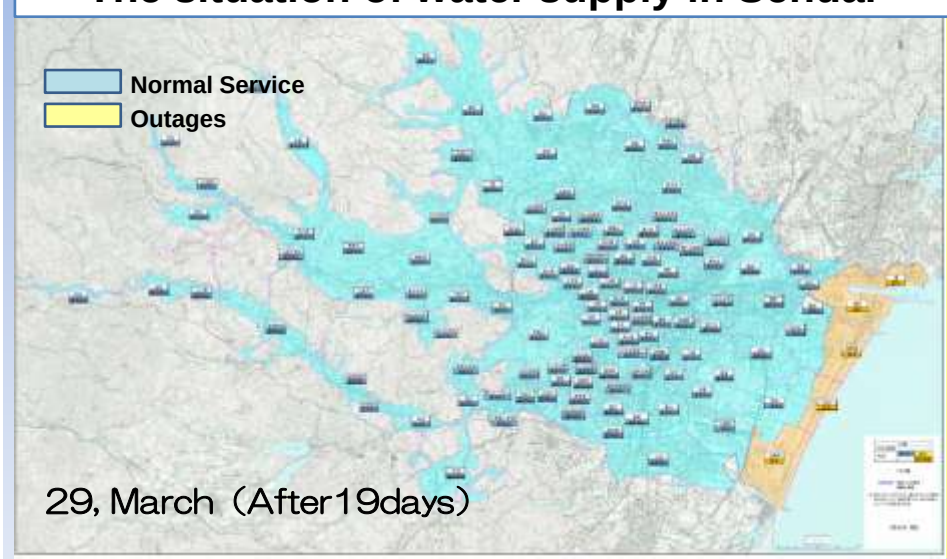
2. Emergency reaction

① Emergency recovery works

② Emergency water supply

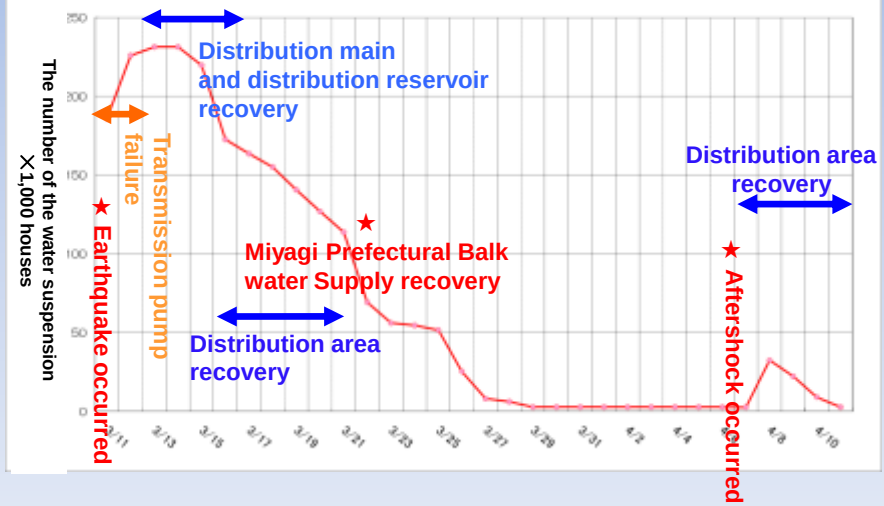
① Emergency recovery works

The situation of water supply in Sendai



① Emergency recovery works

The situation of water supply in Sendai



① Emergency recovery works

- Just after the earthquake, we conducted surveys and Miyagi Plumbing Constructor's Association team came to help out with 33 teams.
- Tokyo Metropolitan water works bureau and Sapporo city water works bureau were sent supporting team for recovering works, based on an agreement for disaster cooperation between waterworks utilities of major cities in Japan.

The situation of recovery

② Emergency water supply

1） Supplying Water by Water Trucks

2） Setting up Water Supply Stations

3） Giving Priority to
Emergency hospitals

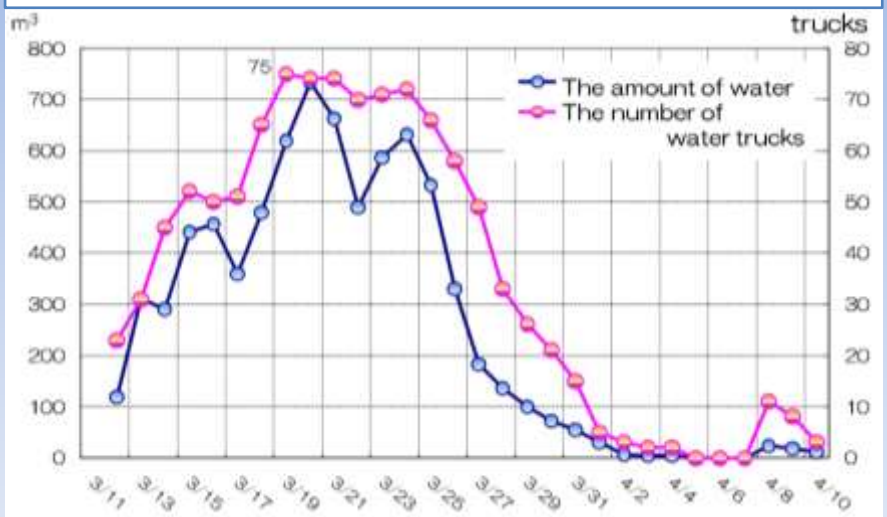
1） Supplying Water by Water Trucks

←the situation of emergency water supply by a water truck

The situation of supplying water for a water truck →

1） Supplying Water by Water Trucks

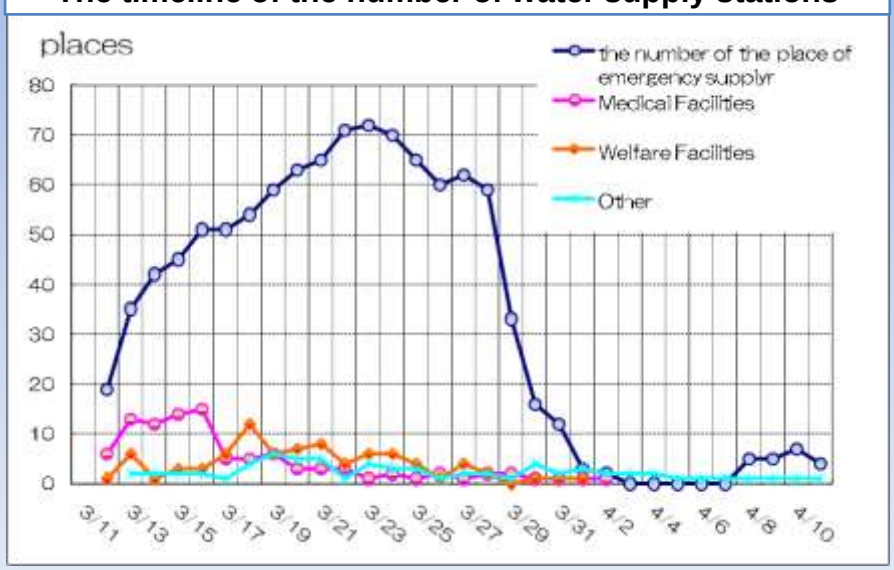
The timeline of the number of water trucks



a total of 1,055 trucks , approx. 2,800 people

2） Setting up water supply stations

The timeline of the number of water supply stations



2） Setting up water supply stations

←canvas tanks
for emergency water supply

Emergency water supply in the night at the waterworks office→

3） giving priority to emergency hospitals

Emergency medical establishments were given first priority of water supply and dialysis clinics had water delivered on request.

Thank you very much
for your attention!

Sendai Water Works Bureau