



Towards disaster risk reduction city - Tagajo

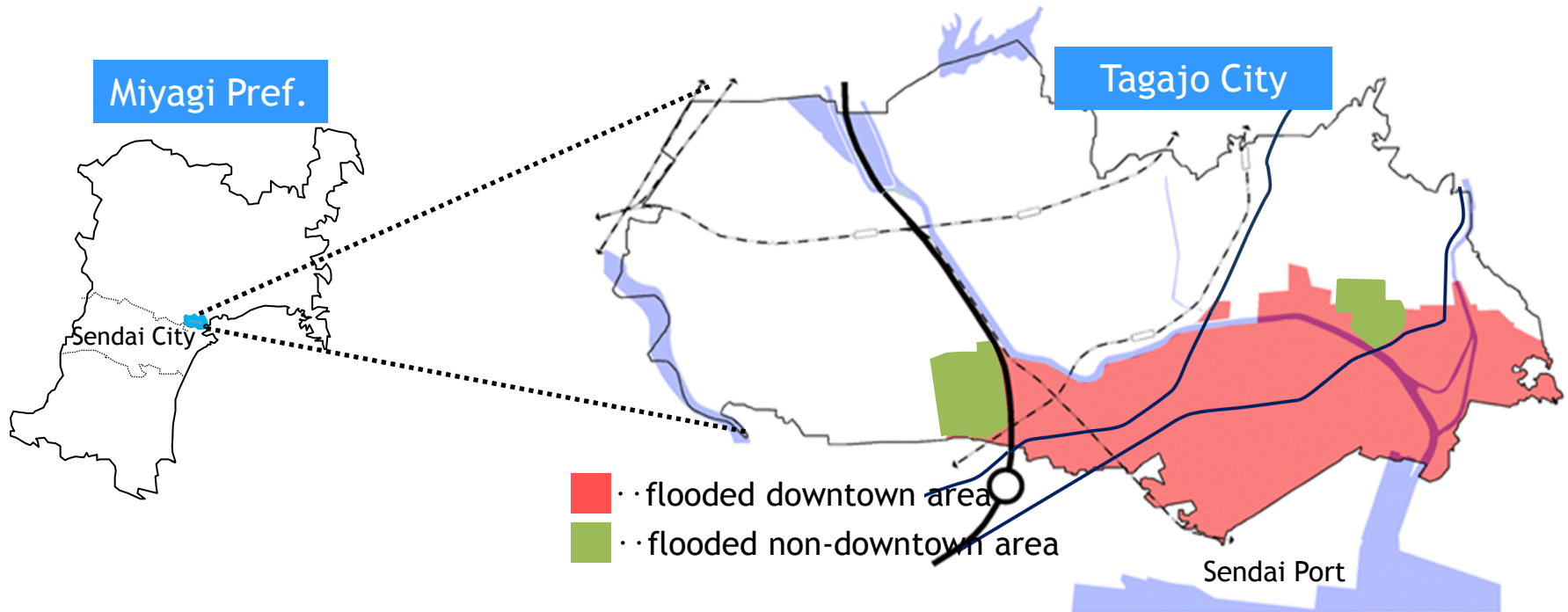
~Disaster-resilient city~



~APRU-IRIDeS summer school~
Tagajo City, Miyagi
Wed. July 22, 2015



1. Damage by “the Great East Japan Earthquake & Tsunami”



Takajo City

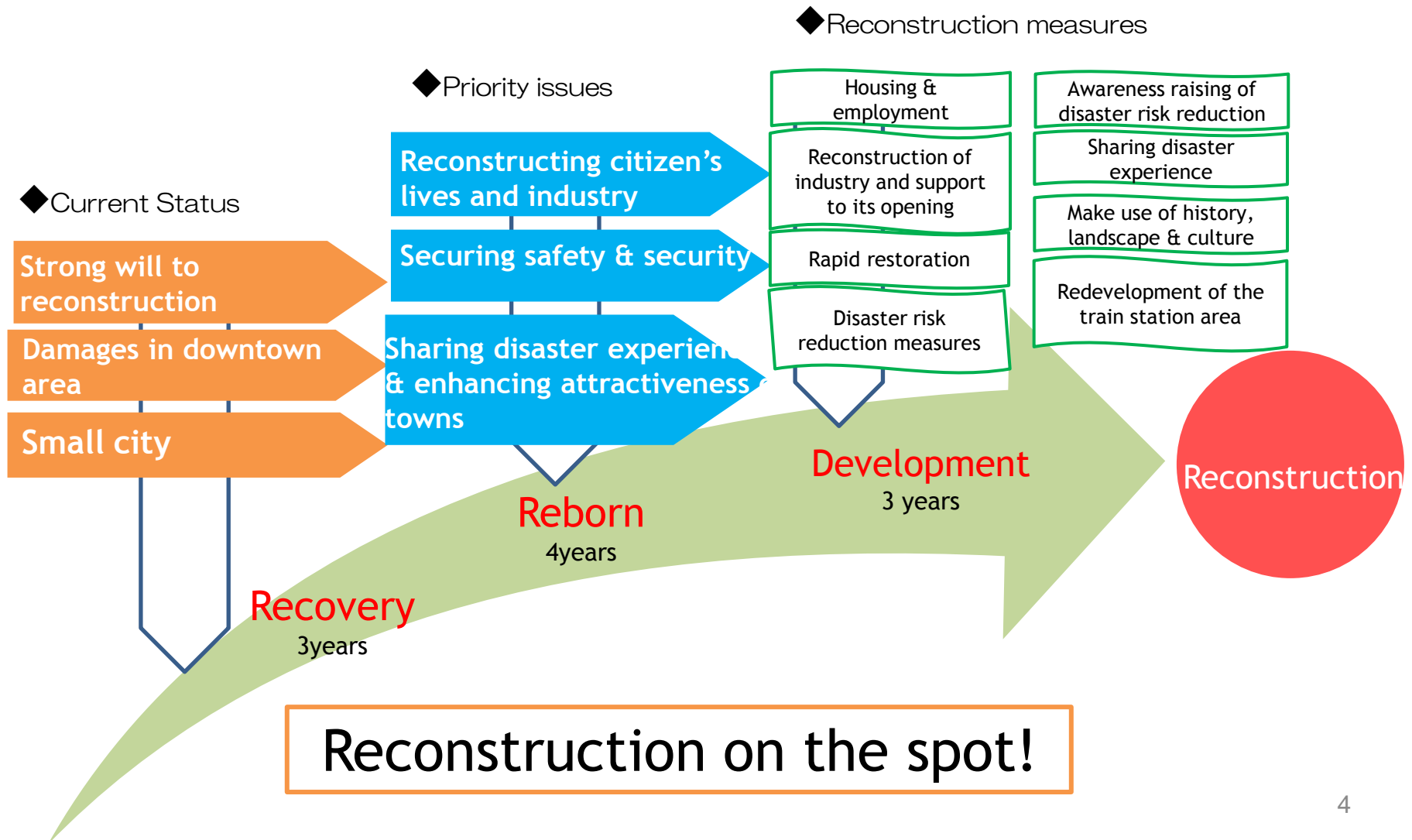
- ◆ Location: 12km from downtown Sendai
- ◆ Population: 62,000
- ◆ Area: 19.69 km²
- ◆ Density: approx. 3,100/km² top in Tohoku area
- ◆ Traffic: 76,000cars/day

Damage

- ◆ Max. seismic intensity: 5+
- ◆ Flooded area: 662ha(1/3 of the city) → 90% downtown
- ◆ Max. height of flood: 4.6m
- ◆ Number of Deaths: 188 (citizen 97, non-citizen 91)
- ◆ Destroyed houses: over 11,000 (including full, half , partial)
- ◆ Approx. 1,400 family have escaped to temporary housing
- ◆ Approx. 8,500 cars were floated into the city
- ◆ Volume of rubble : 353 kiloton

2. Towards reconstruction

Outline of reconstruction plans in Tagajo City



3 . History of natural disasters in Tagajo City

【Heavy rain】

1986年	8.5 Heavy Rain Date : Aug. 5, 1986 Cause : Typhoon No.10 Total rainfall : 394mm Max. rainfall : 37mm/h Flooded above floor : 2,817 houses Flooded below floor : 1,468 houses
1994年	9.22 Heavy Rain Date : Sep. 22, 1994 Cause : low pressure Total rainfall : 305mm Max. rainfall : 119mm/h Flooded above floor : 667houses Flooded below floor : 903 houses
2000年	
2002年	7.11 Heavy Rain Date : Jul. 11, 2002 Cause : Typhoon No.6 Total rainfall : 171mm Max. rainfall : 43mm/h
2011年	9.21 Heavy Rain Date : Sep.22, 2011 Cause : Typhoon No.15 Total rainfall : 310mm Max. rainfall : 49mm/h Flooded above floor : 15houses Flooded below floor : 315houses

【Earthquake & Tsunami】

869年	Jogan Earthquake (subduction-zone) Year : 869 (Heian period) Magnitude : 8.3
1978年	Miyagiken-oki Earthquake (subduction) Date : Jun. 12, 1978 Magnitude : 7.4 Seismic intensity : 5 (Sendai, Ishinomaki)
2003年	Miyagiken-oki Earthquake (subduction) Date : May 26, 2003 Magnitude : 7.0 Seismic intensity : 4 (Tagajo)
	Miyagiken-hokubu Earthquake (epicentral) Date : Jul. 26, 2003 Magnitude : 6.2 Seismic intensity : 4 (Tagajo)
2005年	Miyagiken Earthquake (subduction) Date : Aug. 16, 2005 Magnitude : 7.2 Seismic intensity : 4 (Tagajo)
2008年	Iwate-Miyagi Nairiku Earthquake (epicentral) Date : Jun. 14, 2008 Magnitude : 7.2 Seismic intensity : 3 (Tagajo)
2011年	Great East Japan Earthquake (subduction) Date : Mar. 11, 2011 Magnitude : 9.0 Seismic intensity : 5+

4 . Towards disaster risk reduction city

Declaration of DRR City

Tagajo city, which has a long history and tradition, was suffered from many natural disasters such as Jogan Earthquake in ancient times and 8.5 / 9.22 Heavy Rains in recent years.

The Great East Japan Earthquake caused devastating damage to the northeast region of Japan, making us feel how powerless we are in the face of Nature.

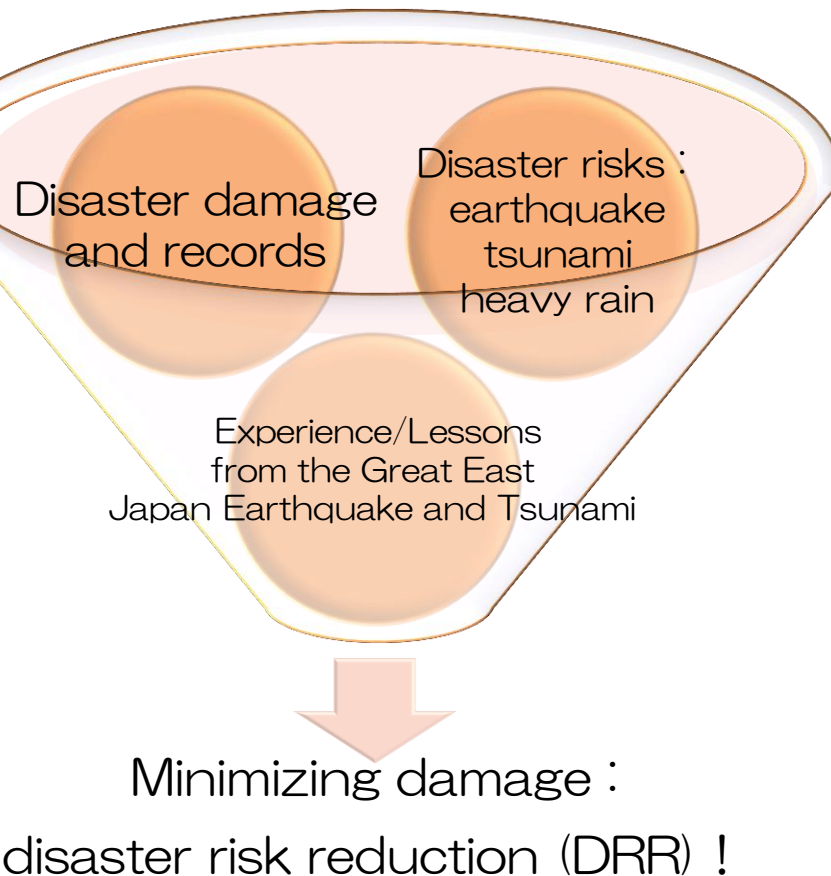
We cannot rule out the possibility of suffering from terrible disasters again like flood, typhoon, landslide, earthquake, tsunami and so on.

Therefore, in order to prepare for future disasters, we have to pass on to the next generation our experience and lessons obtained by surviving natural disasters.

We need to understand that each of us is an agent of town/city development, and to learn from the history based on the roles of self-help, mutual assistance, and support by public bodies, and the mutual collaboration. From such point of view, we will promote "Disaster Risk Reduction" to minimize damage not only as responsible individuals but also as cooperative citizens.

We will also make efforts to protect human lives as top priority, to prepare for disasters, to minimize damage, and to recover rapidly. Aiming to realize such city, we hereby declare "DRR city – Tagajo."

Nov. 28, 2013



Tagajo DRR city strategy

Disaster-resilient City
「Disaster risk reduction city – Tagajo」

5 . Tagajo DRR city strategy ①

Strategy for DRR city Mechanism



Strategy for DRR city Future plan



5 . Tagajo DRR city strategy ②

1

Building multiple barriers for tsunami

Aim

Facilities & systems have been built as the foundation of local recovery

【multiple defenses image】

Emergency radio system



【Project】

- Multiple barriers
- Evacuation roads
- Escape towers
- Dissemination of evacuation announcement

2

Developing earthquake-resilient city

Aim

Buildings have earthquake resistant structure

【Project】

- Earthquake resistant roads and bridges
- Earthquake resistant wooden buildings

3

Minimizing flood damage

Aim

Flood damage by heavy rain is reduced

【Project】

- Rainwater draining system
- Rainwater draining pump
- Side ditches

4

Developing disaster response system

Aim

Disaster response system including rescue, evacuation and recovery is established

【Project】

- Evacuation site management manual
- Stockpile facility
- Distribution base for relief supplies

5. Tagajo DRR city strategy ③

5

Enhancing self-help ability

Aim

Disaster preparedness capacity of each citizen is fulfilled

【Handbook】



【DRR education】

【Project】

- DRR education
- DRR handbook
- Tsunami hazard map

6

Strengthening community DRR capacity

Aim

Local DRR capacity as assistance by public bodies is increased

【emergency drill】



【Project】

- Local emergency drill
- Voluntary disaster prevention organization

7

Sharing disaster experience

Aim

Disaster experience and records are disseminated

【Project】

- Sharing experience & lessons

8

DRR Research Park Program

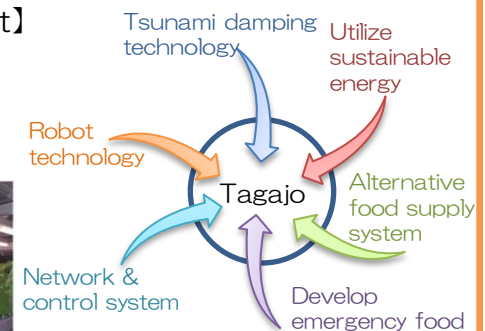
Aim

Various DRR technology and products are developed

【Project】

- Promotion of DRR technology development
- Joint meeting of industry, academia and government
- Joint research with private sector and university

【lettuce grown in artificial light】



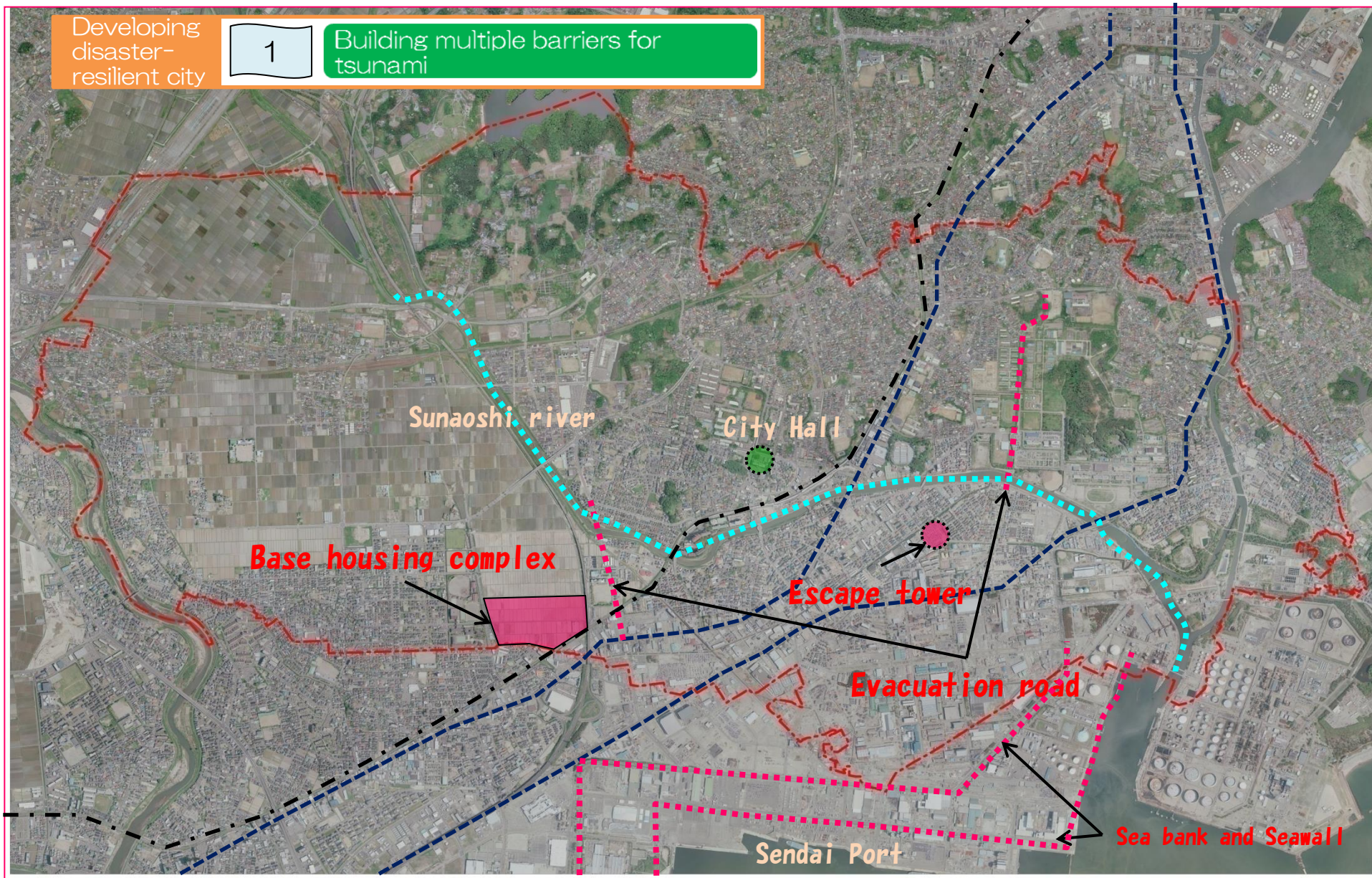
【image of DRR technology】

6 . Efforts based on DRR strategy①

Developing
disaster-
resilient city

1

Building multiple barriers for
tsunami



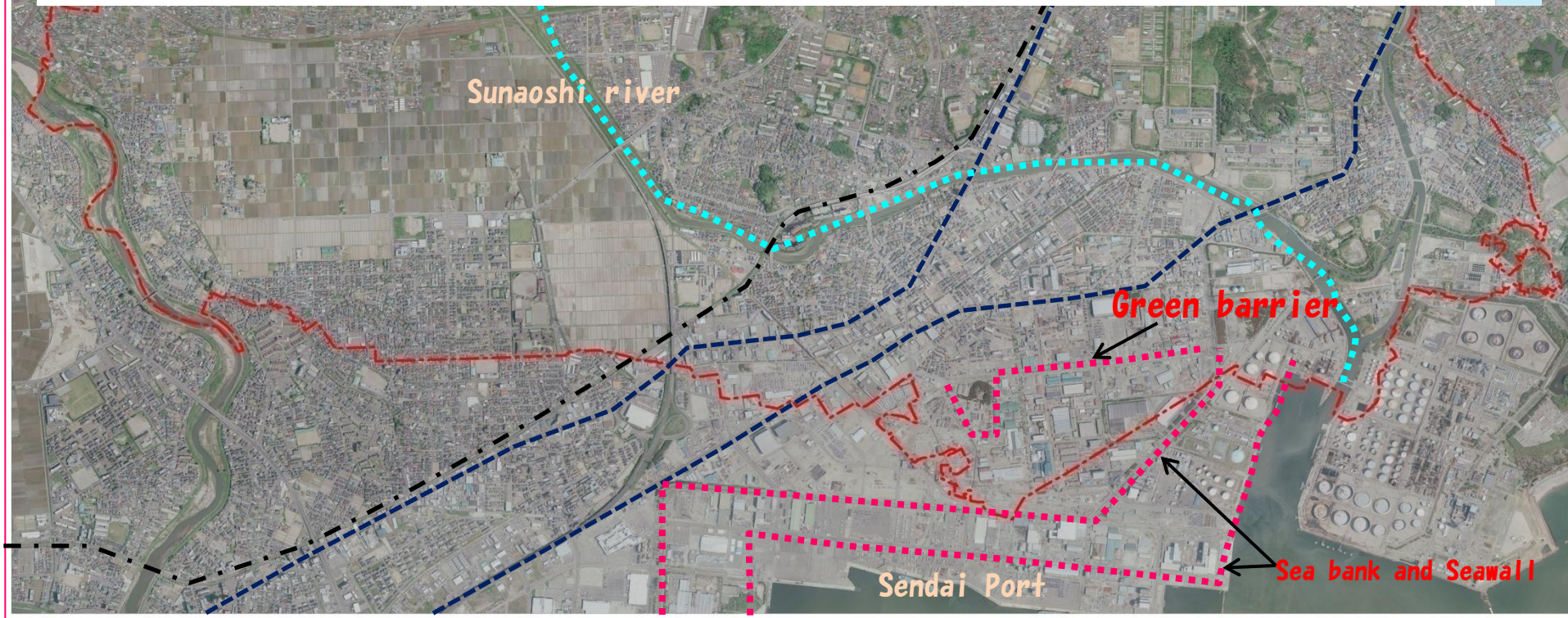
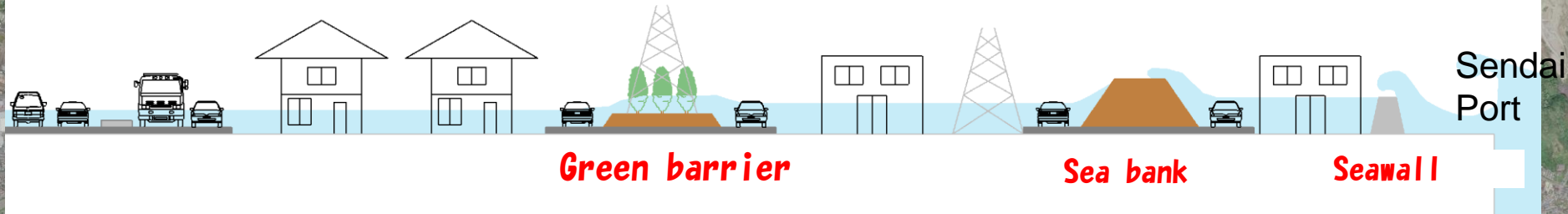
6 . Efforts based on DRR strategy ②

Developing disaster-resilient city

1

Building multiple barriers for tsunami

~ Prevent Tsunami! Reduce tsunami impact! ~



6 . Efforts based on DRR strategy ③

Developing
disaster-
resilient city

1

Building multiple barriers for
tsunami

~ Escape from Tsunami ! ~



6 . Efforts based on DRR strategy④

Developing
disaster-
resilient city

1

Building multiple barriers for
tsunami

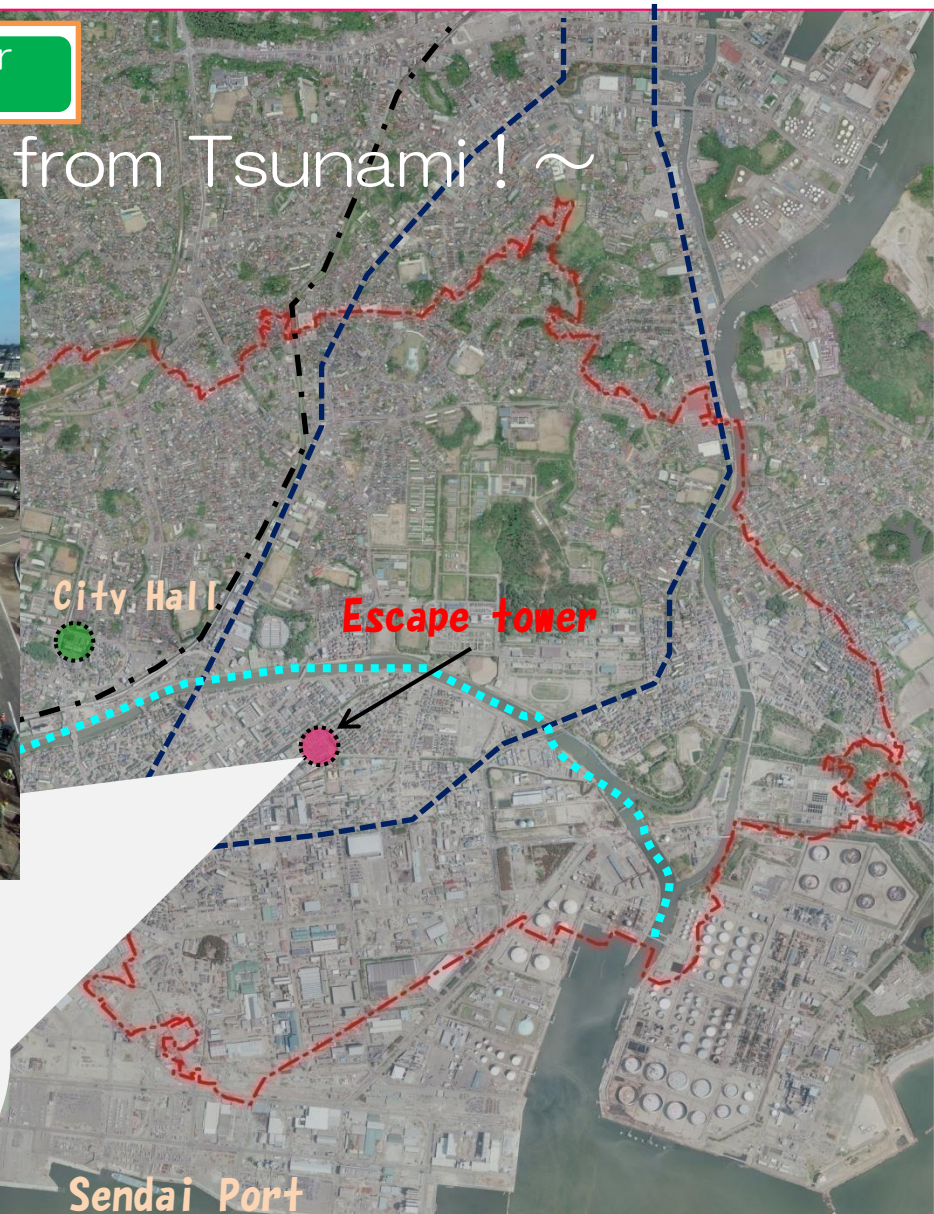
~Escape from Tsunami!~

Disaster public housing
Started to move in in October 2014



【Features of Sakuragi area】

- Pilotis structure on the first floor
- Evacuation site & stockpile facility on the rooftop
- Support facility for the elderly & child care facility (also used as meeting places)
- Each second floor is connected by passageways to make meeting space



【Disaster public housing in Sakuragi area Before construction】



【Disaster public housing in Sakuragi area Oct. 20, 2014】



【Features of Sakuragi area】

- Pilotis structure on the first floor
- Evacuation site & stockpile facility on the rooftop
- Support facility for the elderly & child care facility (also used as meeting places)
- Each second floor is connected by passageways to make meeting space

【Facilities in disaster public housing in Sakuragi area】



Sakuragi childcare center

Facility for the elderly



【Facility in disaster public housing in Sakuragi area】



Meeting space

Meeting place



【Facility in disaster public housing in Sakuragi area】

Passageways to connect each second floor



Tsunami evacuation stairs (east and west end of each building)



6 . Efforts based on DRR strategy ⑤

Developing
disaster-
resilient city

4

Developing disaster response
system

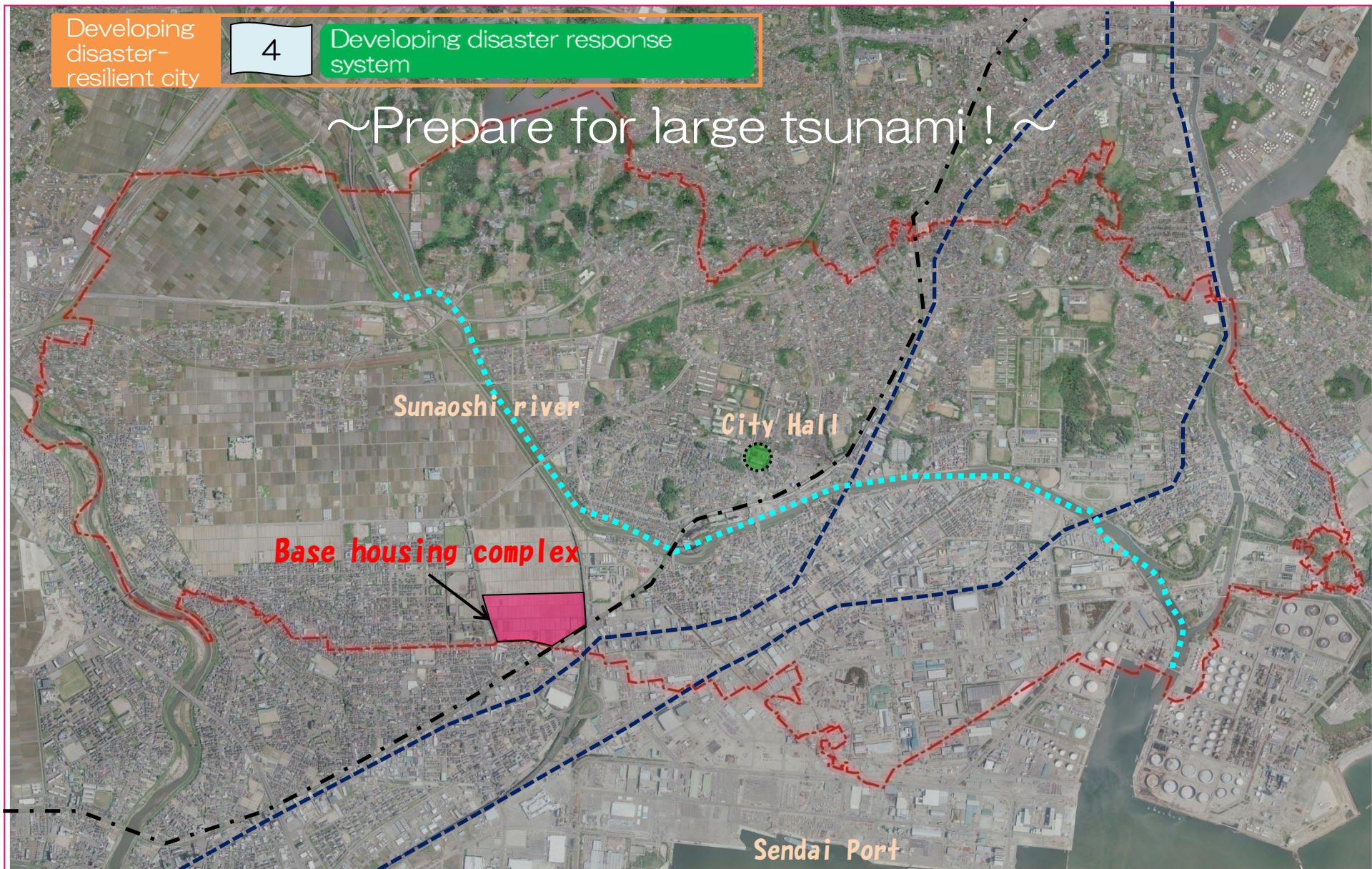
~Prepare for large tsunami!~

Sunaoshi river

City Hall

Base housing complex

Sendai Port



6 . Efforts based on DRR strategy ⑥

Developing
disaster-
resilient city

4

Developing disaster response
system

~Prepare for large tsunami!~

Develop housing complex as
1) DRR base
2) industrial rehabilitation base

Road width:12m (両側歩道)

【DRR base function】

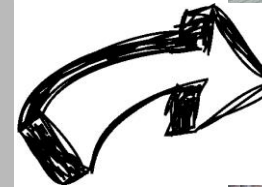
- Accept people unable to go home
- Food distribution etc.

Evacuation site



DRR base
function

調整池
約1.0ha



Industrial area

Industrial
rehabilitation
base

【Industrial rehabilitation support function】

- Manufacture on assignment, Production line lending etc.
- Technical proposal, Development of markets etc.

Stockpile/Fire-fighting
base

JR仙石線

Industrial area

Tsunami
flood
damage



Tagajo city post-tsunami reconstruction base project - perspective drawing -

多賀城市津波復興拠点整備事業

イメージパース



6 . Efforts based on DRR strategy ⑦

Increasing
DRR capacity
based on self
and mutual
help

5

Enhancing self-help ability

6

Strengthening community DRR
capacity

～DRR Handbook : to prepare for disasters individually ! ～



6 . Efforts based on DRR strategy ⑧

Increasing
DRR capacity
based on self
and mutual
help

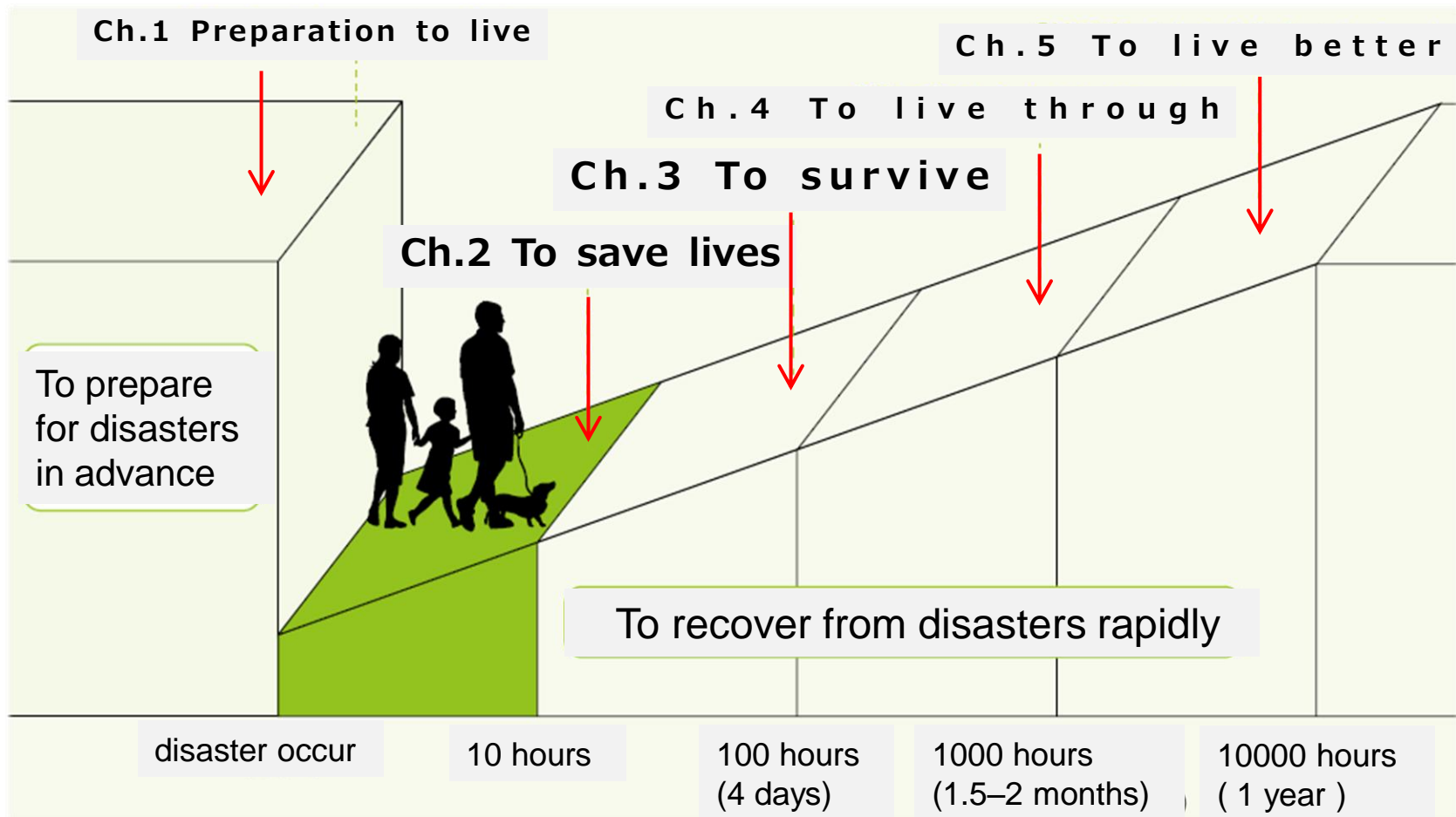
5

Enhancing self-help ability

6

Strengthening community DRR
capacity

~DRR Handbook : to prepare for disasters individually ! ~



6 . Efforts based on DRR strategy ⑨

Increasing
DRR capacity
based on self
and mutual
help

5

Enhancing self-help ability

6

Strengthening community DRR
capacity

~DRR Handbook : to prepare for disasters individually ! ~

Learn natural disaster threats and disaster preparedness in advance

[Chapter 1. Preparation to live](#) DRR life manual for daily life

~Know disasters and prepare for disasters~

[Chapter 2. To save lives](#) from disaster occurrence to 10 hours

~Save lives from disasters~

[Chapter 3. To survive](#) from 10 hours to 100 hours

~Survive severe living condition after a disaster strikes~

[Chapter 4. To Live through](#) from 100 hours to 1000 hours

~Live through severe condition better~

[Chapter 5. To live better](#) from 1000 hours to 10,000 hours

~Livelihood rehabilitation~

6 . Efforts based on DRR strategy ⑩

Increasing
DRR capacity
based on self
and mutual
help

5

Enhancing self-help ability

6

Strengthening community DRR
capacity

~DRR Handbook : to prepare for disasters individually ! ~

Residents meeting with the Handbook



6 . Effort based on DRR strategy⑪

Increasing DRR capacity based on self and mutual help

5

Enhancing self-help ability

6

Strengthening community DRR capacity

Sharing disaster experience

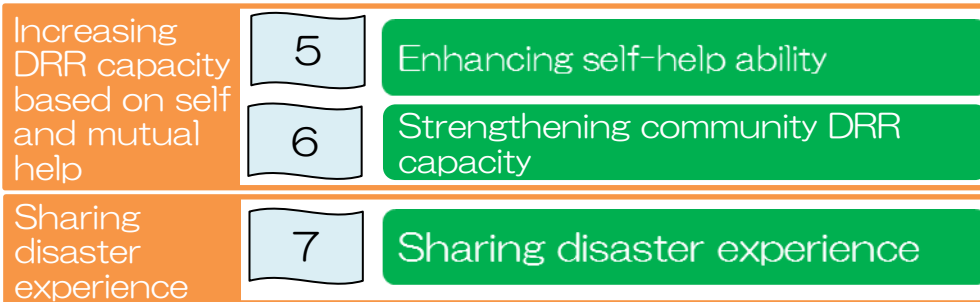
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Sharing disaster experience

Placing “tsunami indication board” by students of Tagajo High School



6 . Efforts based on DRR strategy ⑫



Tagajo “*ken-bun-oku*” ~ utilize, disseminate and pass on ! ~

史都・多賀城 防災・減災アーカイブス



- **Digital database:** collect and reserve the records from the Tsunami and organize them systematically
- It is disclosed on the internet.
- Aiming to passing on records, experience and knowledge “**to the next generation**” without being forgotten.

6 . Efforts based on DRR strategy ⑬

Increasing DRR capacity based on self and mutual help	5	Enhancing self-help ability
	6	Strengthening community DRR capacity
Sharing disaster experience	7	Sharing disaster experience

Tagajo “*ken-bun-oku*” ~ utilize, disseminate and pass on ! ~



➤ *Ken*: What you saw and wrote down
digital image, video, document



➤ *Bun*: What you heard and want to talk
experience story, opinion, knowledge



➤ *Oku*: what you want to share and value
pass lessons on to the next generation



Disaster risk reduction city – Tagajo

6. Efforts based on DRR strategy ⑭

Increasing DRR capacity based on self and mutual help

5

Enhancing self-help ability

6

Strengthening community DRR capacity

Sharing disaster experience

7

Sharing disaster experience

Tagajo “*ken-bun-oku*” ~ utilize, disseminate and pass on ! ~



【Contents】

- Damage overview & emergency response
- Recovery and reconstruction from the disaster
- One story per person
- Damage caused by urban-type tsunami
- Reconstruction plan & project
- Efforts towards DRR city etc.

【Features】

- Video & photos over 20,000
- Experience stories, opinions & messages over 180
- Keywords, time information retrieval system

~ DRR measures ~ Comprehensive site with lots of guidance, hints, and ideas for DRR.

6 . Efforts based on DRR strategy ⑮

DRR
technology

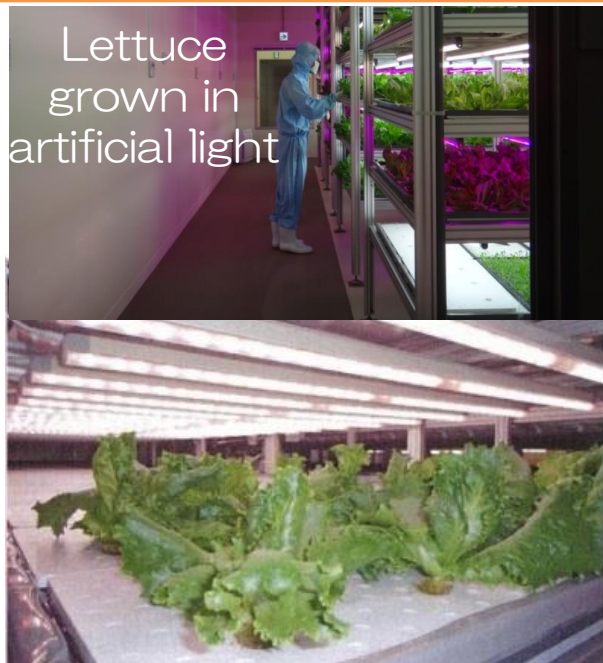
8

DRR Research Park Program

~ New technology introduced after the Tsunami disaster ~

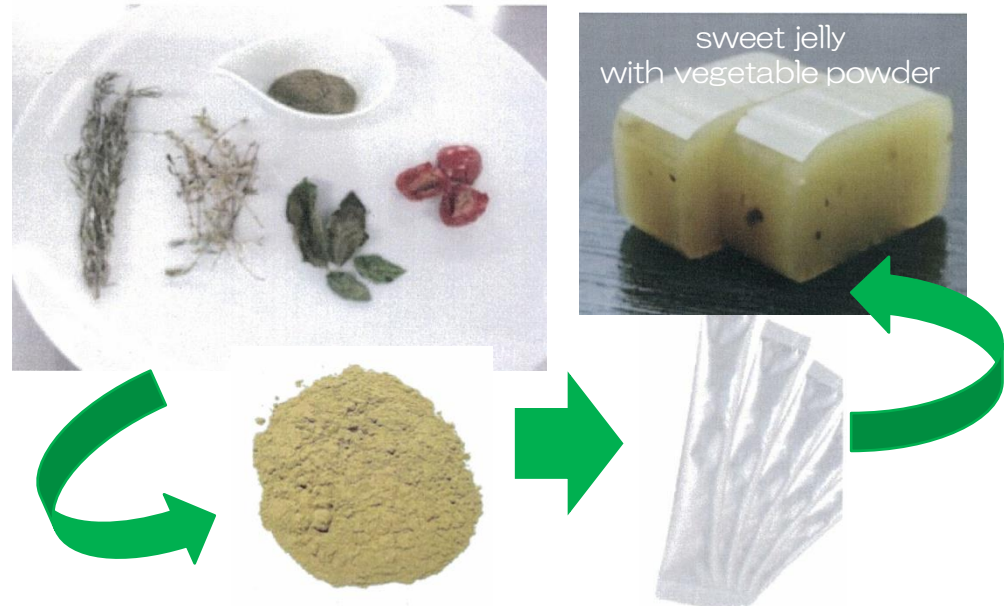
People worried about limited power supply and radioactivity...
→ necessity for safe & energy efficient foods

Most distributed foods were those with lots of carbohydrates...
→ concern about nutritional imbalance of children, pregnant women, etc



DRR measures

- Develop food production technology unaffected by external environment
- Establish stable food supply system under emergency



DRR measures

- Develop & produce emergency foods with high nutrition value & stockpiles for emergency

6 . Efforts based on DRR strategy ①⑥

DRR
technology

8

DRR Research Park Program

~ New technology introduced after the Tsunami disaster ~

There were heavy traffic jams at the disaster...
→ necessity for guiding systems of evacuation routes

Research on next generation mobile body
system



DRR measures

- Develop systems to guide evacuating vehicles effectively
- Reduce damage in urban areas with heavy traffic



6 . Efforts based on DRR strategy ⑰

Increasing DRR
capacity based
on self and
mutual help

5

Enhancing self-help ability

DRR
technology

8

DRR Research Park Program

~ New technology introduced after the Tsunami disaster develops future DRR capacity ~



DRR measures

- Raise children' & parents' awareness on DRR
- Expand children' possibilities towards DRR



Thank you for your attention

We are steadily moving forward thanks to your support and cooperation

We will be built back better as 「DRR City-Tagajo」 !

We appreciate your continuous support

