The Great Eastern Japan Earthquake – impressions from the event and related response strategies

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1. Introduction
2. Socio-economic framework conditions
3. The local impacts of the event
4. Principles of tsunami mitigation strategy
5. Conclusions

1. The Event

Figure 1: Japan: Source: stepmap.de (2013)

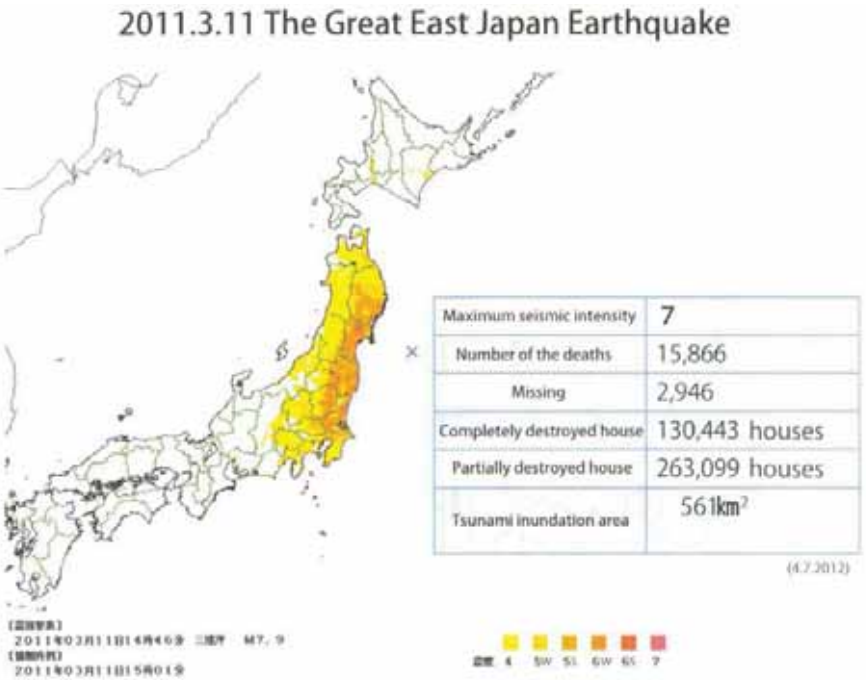


Figure 2: Affected area. Source: Ubaura (2013)

2. Socio-economic framework conditions

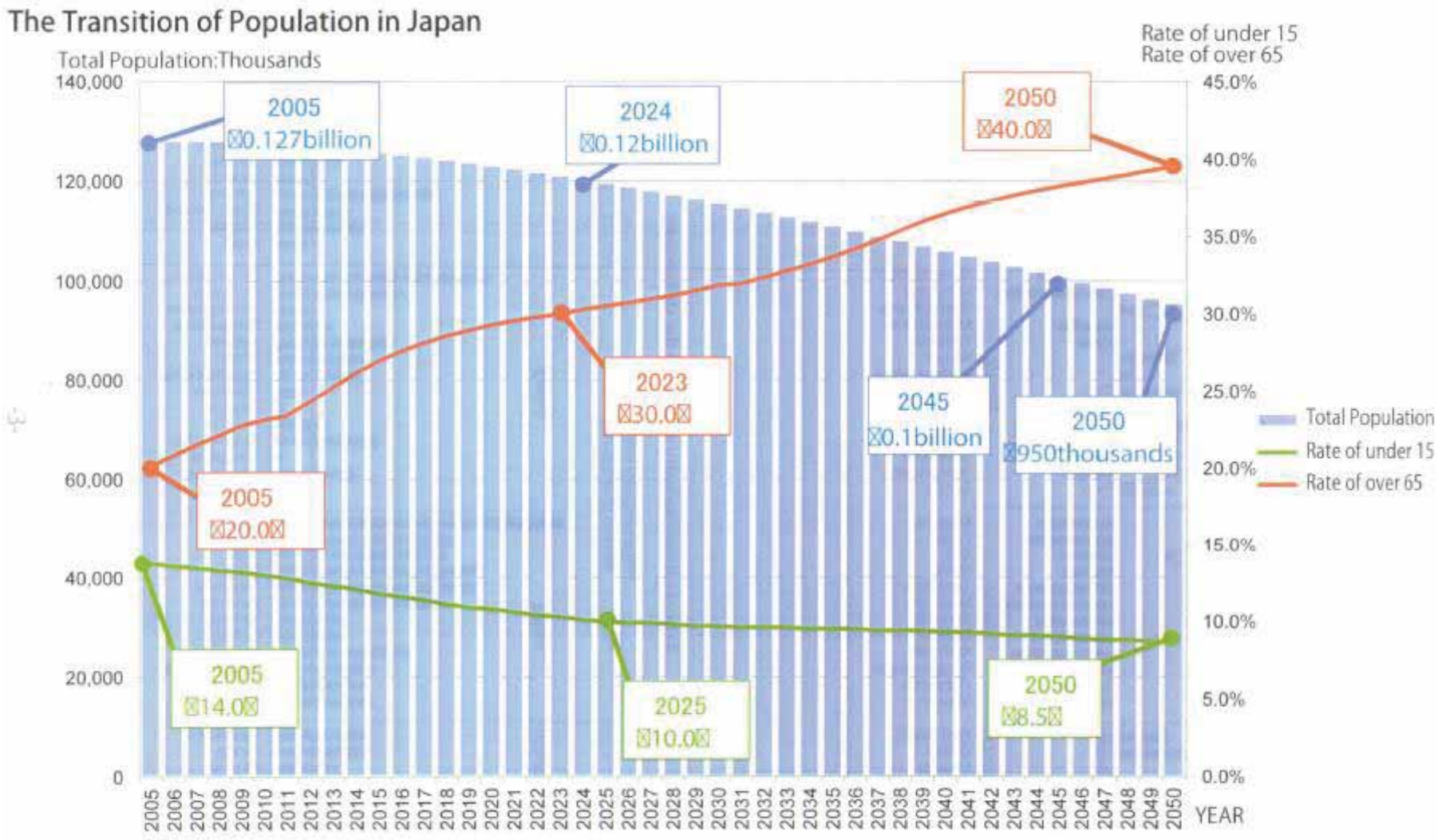


Figure 3: The transition of population in Japan. Source: Ubaura (2013)

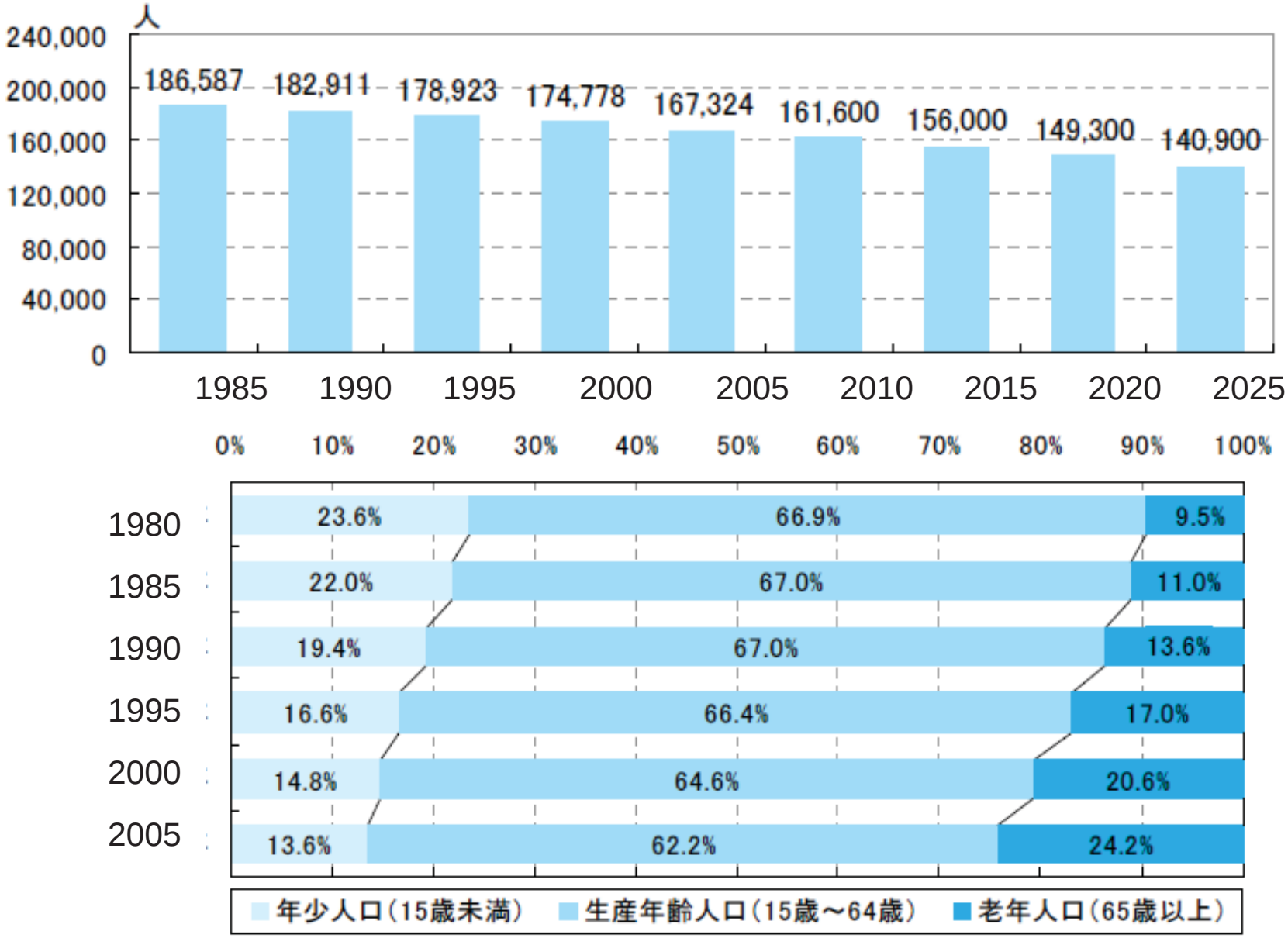


Figure 4: Population and Age Structure (Ishinomaki City). Source: Ubaura (2013)

Figure 5: Scattered Developments（Takamatsu City. Source: Ubaura (2013)

Figure 6: Scattered Developments（Takamatsu City.
Source: Ubaura (2013)

Figure 7: Scattered Developments（Takamatsu City. Source: Ubaura (2013)

Figure 8: Vacantness of shops（Takamatsu City. Source: Ubaura (2013)

Problems in urban planning BEFORE Mar. 11th

- Population decline
- Deterioration of fiscal conditions

- “urban sprawl” in the suburbs
- declination of low-density urbanized area
- CBD declines

⇒ Sustainable (compact) City

Development

“Top Down” urban planning

hardware exclusively

regulation

Overcoming the disaster risk technically

⇒

Shrinking

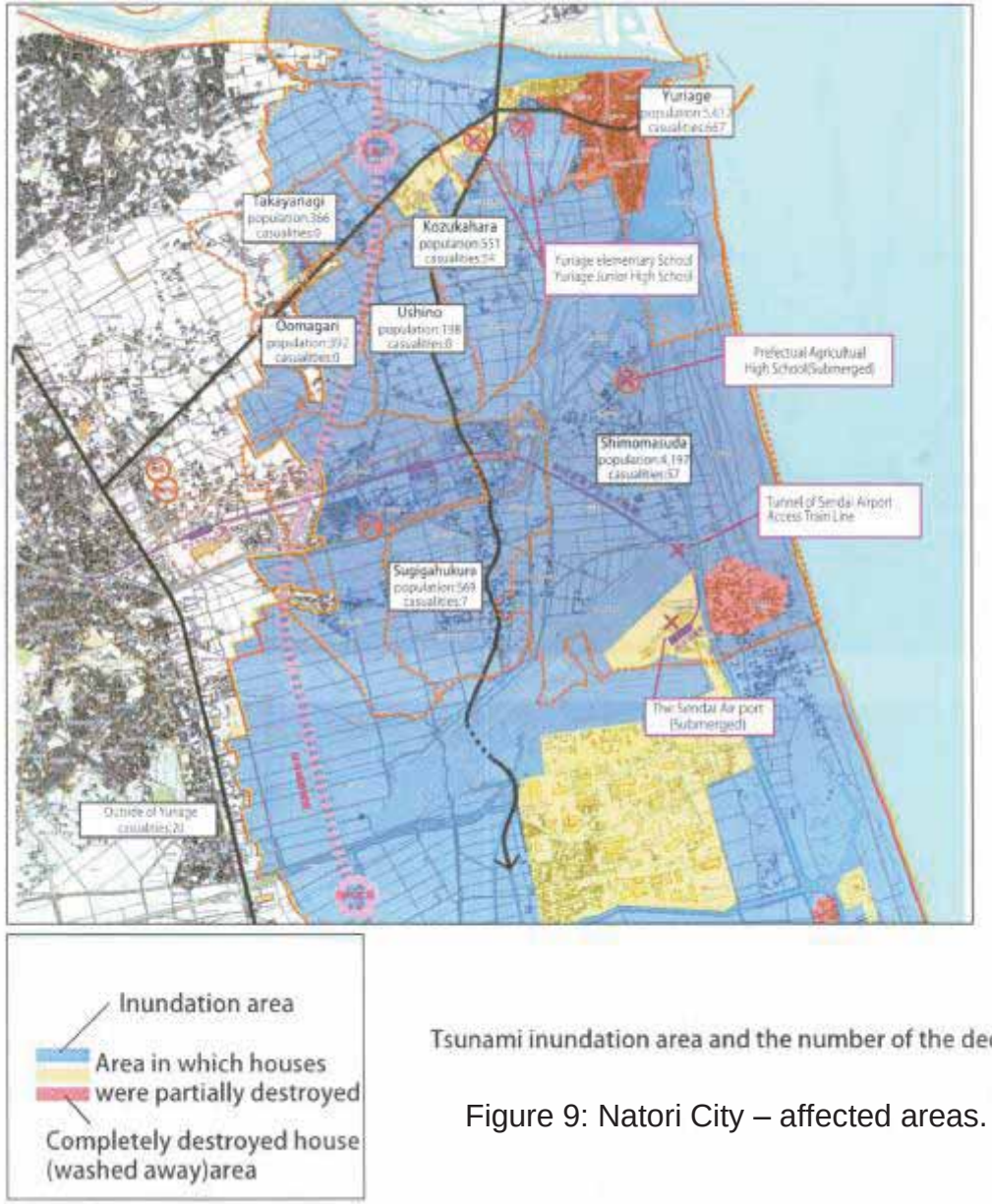
“Bottom up” community based planning

software inclusively

management

Disaster risk oriented land use plan

3. The impacts of the event



Tsunami inundation area and the number of the deceased

Figure 9: Natori City – affected areas. Source: Ubaura (2013)

Figure 10: Natori City – impressions from the affected area. Source: Ubaura (2013)

Figure 11: Natori City – affected areas. Source: own pictures.

Figure 12: Natori City – reconstruction plans (alternatices 1 and 2). Source: Ubaura (2013)

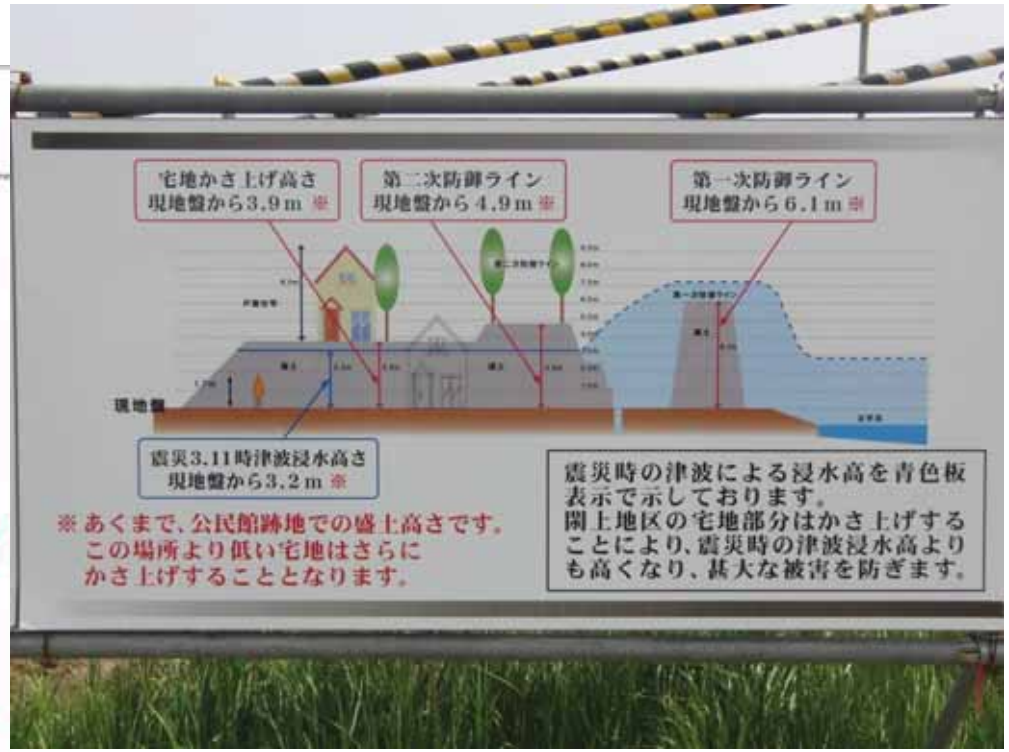


Figure 13: Natori City – affected areas. Source: own pictures

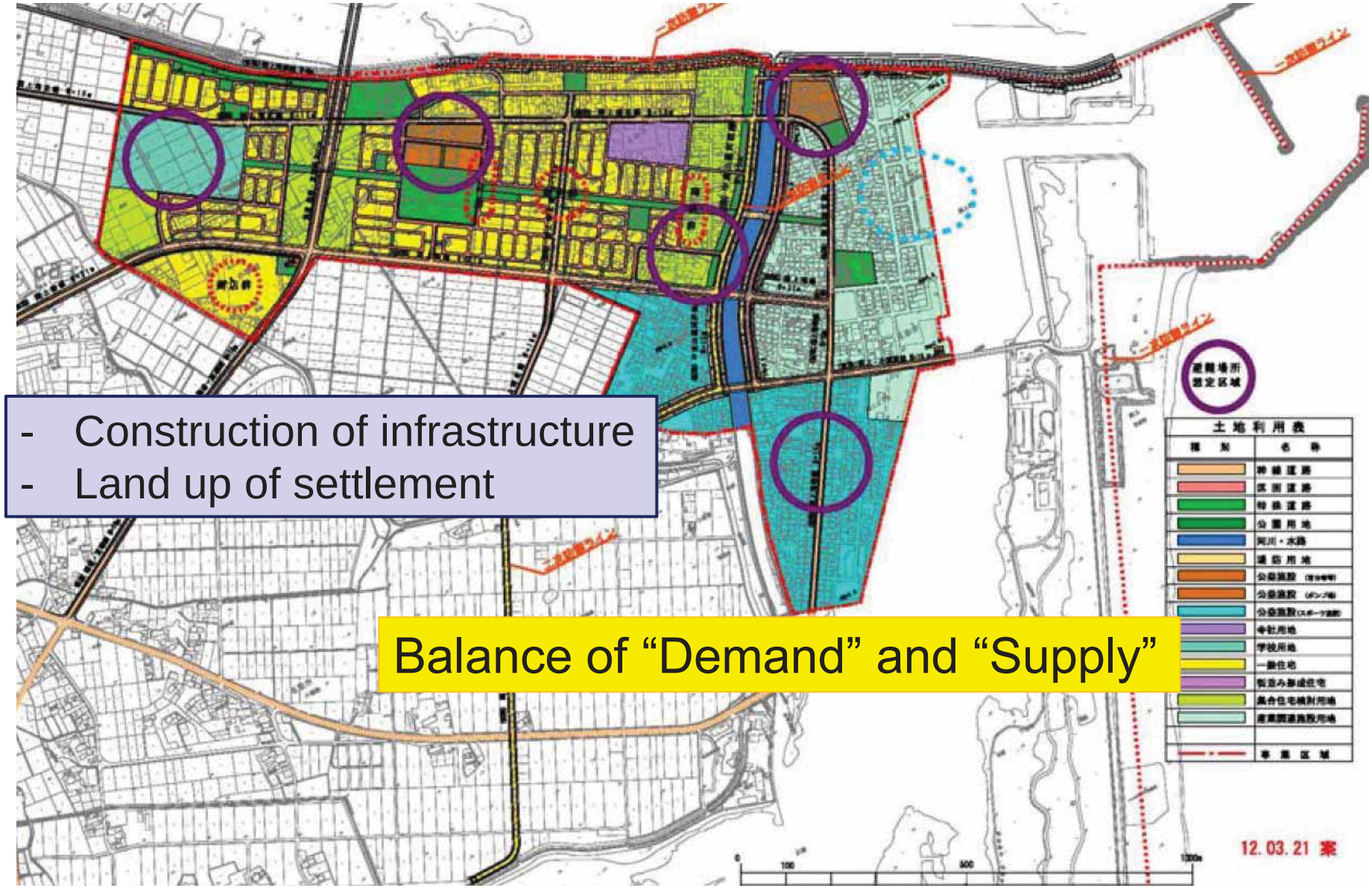


Figure 14: Land Readjustment (Reconstruction on site). Source: Ubaura (2013)

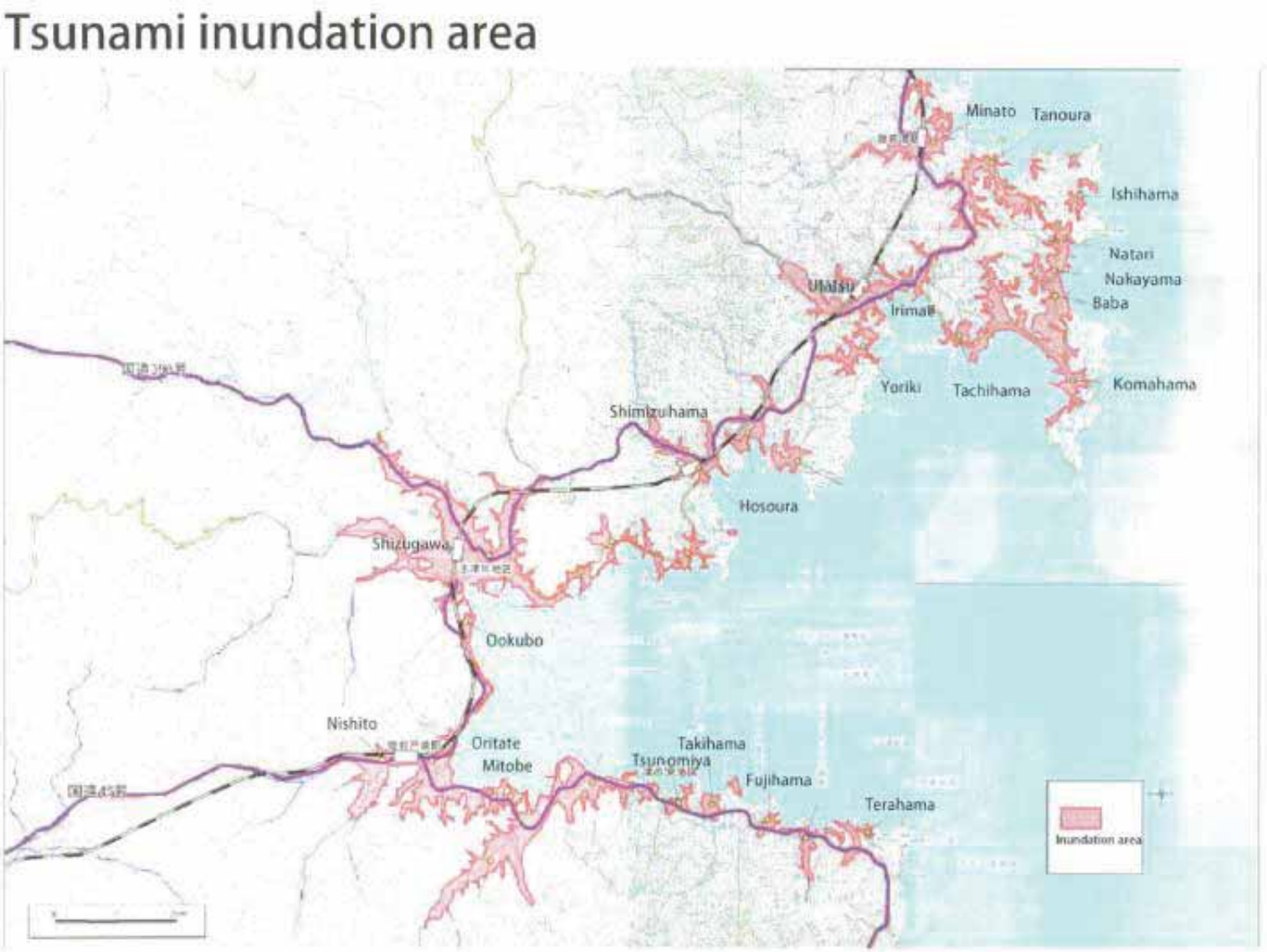


Figure 15: Minaminasanriku Region – Tsunami inundation area. Source: Ubaura (2013)

Figure 16: Minamimisanriku Region – affected area. Source: own picture

17 Figure 17: Minaminasanriku Region – affected area. Source: own pictures

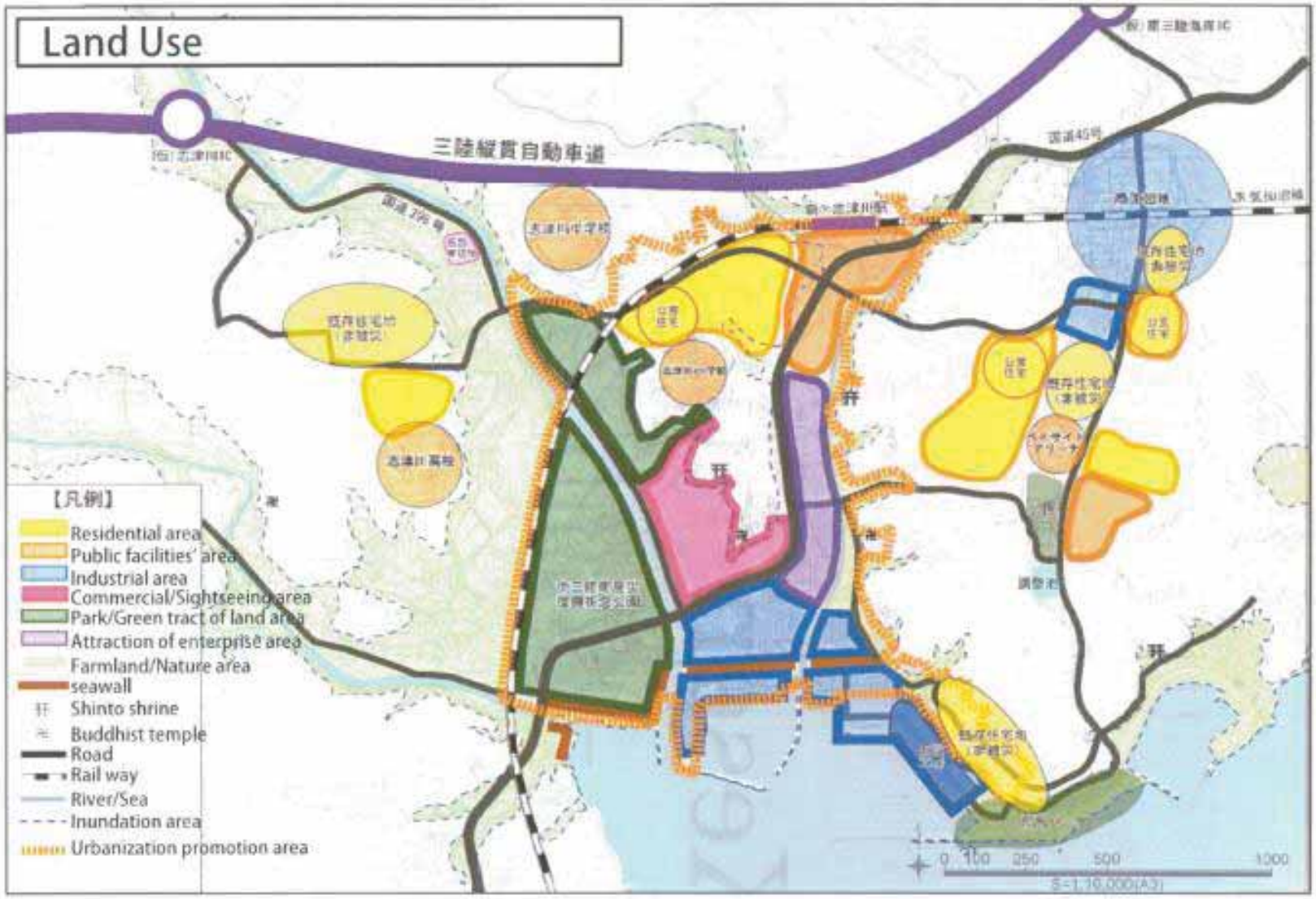


Figure 18: Mitigation plan for Minaminasanriku City. Source: Ubaura (2013)

Figure 19: Retreat – a coordinated response stratey for the whole Minaminasanriku region. Source: Ubaura (2013)

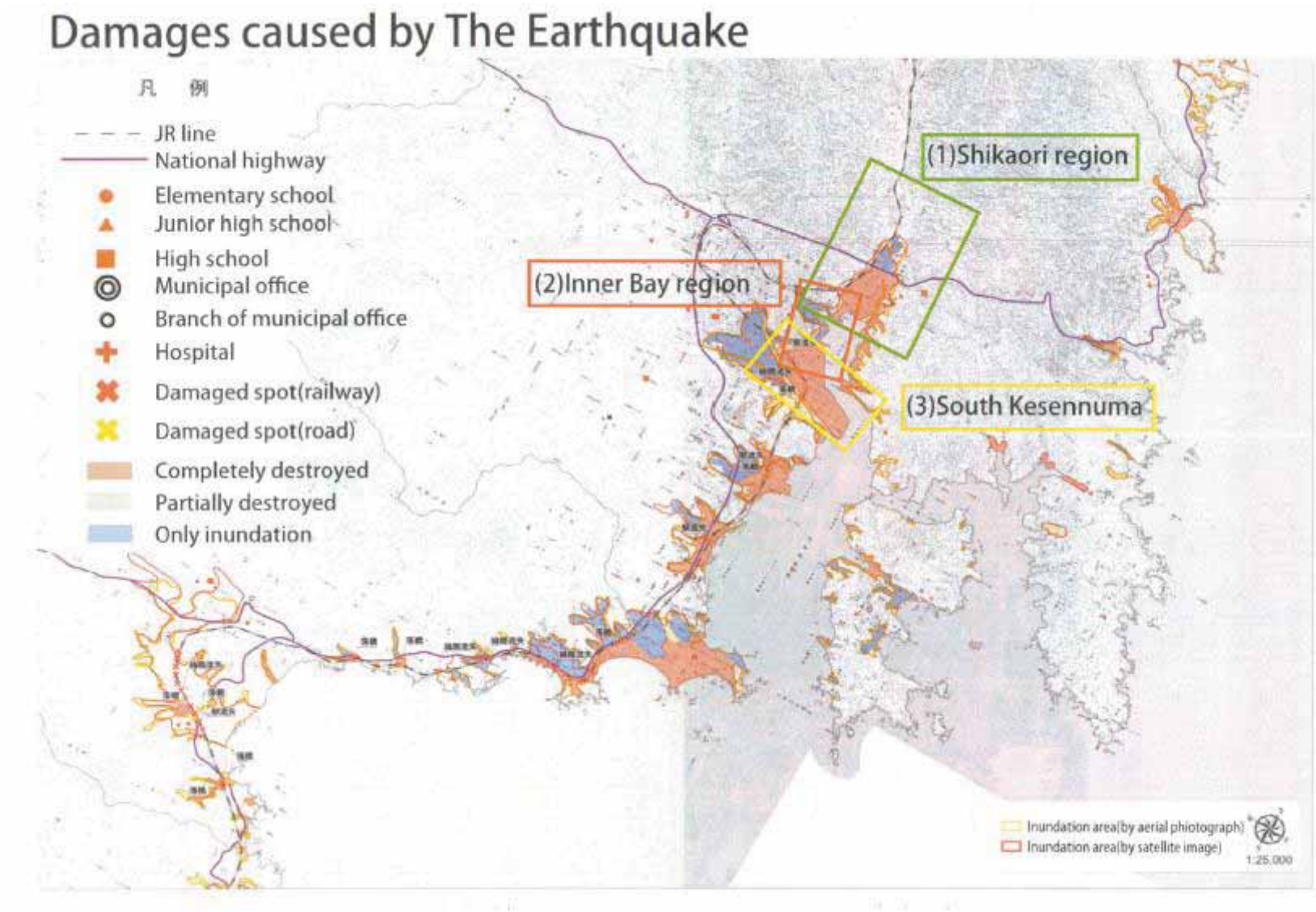
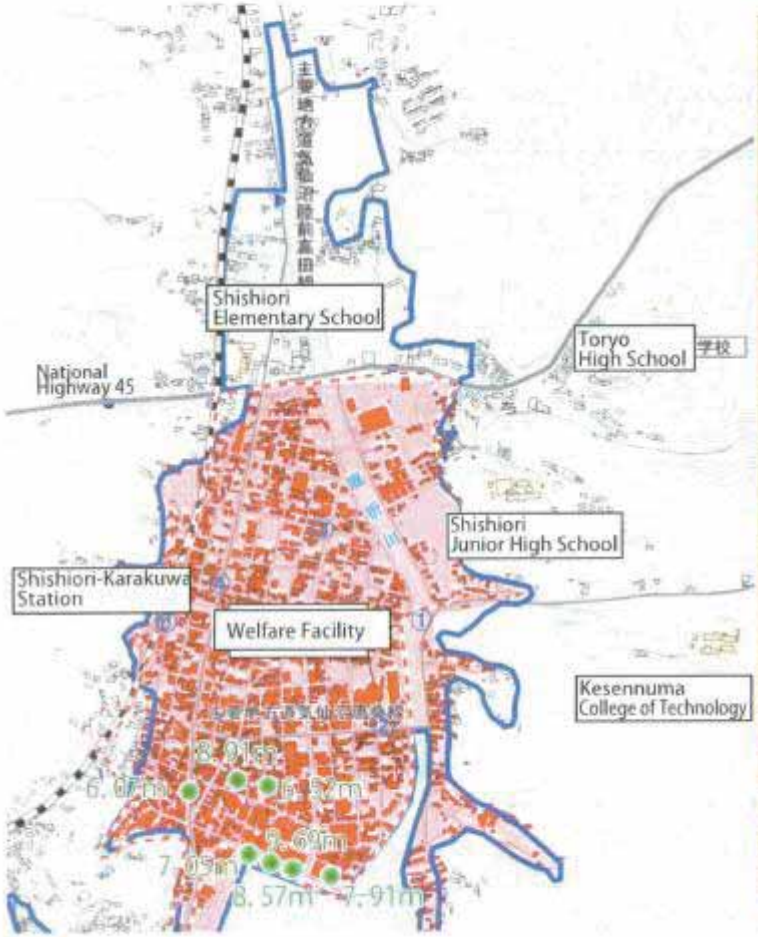


Figure 20: Kesennuma City – damages caused by the earthquake. Source: Ubaura (2013)

(1) Shishiori district



An aerial photograh

Figure 21: Shishori district– damages caused by the earthquake.
Source: Ubaura (2013)

Figure 22: Shishori district– impressions from the affected area.
Source: own pictures

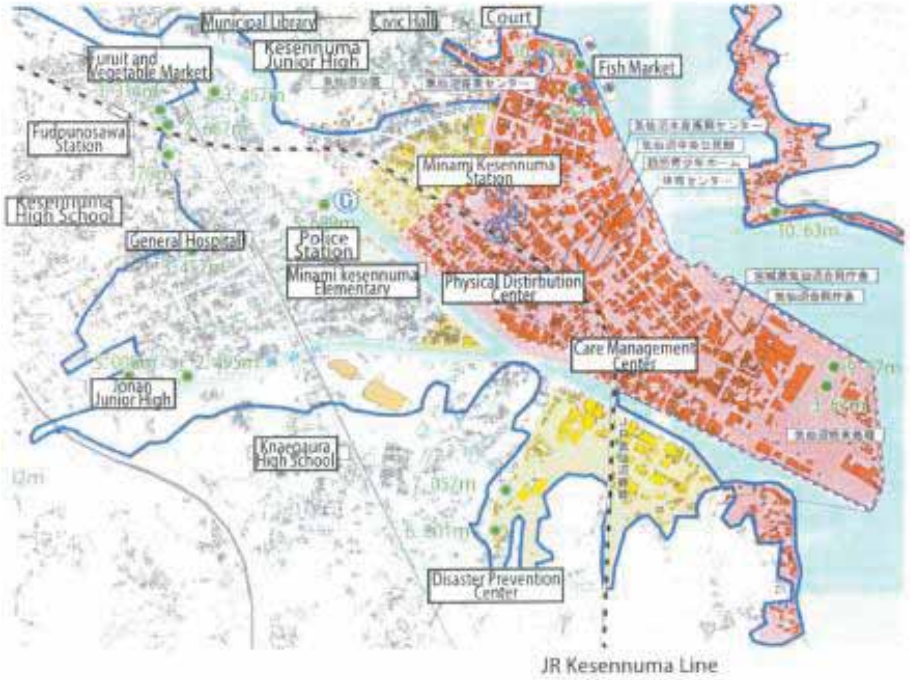


Figure 23: Kesennuma – damages caused by the earthquake. Source: Ubaura (2013)

Figure 24: South Kesennuma – impressions from the affected area. Source: own picture

4. Principles of tsunami mitigation strategy

- Tsunami Protection Level （“L1”）
  - Is a Tsunami level, which generates every decades or a hundred and several decades.
  - Urban area should be protected by coastal levee.

- Tsunami Diminishing Level （“L2”）
  - Is a Tsunami level, which generates every several hundred years or more.
  - We must tackle from both hardware and software aspect.
  - Inhabitable area: limited to less than 2m of expected inundation height
  - Uninhabitable area: Relocation of settlements + Designation of “disaster hazard area”
  - “Secondary levee” using road or railroad

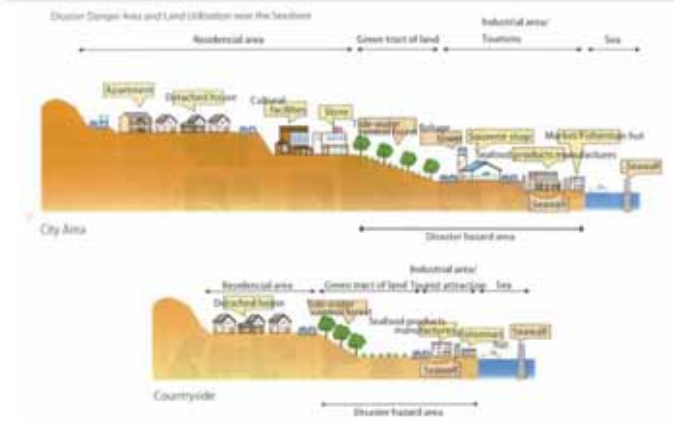


Figure 25: principles of land use. Source: Ubaura (2013)

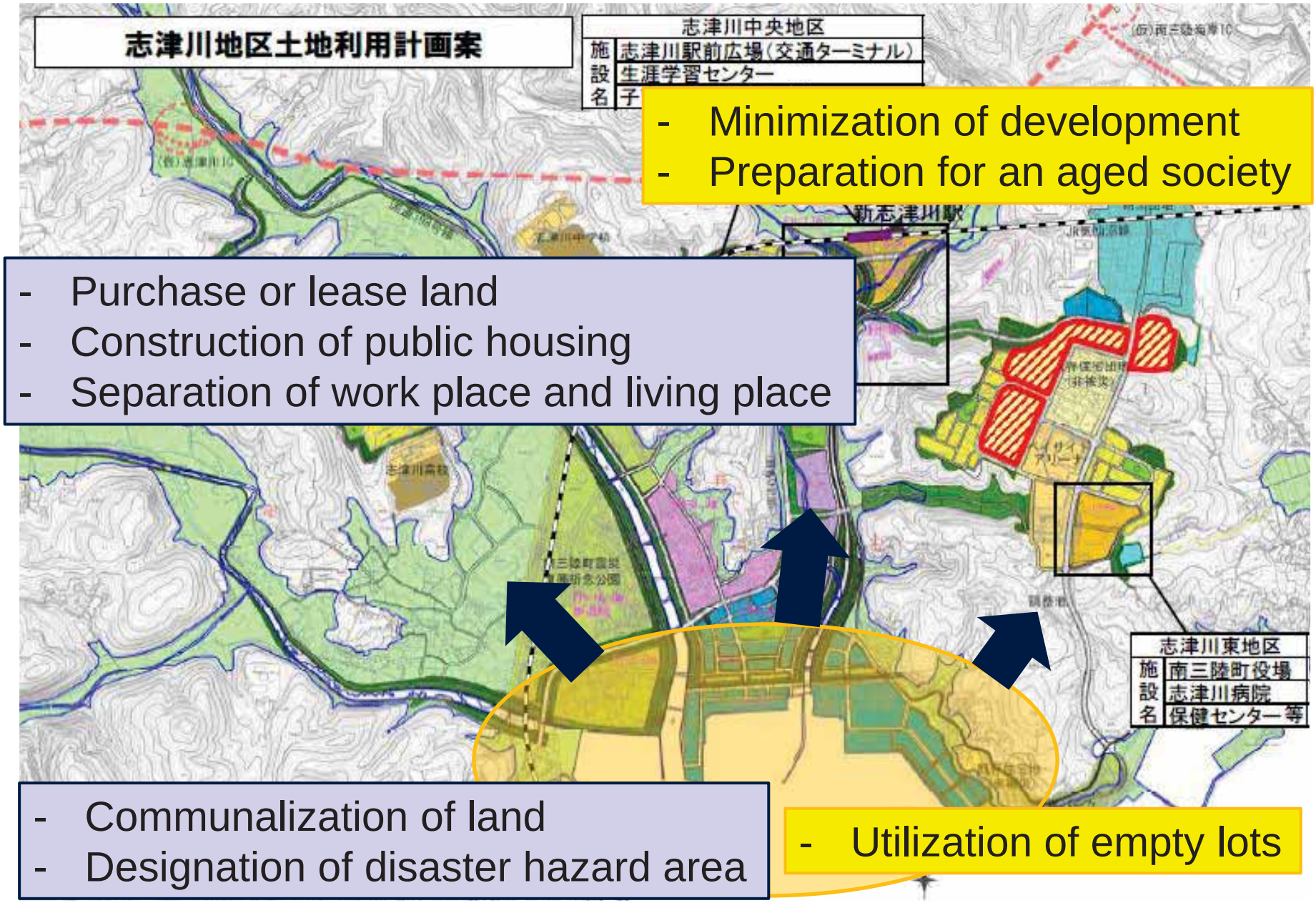


Figure 26: Collective Retreat for Disaster Prevention (Dislocation). Source: own figure on basis of Ubaura (2013)

Urban planning and Safety planning

- Safety planning from the aspect of urban planning:
  - Safety is one of the most important factors in the urban planning
    -> especially human safety in case of high frequency disasters
  - HOWEVER, urban planning is the result of comprehensive evaluation of different private and public interests
  - HOPEFULLY, common countermeasures to both safety and other problems -> high sustainability

- Urban planning from the aspect of safety planning
  - Land use regulation is one of the most important measures in safety planning
    -> limitation of disaster prevention with levee: disaster diminishing
  - It is not the only measure
    -> necessity of assurance of safety through both structural and non-structural measures

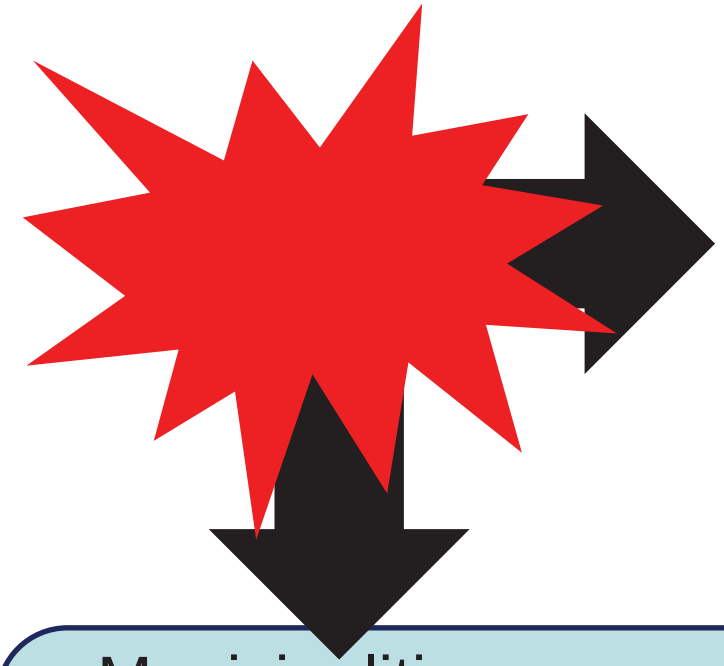
Difficulty in consensus building

- Changing interests of inhabitants
  - Changing with the march of time
  - Difference between profession / generation / gender
  - Deep-seated “safety-oriented thinking”

- What comes in the end?
  - Risk thinking attitude? -> drop out of younger generation -> short term declination
  - Safety oriented, but inconvenient towns? -> long term declination
  - Half & Half? -> too small total amount for halfway plan -> short-. middle term declination
  - Decision making after cooling period? -> drop out of the people, who cannot wait any more -> short term declination

Relationship between local government and residents

- Share of process
- Support from experts



Local residents

- Lack of experience of self-decision making ←lack of support from experts
- “What will the local government do for us?” instead “what can and should WE do?”
- Distrust to local government (unilaterally decision making)

Municipalities

- Lack of experience of dialogue with local residents
- Decision Making → Explanation ⇔ Collaboration
- Distrust to local residents: Relying on administration with complain

5. Conclusions

- Effective land use: countermeasures against population decline
  - Securement of urban land use density: consolidation of land use, prioritize infill development, Invigoration of central city…
  - Spatially integrated plan: location control, mutual adjustment of public facilities, …
  - Plan considering time factor: conversion of land use, building, long-term sustainability assessment…
- Retreat from disaster prone area
  - Difficulty in positive planning: low demand for land use
  - Necessity of negative planning? (e.g. prohibition of waste disposal)

5. Conclusions

- Retreat is obviously thinkable – even as strategy for a whole region!
- Synergies with other ongoing changes such as demographic change (also relevant for Germany)
- Some important prerequisites:
  - Trust in the government, no/few illegal building activities
  - Effective land-use planning
  - Clear protection goals
  - Financial and technical resources
- But: Hardly possible under growth – too much pressure on land!

Literature

- Ubaura, M. (2013): Damages caused by the Great Eastern Japan Earthquake and Recovery Plans of Municipalities. Handout for the excursion on May 13, 2013. Sendai.