Damage and Recovery of the Resettlement Sites after the Syowa Sanriku Tsunami (1933)

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1896 Meiji Sanriku
三陸津浪に因る
被害町村の復興計画報告書

昭和九年三月

内務大臣官房都市計画課
Recovery Plan of Syowa Tsunami (1933)

• Urban Area (in situ)
  – 1) Housing Lot, 2) Road, 3) Sea Wall

• Fishing and farming Village (move to higher ground)
  – 1) Housing Lot, 2) Village Plan, 3) Road, 4) Sea Wall

• Recovery projects (Miyagi 60 settlements, Iwate 42 settlements)
<table>
<thead>
<tr>
<th>Urban Area</th>
<th>Location</th>
<th>Road</th>
<th>Tsunami Protection</th>
<th>Resettlement Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery at original location. Residential area mover to higher ground. Storage, and transportation industry stays at sea side.</td>
<td>Road network with the other cities and villages is the core of road network within the area. Width of road should consider tsunami evacuation and fire proof. Road from resettlement sit to the sea side need to be secured.</td>
<td>Making mound for minor impacted are. Sea wall and sea reclamation will be done for tsunami protection. Unti seismic and tsunami structure will be constricted at sea front to prevent wooden structure building behind.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Fishery and Farming village | Village move to higher ground near from original location. Condition of resettlement site is as follows: 1) Near from the sea, 2)Higher than tsunami inundation heights, 3)Sea view, 4) South facing hill, 5) Drinking water | Road network between villages need to be tsunami safe heights to prevent isolation of villages. | Sea wall, buffer zone, and evacuation road will be installed for non-resettled villages. | |

Public facilities such as Village office, schools, police, temples should be located the highest location in the site. Community park locates at the center of resettlement site, and meeting hall and public bath is around the park. Resettlement site should accommodate all the villagers who would move to higher ground in the future. Tsunami inundation area will be used for common working space for
Taro Plan, Iwate
Damage in Taro
## Damage of the 311 East Japan Disaster to resettlement Site

<table>
<thead>
<tr>
<th>Village</th>
<th>Summary</th>
<th>Damage</th>
<th>Date of Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onappe Sakiyama, Miyako, Iwate</td>
<td>Residential area have stayed in higher ground and no damage for housing. Fishery facilities at sea side got damage.</td>
<td>◯</td>
<td>13-Aug-11</td>
</tr>
<tr>
<td>Aneyoshi Shigemori, Miyako, Iwate</td>
<td>No damage in spite of the highest inundation reaching to 40m. Famous village for stone monument saying no residents under the monument</td>
<td>◇</td>
<td>11-Aug-11</td>
</tr>
<tr>
<td>Funakoshi Yamada, Iwate</td>
<td>Though Sea wall got damage, Minor damage to residential area because people have stayed in resettlement site of Meiji and Syowa recovery.</td>
<td>◯</td>
<td>11-Aug-11</td>
</tr>
<tr>
<td>Tanohama</td>
<td>Damage at sea wall and residential area in lowland got severe damage. Resettlement site of Syowa recovery survived without minor damage.</td>
<td>△</td>
<td>11-Aug-11</td>
</tr>
<tr>
<td>KiriKiri</td>
<td>Resettlement site of Syowa recovery got damage but housing in higher ground survived.</td>
<td>△</td>
<td>11-Aug-11</td>
</tr>
<tr>
<td>Ryouishi Kamaishi, Unozumai, Iwate</td>
<td>Sea wall was destroyed. Resettlement site of Syowa recovery got severe damage.</td>
<td>×</td>
<td>14-Aug-11</td>
</tr>
<tr>
<td>Hongo</td>
<td>No damage in resettlement site of Syowa recovery, but expanded lowland residential area got severe damage</td>
<td>△</td>
<td>14-Aug-11</td>
</tr>
<tr>
<td>Koshirahama</td>
<td>Sea wall was destroyed, and residential area in lowland got severe damage. Resettlement site of Syowa recovery was safe.</td>
<td>△</td>
<td>14-Aug-11</td>
</tr>
<tr>
<td>Urahama</td>
<td>All the village got severe damage. Resettlement of Syowa recovery also got severe damage.</td>
<td>×</td>
<td>18-Oct-11</td>
</tr>
<tr>
<td>Minato</td>
<td>Residential area in low land got severe damage. Resettlement site of Syowa recovery did not get any damage.</td>
<td>△</td>
<td>18-Oct-11</td>
</tr>
<tr>
<td>Location</td>
<td>Details</td>
<td>Icon</td>
<td>Date</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Syuku (Akazaki, Oofunato, Iwate)</td>
<td>Residential area in low land got severe damage, and slight damage in resettlement site of Syowa recovery.</td>
<td>△</td>
<td>17-Oct-11</td>
</tr>
<tr>
<td>Hosoura (Suezaki, Oofunato, Iwate)</td>
<td>Residential area in low land got severe damage. Resettlement site of Syowa recovery did not get any damage.</td>
<td>△</td>
<td>17-Oct-11</td>
</tr>
<tr>
<td>Tomari (Suezaki, Oofunato, Iwate)</td>
<td>Residential area in low land got severe damage. Resettlement site of Syowa recovery stays in minor damage.</td>
<td>△</td>
<td>17-Oct-11</td>
</tr>
<tr>
<td>Tomari (Rikuzentakada, Iwate)</td>
<td>Resettlement of Syowa recovery was safe. Minor damage in residential area in sea side.</td>
<td>△</td>
<td>17-Oct-11</td>
</tr>
<tr>
<td>Osabe (Rikuzentakada, Iwate)</td>
<td>Reclaiming land and sea wall of Syowa recovery did not work. All the villages got severe damage.</td>
<td>×</td>
<td>17-Oct-11</td>
</tr>
<tr>
<td>Oosawa (Karakuwa, Kesennuma, Miyagi)</td>
<td>Resettlement and lower land housing got severe damage.</td>
<td>×</td>
<td>17-Oct-11</td>
</tr>
<tr>
<td>Tadakoshi (Karakuwa, Kesennuma, Miyagi)</td>
<td>Housing in lowland got severe damage No damage in resettlement of Syowa recovery.</td>
<td>△</td>
<td>17-Oct-11</td>
</tr>
<tr>
<td>Ootani (Motoyoshi, Kesennuma, Miyagi)</td>
<td>No damage in resettlement site of Meiji and Syowa recovery. Mainer damage at houses near from the sea.</td>
<td>○</td>
<td>17-Oct-11</td>
</tr>
<tr>
<td>Aikawa (Kitakami, Ishinomaki, Miyagi)</td>
<td>Residential area in lowland got damage. No damage in resettlement of Syowa recovery.</td>
<td>△</td>
<td>16-Oct-11</td>
</tr>
<tr>
<td>Tanigawa (Ojika, Ishinomaki, Miyagi)</td>
<td>Resettlement site of Syowa recovery got severe damage.</td>
<td>×</td>
<td>16-Oct-11</td>
</tr>
<tr>
<td>Okatsu (Ishinomaki, Miyagi)</td>
<td>Severe damage at residential area in lowland. Minor damage in resettlement site of Syowa recovery.</td>
<td>△</td>
<td>16-Oct-11</td>
</tr>
</tbody>
</table>
Damage of the 311 East Japan Disaster to Showa Resettlement (Tanohata, Yamada) △
Damage of the 311 East Japan Disaster to Showa Resettlement (Hongo, Kamaishi) △
Damage of the 311 East Japan Disaster to Showa Resettlement (Aikawa, Ishinomaki) △
Damage of the 311 East Japan Disaster to Showa Resettlement (Ryoishi, Kamaishi) ×
Kirikiri, Otsuchi
Damage of the 311 East Japan Disaster to Showa Resettlement (Osabe, Rikuzentakada) ×
Damage of the 311 East Japan Disaster to resettlement Site

• 1) No damage (◎): Aneyosi settlement, which is famous for a stone monument saying that villagers should not live under the monument, did not get any damage in spite of the highest tsunami inundation of this event.
• 2) Slight damage (○): Resettlement site of Meiji tsunami stayed in higher ground and did not suffer from major damage.
• 3) Major damage in expanded lowland settlements (△): Syowa resettlement community have expanded their settlement to lower land and got damage, though no damage in resettlement site.
• 4) Major damage in resettlement site (×): Even the Syowa resettlement site in higher ground got damage for unexpected scale of Tsunami.
Flores Tsunami, 1994
PNG Tsunami, 1998
It is very natural
Result of Cluster Analysis

Sustainable Pattern

Dependent Pattern

Marginal Pattern

min→q={1,2,⋯,q} D↓q
=√2&∑n=1\text{\tex...
Demographic Pattern before the 1995 Kobe Earthquake

Kita

Nishinomiya

Hyogo

Chuo

Suma

Nagata

Nada

Higashi Nada

Ashiya

Demographic Pattern (1990)
- Marginal
- Sustainable
- Dependent

Land Readjustment

Urban Redevelopment

280 Public Housing

[Map showing the distribution of public housing and land readjustment areas before the 1995 Kobe Earthquake, with labels for each area such as Suma, Nagata, Kita, Hyogo, Nishinomiya, Chuo, and Nada.]
Kobe in 2005 without Disaster

Estimation of Patterns (1990-2005)

- Sustainable Development
- Marginal Dependent
Kobe in 2005 with Disaster

Actual Condition (2005)
- Marginal
- Sustainable
- Dependent

Legend:
- Land Readjustment
- Urban Redevelopment
- 280 Public Housing
Kobe in 2005 with and without disaster

<table>
<thead>
<tr>
<th>Public Housing</th>
<th>Land Readjustment</th>
<th>Urban Redevelopment</th>
<th>280 Public Housing</th>
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<thead>
<tr>
<th>Estimate</th>
<th>Sustainable</th>
<th>Dependent</th>
<th>Marginal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable(62%)</td>
<td>80%(100)</td>
<td>18%(23)</td>
<td>0%(0)</td>
</tr>
<tr>
<td>Dependent(22%)</td>
<td>29%(13)</td>
<td>58%(26)</td>
<td>7%(3)</td>
</tr>
<tr>
<td>Marginal(2%)</td>
<td>17%(1)</td>
<td>17%(1)</td>
<td>17%(1)</td>
</tr>
</tbody>
</table>
Estimated Pattern (1995→2010)

- Marginal
- Sustainable
- Dependent

Relocation within the area
Original Area
Relocated Area
Public Housing

Group Relocation for Disaster Mitigation

Niigata in 2010 without Earthquake

Nagaoka
Koshiji
Oguni
Ojiya
Kawaguchi
Yamakoshi
Niigata in 2010 with Earthquake
Niigata in 2010 with and without disaster

Group Relocation for Disaster Mitigation

Sustainable(8%) 41%(12) Dependent 52%(15) Marginal 3%(1)
Dependent(59%) 18%(37) 67%(140) 10%(20)
Marginal(12%) 0%(0) 5%(2) 59%(26)
Regional Characteristics based on demographic pattern

Iwate

Miyagi

Fukushima

Estimated 2030

2010
Kanoko’s question

• 1) What was the issue in rebuilding
• 2) How efforts made through Planning polices and processes, rebuilding regions with local resources, people centered relocation
• 3) What was key lessons learned.