Land Use Plan for Recovery from the Great East Japan Earthquake and its Problems

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### 2011.03.11 Great East Japan Earthquake

<table>
<thead>
<tr>
<th>Max. seismic intensity</th>
<th>7（Kurihara city）</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of dead</td>
<td>15,883</td>
</tr>
<tr>
<td>Number of missing</td>
<td>2,671</td>
</tr>
<tr>
<td>Number of totally-destroyed houses</td>
<td>129,549</td>
</tr>
<tr>
<td>Number of partially-destroyed houses</td>
<td>265,781</td>
</tr>
<tr>
<td>Inundated area</td>
<td>Approx. 561km²</td>
</tr>
</tbody>
</table>
Paradigm Shift in Urban Planning in Japan

“Urban Planning in modern age”
Urban planning for expansion

- Urban Development for expansion
- Top Down decision making by administration
- Vertically-segmented land use planning and development projects
- control
- Efficiency, uniformity
- Land ownership
- Tax on development cost

“Urban planning today”
Urban planning for shrinking

- population decline
- aging society
- fiscal difficulties

- Land use transfer for consolidation
- Bottom Up decision making by collaboration with citizen
- Spatially synthesizing on district level
- management
- Historical, cultural and environmental characteristics
- Land use rights
- Tax on maintenance cost
Population and Age Structure (Ishinomaki City)

- Under 15
- 15 - 64
- Over 65
Image of the Ideal City after Recovery

Disaster-resistant (resilient) city

Compact and networked city

歩いて暮らせるまちづくり

都市機能をコンパクトに整備し、基本的には歩いて暮らせる範囲（徒歩20分圏域）で生活のための機能が充足できる新たな復興のまちづくりを目指します。
Reconstruction Patterns

A. Relocation

B. Aggregation on site

C. Land Raising

D. Relocation+Land Raising

E. On site with defense facilities
## Two main projects

<table>
<thead>
<tr>
<th>Group Relocation Promoting Project for Disaster Mitigation</th>
<th>Land Readjustment Project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective of the project</strong></td>
<td>To promote the group relocation of houses in the disaster hazard area</td>
</tr>
<tr>
<td><strong>Required condition</strong></td>
<td>Group relocation to dwelling estate with more than 5 households</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Image of the projects</strong></td>
<td>Group relocation of houses: Relocation site should locate on the hill or in the urbanized area</td>
</tr>
</tbody>
</table>
Reconstruction Projects in Ishinomaki City (urban area)

- Land readjustment
- Urban redevelopment
- Collective household relocation
  + Disaster hazardous area
- Secondary Levee (Road)
- Land Raising (Industrial zone)
- Park facilities
田老地区 土地利用計画図

宮古市田老

田老地区土地区画整理事業
A=19.2ha
H25～H27

田老地区防災集団移転促進事業
乙部団地 A=24.5ha
H24～H27
285戸（うち災害公営96戸）

野原地区土地区画整理事業
A=15.8ha
H25～H27
Aggregation on the municipal level
But in most cases...
Efforts for in-fill relocation
Reconstruction Projects in Ishinomaki City (urban area)

- Land readjustment
- Park facilities
- Secondary Levee (Road)
- Land Raising (Industrial zone)
- Urban redevelopment
- Collective household relocation
- Disaster hazardous area
Infill-developments by individual recovery activities
Infill-developments by individual recovery activities
Scattering-developments by individual recovery activities
Scattering-developments by individual recovery activities
Category of Land Use Planning (and Project) System

- Residential district for relocation
- Land readjustment for on-site recovery
- Inundated area
- "Blank zone"
- Disaster hazard area (inhabitable area in condition)
- Disaster hazard area (uninhabitable area)

Sea
Disaster hazard area (uninhabitable area)
Spatially mixed land ownership in lower area

Only the land for residential use can be purchased by the local government.

The lots used for commercial or industrial use beforehand remain to be private owned land dispersively.
Disaster hazard area (uninhabitable area)

- Difficulty of land use planning of lower land
  - “Collective relocation project for disaster prevention” is planned only from the aspect of disaster prevention. It is not planned based on land use master plan, which plans both lower and higher land.
  - Population decline, Shrinking city ⇔ Expanding urban area!

- Various situation and solution
  - Urban area? Rural area?
  - Status of disaster damage?
  - Intention of the local residents?

Advanced efforts of the solution for the problems of Japanese urban planning
Advanced efforts for aggregation of land use
Some Discussion Points

- Plan for the land with no demand
  - Agricultural use? Industrial use? Park???
  - Should all the land utilized for certain objective? Some can be abandoned intentionally???

- How to make use of dispersed private and public lots?
  - Should they be aggregated? How to aggregate technically?

- Method for implementation
  - “Simple” method should be chosen: mainly exchange of land, abolishment of infrastructure…
  - The only method is urban land readjustment project, which can be applied only in urban planning area; how to implement in the rural area?
Disaster hazard area (inhabitable area in condition)
Large scale changeover of land use (industrial use)
Advanced efforts for change-over of land use
Though the area was hit by tsunami, no projects for area redevelopment are planned since the necessity of the urban development project is low.

These areas are not only the blank area of urban development project, but also that of information, support…

Reconstruction rate of houses is low especially when the damage was heavy.
Project Blank Zone in Ishinomaki City

Urban and Regional Planning System Lab, Tohoku University
Land readjustment for on-site recovery

- On-site land readjustment
  - Land readjustment project is planned in the area, where was severely damaged by tsunami, where, however, will be safe from even L2 tsunami, because of the construction of sea wall.
  - Streets and parks are not well developed in this area.

- Necessity of the project
  - Low demand for residential use because of the fear of residents
    However, the project is necessary as;
    - the measures to increase the attractiveness to let the people come back
    - the measures to make the land desired to be sold urban facilities.
    - the measures to consolidate the land use.
Problems of the projects

- Demand and supply of the land
  - Demand and supply is balanced to some extent.
  - In some cases, land “supply” is shorten because of the intension of expansion of industrial use or small residential plot.
  - In other cases, however, formal ownership is diverged from actual use. In these cases, houses will not be build even if the infrastructure is developed.

- Solution:
  - Speedy implementation of the projects
    - Small area, speedy, low budget
  - Citizen participation
    - Provision of information encourages people to rebuild their houses.
    - It is important for the residents to discuss about the future of their local community.
Empty Lots in Residential Zone for Relocation

- Mismatch between demand and supply
  - Change of citizen’s intention with the course of time: decrease of demand for self recovery and increase of demand for public housing
  - Mis-prediction of demand: especially in case of large scale development
  - Risk of large-scale changes of projects, needs for small scale management of projects

- Hollowing after accomplishment of projects
  - Progress in aging, declining…
  - Land use planning and management on the premise of hollowing
- Self-housing-reconstruction activities result both in the increase of density and in the spread of urban sprawl.
- In some affected areas, there is a danger that the urban area with ultra-low-density will be formed.
Urban project for shrinking

Urban projects for expansion
Urban development projects for well-planed development of urban area
e.g.) land readjustment project

Urban projects for improvement
Urban redevelopment projects for improvement of problems in urban area
e.g.) urban redevelopment project

“preventive planning” + “curing planning”

Urban projects for shrinking
Urban projects for aggregation of land use in low density urban area and efficient use of infrastructure by abolishment

“Planning for diet”
Necessity of Land Use Management on the District Level

Absence of land use management body

- Many devastated sites emerge after succession/relocation.
- Neither local government nor land owner can manage the sites.
- These sites are either covered with overgrown rank weeds or dumped waste.

→ Generation of external diseconomy

Emergence of “Demerit land”

Necessity of land use management on the district level

- It is necessary to manage the land use in partnership.
- More fundamentally, it is also necessary to restructure the concepts of “Ownership”, “Management” and “Use” of land
Thank you for your attention!
Decision logic of sea wall height
Principle of Tsunami Defense in Recovery Planning

- **Tsunami “Protection” Level (“L1”)**
  - Comparatively frequent tsunami, generating once every or several decades, up to a hundred years
  - Urban area will be protected by coastal levee.

- **Tsunami “Diminishing Level” (“L2”)**
  - Largest-scale tsunami, generating once every several hundred or more years
  - Tackled from both structural and non-structural aspects
  - Inhabitable area: limited to expected inundation height less than 2m
  - Uninhabitable area: Relocation of settlements + Designation of “disaster hazard area”
  - “Secondary levee” by using raised road or railroad
津波浸水シミュレーションの計算結果について

①海岸の条件
- 地形（標高）データ：平成23年3月11日の津波流後の地形（地盤沈下を考慮）
- 對象とする津波規模：過去最大規模である、平成23年3月11日の津波を東北大学がモデル化し、再現。

①現況再現
平成23年3月11日の津波による浸水状況を再現したもの。概算は平成23年3月11日の津波発生時の海面である。T.F.は6m。

③海壌の条件（幹線道路は現在の海岸道路沿線の位置、標高5m以下の区域）
海岸浸水およびその影響を計算により、水没の状況を模擬するため行うもの。

④条件設定に関する留意事項
今回のシミュレーションは、以下のような仮定が含まれているため、今後、シミュレーション結果も変わっていく可能性があります。
(1) 建築の位置と高さについては現在、海と海岸区において検討中です。
(2) 幹線道路のシミュレーション手引きにおいては、建物の被害を考慮することとしていますが、今回は検討の過程のため、考慮していないもの。
(3) 幹線道路の位置と高さ、今後検討を要します。
For example…
For example…