GIS supports the restoration of the nuclear disaster in Fukushima

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Asia Air Survey Co., Ltd.
Outline:

1. The nuclear disaster in Fukushima.

2. Decontamination projects for the restoration.

3. The case of Kawamata town, which GIS supports the decontamination project.

4. For securing safety and reliability of inhabitants.
Great East Japan Earthquake and Tsunami in 2011.

Date: 2011.3.11, 14:16
Magnitude: 9.0
Flood area: 561km²
Deaths: 15,894
Missing: 2,561 (2016.3.10)

seven-stage seismic scale*

Rescue activities**

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* Japan Meteorological Agency, Japan (http://www.jma.go.jp/jma/indexe.html)
** Ministry of Defense, Japan (http://www.mod.go.jp/j/approach/defense/saigai/tohokuoki/)
After the Tsunami, the nuclear accident occurred in F1NPS.

Emergency actions by disaster relief teams*

* Ministry of Deffence, Japan: YouTube modchannel (http://www.mod.go.jp/j/approach/defense/saigai/tohokuoki/)
Radioactivity substances were released to the air, evacuation zone was designated across 2 cities, 7 towns, and 3 villages. Over 164,000 people were forced to evacuate in Fukushima.
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Decontaminated zones in Fukushima

The first step of the restoration was to remove the radioactive substances. Decontamination projects were planned following 「The Act on Special Measures concerning the Handling of Radioactive Pollution」 in 2011.

<table>
<thead>
<tr>
<th>Legend</th>
<th>Zone name</th>
<th>Agency</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light blue</td>
<td>Special decontamination area</td>
<td>National Government</td>
<td>The &quot;former planned evacuation zones&quot; where the annual integral dose may exceed 20 mSv and the &quot;former warning zones&quot; located within 20 km of the F1NPS.</td>
</tr>
<tr>
<td>Red frame</td>
<td>Priority contamination survey area</td>
<td>Municipality</td>
<td>Municipality including areas where the annual additional exposure dose exceeds 1 mSv.</td>
</tr>
<tr>
<td>Yellow</td>
<td>Municipalities where the decontamination plan is in effect</td>
<td>Municipality</td>
<td>Municipality where a decontamination plan was drawn up and is in progress.</td>
</tr>
</tbody>
</table>

Fukushima Prefecture  (https://www.pref.fukushima.lg.jp/sec/01010d/koho-chosakuken.html)
Techniques Used for Decontamination

- **Houses, buildings**
  - Removing deposits from the roof, deck, and gutters
  - Wiping off roofs and walls, high-pressure washing etc.

- **Gardens and trees**
  - Mowing, removing fallen leaves, topsoil stripping etc.

- **Roads**
  - Removing deposits in ditches, high-pressure washing etc.
Effects of decontamination and radiation levels in Fukushima


Effect of decontamination *

* Conducted between Sep. - Oct., 2013

Airborne monitoring **

** Nuclear Regulation Authority, Japan (http://radioactivity.nsr.go.jp/ja/list/191/list-1.html)

Comparison between overseas major cities ***

*** Fukushima Prefectue (https://www.pref.fukushima.lg.jp/sec/01010d/koho-chosakuken.html)
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Kawamata town is located in north-east area of Fukushima prefecture. The half of the town was neighboring the evacuation zone. One of the most important policy was to secure safety and reliability of inhabitants.
In the case of Kawamata town, the related information are consolidated into Geological Information System “AlandisNeo” which supports the project management.

Decontaminated area
Records of radioactive waste
Radioactive monitoring points
Measurement results

Land owner information
Resident information
Aerial photograph

Geological Information System “AlandisNeo” based on ArcGIS engine.

Radiation maps (point/mesh data)
report to inhabitants, related agency
In order to search the information easily, reports and photos of operations are linked with shape files including individual information.

Searching by ID, owner’s name, resident’s name, address..
Monitoring points visualize the radiation levels. The radiation maps are created with kriging method by ArcMAP.

Before the decontamination

<Point data>
79,907 points were measured, 1m above the grand surface.

After the decontamination

Radiation map was created with kriging method by ArcMAP
“GIS AlandisNeo” provide following information to local government officers precisely and quickly.

- The decontaminated area.
- Radiation revels from the past to present.
- The distribution of “hot spots”.
- Photos of operations.
- The reports which they sent to inhabitants in the past.
- Other reports which they made in the project.

GIS supports the project in several scenes of management.

considering the priority of following monitoring.
avoiding omissions.
making progress reports to related agencies, ex. national government.
replying to inquiries from inhabitants.
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In order to secure safety and reliability of inhabitants, Kawamata town provides the information at the counters, publishes papers and pamphlets.

These information are based on the accurate data managed on GIS.

Counter reception

Published papers (radiation maps)

Pamphlet sent to inhabitants in 2017

※About the case of Kawamata town, we got permission for using from the mayor.