

## Chapter 5 Reconstruction of Homes and Cities

### Section 11 Farmland and agricultural facilities

#### 1. Overview of damage

Total damage to farmland and agricultural facilities amounted to 900.5 billion yen as of the end of January 2022. The breakdown shows damaged farmland of 26,000 ha amounting to 428.8 billion yen; and damaged agricultural facilities (waterways, water pumps, community drainage facilities, etc.) in 18,143 locations amounting to 471.7 billion yen<sup>1</sup>.

Farmland flooded by the tsunami suffered salt damage in addition to the accumulation of debris. The impact of salt damage on agriculture is large because the separation and removal of salt from the soil (salt removal) is required before planting crops.

Other damage to farmland and agricultural facilities caused by the strong tremors hit not only the Tohoku region, but also the Kanto and Chubu regions. Apart from liquefaction damage and landslides on farmland over a wide district, agricultural waterways (pipelines, etc.) and drainage pump stations were damaged in many districts, affecting water supply to, and drainage from, much farmland.

Figure 5-11-1 Damaged farmland and agricultural facilities (1)



Source) Ministry of Agriculture, Forestry and Fisheries, “White Paper on Food, Agriculture and Rural Areas” (p.5) (FY2011)  
[https://warp.ndl.go.jp/info:ndljp/pid/12232574/www.maff.go.jp/j/wpaper/w\\_maff/h23/zenbun.html](https://warp.ndl.go.jp/info:ndljp/pid/12232574/www.maff.go.jp/j/wpaper/w_maff/h23/zenbun.html)  
 (browsed July 31, 2023)

Figure 5-11-2 Damaged farmland and agricultural facilities (2)



Source) Miyagi Prefecture, “Miyagi’s Progress in the Recovery and Reconstruction of Agricultural and Rural Areas - From Revival to Creative Reconstruction-” (p.75) (March 2017)  
<https://www.pref.miyagi.jp/soshiki/nosonshin/ayumi.html> (browsed July 31, 2023)

<sup>1</sup> Ministry of Agriculture, Forestry and Fisheries, “Efforts to Support the Reconstruction of Agriculture, Forestry and Fisheries from the Great East Japan Earthquake” (December 2022).  
<https://www.maff.go.jp/j/kanbo/joho/saigai/attach/pdf/torikumi-50.pdf> (browsed July 31, 2023)

## 2. Emergency recovery

The recovery of farmland and agricultural facilities was implemented under the first supplementary budget of 2011, focused on emergency measures for farmland and water facilities in districts where planting was required in 2011, as well as drainage channels and drainage pump stations required to prevent secondary disasters. In addition, the removal of salt from the affected farmland was carried out starting from inland districts where farming could be resumed promptly.

Subsequently, in the third supplementary budget established on November 21, 2011, measures were taken for the disaster recovery of damaged farmland and agricultural facilities, the prevention of another disaster, and salt removal projects.

For agricultural facilities, emergency measures such as the installation of drainage pumps were implemented at all 72 drainage pump stations in the three Tohoku prefectures where temporary recovery was possible, and emergency measures were also taken for 7.3 km of agricultural coast given priority in consideration of the importance of the hinterland, including closing access as far as the high tide mark with levees, etc<sup>2</sup>.

Figure 5-11-3 Implementing emergency measures such as the installation of drainage pumps (Miyagi Prefecture)



Source) Miyagi Prefecture, "Miyagi's Progress in the Restoration and Reconstruction of Agricultural and Rural Areas - From Revival to Creative Reconstruction -" (p.49, p.50) (March 2017)  
<https://www.pref.miyagi.jp/soshiki/nosonshin/ayumi.html> (browsed July 31, 2023)

## 3. Recovering and reconstructing

### (1) Development policy based on the Great East Japan Earthquake

Disaster recovery projects carry out disaster recovery of damaged facilities, etc., and development related to preventing disaster happening again in combination with recovery, etc., based on the responsibilities for implementation by the national government and local governments stipulated in the Basic Act on Disaster Management, and because in Japan, where disasters occur easily, it would be difficult to process recovery quickly with farmers alone, it was thought necessary to inject national funds to cover the expenses required for prefectures to provide assistance to business entities to maintain agriculture, forestry and fisheries and contribute to the stability of their management by recovery and reconstruction following the Great East Japan Earthquake<sup>3</sup>.

<sup>2</sup> Ministry of Agriculture, Forestry and Fisheries, "White Paper on Food, Agriculture and Rural Areas" p.13 (FY2011)  
[https://warp.ndl.go.jp/info:ndljp/pid/12232574/www.maff.go.jp/j/wpaper/w\\_maff/h23/zenbun.html](https://warp.ndl.go.jp/info:ndljp/pid/12232574/www.maff.go.jp/j/wpaper/w_maff/h23/zenbun.html) (browsed July 31, 2023)

<sup>3</sup> Reconstruction Agency, "FY2021 Administrative Business Review Sheet"  
[https://www.reconstruction.go.jp/topics/main-cat8/sub-cat8-3/review\\_r03/rs2021page/r03rs20008600.html](https://www.reconstruction.go.jp/topics/main-cat8/sub-cat8-3/review_r03/rs2021page/r03rs20008600.html) (browsed July 31, 2023)

The “Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake” were formulated as the basic policy for national efforts toward reconstruction after the Great East Japan Earthquake, and the Ministry of Agriculture, Forestry and Fisheries formulated the “Master Plan for the Reconstruction of Agriculture and Rural Areas” (released in August 2011) to evolve and materialize the direction for the reconstruction of agriculture and rural districts indicated in the basic policy.

In the recovery process, key facilities where quickly recovery was possible such as drainage pump stations and levees were done first, then recovery of farmland, such as removing debris and sludge, removing salt and repairing dykes were carried out, grasping the state of progress appropriately so that farming could resume at an early stage.

Based on the “Act on Special Measures for the Land Improvement Act for Dealing with the Great East Japan Earthquake,” along with disaster recovery and salt removal on farmland and agricultural facilities and land readjustment and other projects concurrently, were implemented on an emergency basis by the national government and others, in combination to facilitate the early resumption of farming operations. In addition, the same act enabled the simplification of the procedures for commencing land improvement projects and the implementation of projects with a high national treasury contribution rate.

For districts where evacuation orders were lifted (excluding damage due to the tsunami), the government was able to implement disaster recovery projects for farmland and agricultural facilities, etc., with a high national treasury contribution rate based on the Act on Special Measures for the Reconstruction and Revitalization of Fukushima.

Of the 21,480 ha of farmland damaged by the tsunami, 19,660 ha of farmland subject to recovery that excludes farmland expected to be converted to public land, 18,640 ha (95%) has become available for farming as of the end of September 2022.

## 1) Overview of the “Act on Special Measures for the Land Improvement Act for Dealing with the Great East Japan Earthquake”

### a. Establishing salt removal projects

The act defines salt removal and deems this to be a land improvement project (disaster recovery).

### b. Recovering agricultural production infrastructure in accordance with local conditions

- ① The national government, prefectures and others will implement salt removal and disaster restoration of farmland and agricultural facilities urgently for the early resumption of farming.
- ② In conjunction with disaster recovery, the national government, prefectures and others will implement land readjustment (including the development of agricultural land) and the improvement of old facilities without application from farmers and others.
- ③ In certain cases, the consent of the land improvement district will be sufficient with regard to the procedures for collecting consent of two-thirds or more of those concerned with the district for a project plan related to the improvement of facilities.

### c. National treasury contribution

- ② For salt removal, 90%.
- ② For land readjustment, the current half-rate plus a significant increase in accordance with the amount required for the project.
- ③ If the national government implements projects such as disaster recovery, improvement of old facilities or land readjustment, etc., the rate is the current government subsidy rate to local government plus a significant increase in accordance with the amount required.

Figure 5-11-4 State of Efforts by the Tohoku Regional Agricultural Administration Office, etc., for the Recovery and Reconstruction of Agriculture and Rural Areas



Source) Tohoku Regional Agricultural Administration Office, Ministry of Agriculture, Forestry and Fisheries, “State of Efforts by the Tohoku Regional Agricultural Administration Office, etc., for the Recovery and Reconstruction of Agriculture and Rural Areas” (November 2021)

[https://www.maff.go.jp/tohoku/osirase/higai\\_taisaku/hukkou/torikumi.html](https://www.maff.go.jp/tohoku/osirase/higai_taisaku/hukkou/torikumi.html) (browsed July 31, 2023)

Tohoku Regional Agricultural Administration Office, Ministry of Agriculture, Forestry and Fisheries, “Directly-controlled specific disaster recovery projects/directly-controlled disaster recovery-related land readjustment projects, Sendai Higashi District Project Journal” (March 2021).

## 2) The state of the main restoration of farmland and agricultural facilities (as of the end of September 2022)

- Recovery of 95% of tsunami-affected farmland completed (of 19,660 ha that excludes converted farmland (including where conversion is expected); completed excluding 1,020 ha in Fukushima Prefecture)
- Recovery of all major drainage pump stations completed (at 96 locations where recovery was required)
- Recovery of 98% of agricultural coast completed (in 122 districts where recovery was required (completed excluding three districts in the difficult-to-return zone in Fukushima Prefecture))
- Recovery of 99% of rural community sewerage facilities completed (in 401 affected districts (including facilities where recovery is currently being implemented))
- The expansion of farmland in districts affected by the earthquake and the tsunami, and surrounding districts was implemented using comprehensive infrastructure development projects under Great East Japan Earthquake Reconstruction Grants and farmland development projects. Fukushima Revitalization Acceleration Grants were used to implement the expansion of farmland for acceleration of the resumption of farming in nuclear power disaster-affected areas where farming was suspended as well.

## 3) Efforts for the expansion of farm field in combination with the recovery of farmland

In earthquake and tsunami disaster-affected areas, farmland plots are being expanded in combination with farmland recovery through the use of directly-controlled projects, reconstruction grants, etc. As of the end of March 2022, development of 8,240 ha of farmland had been completed and farmland expansion work had been carried out on 7,060 ha of farmland.

Of the 17,298 ha of farmland where farming was suspended in the 12 affected municipalities in the nuclear power disaster-affected area, farmland development is planned on 4,455 ha, and 41% has been completed as of March 2022, using Fukushima Revitalization Acceleration Grants, etc.

Figure 5-11-5 Efforts for the expansion of farm field in combination with the recovery of farmland



Source) Ministry of Agriculture, Forestry and Fisheries, "Efforts to Support the Reconstruction of Agriculture, Forestry and Fisheries from the Great East Japan Earthquake" p.6 (December 2022)

<https://www.maff.go.jp/j/kanbo/joho/saigai/attach/pdf/torikumi-50.pdf>

#### 4) Aligning agricultural and rural development projects and disaster prevention collective relocation promotion projects

Agricultural and rural development projects have been implemented aligned with projects to promote collective relocation for disaster prevention, and in conjunction with collective relocation to higher ground, farmland development including land left vacant due to relocation, has been promoted in 17 districts of ten municipalities, with development completed in 14 districts.

(As of the end of March 2022)

Figure 5-11-6 Agricultural and rural development projects in cooperation with projects to promote collective relocation for disaster prevention

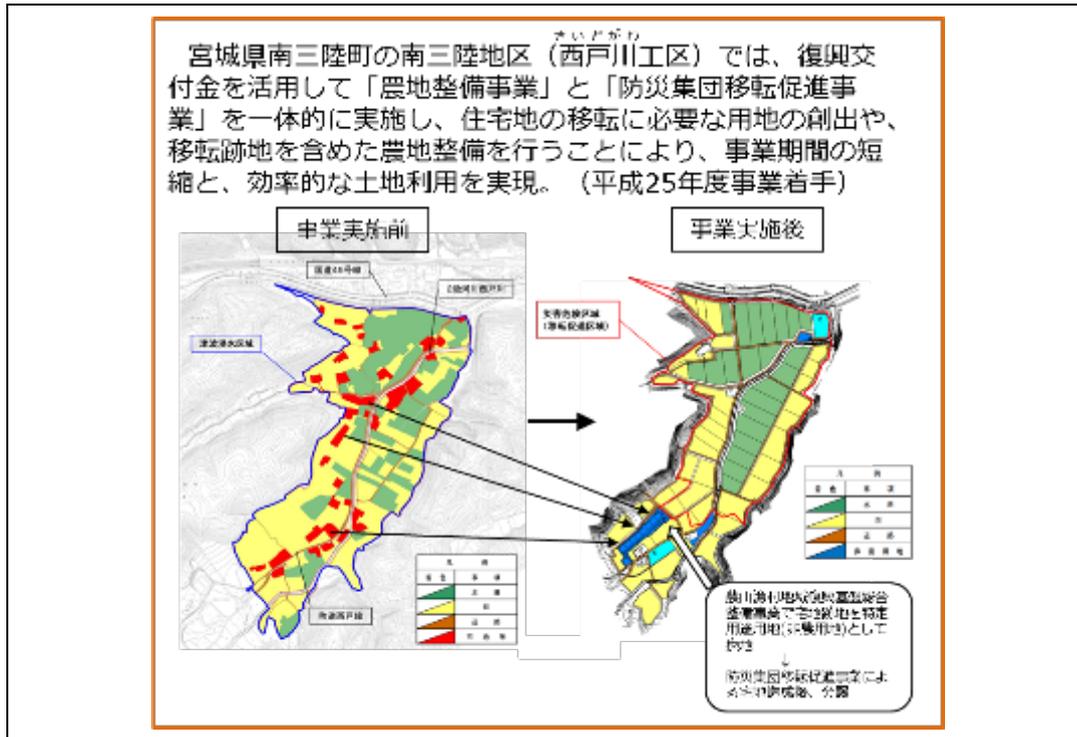


Figure 5-11-7 Districts where agricultural and rural development projects were implemented in cooperation with projects to promote collective relocation for disaster prevention

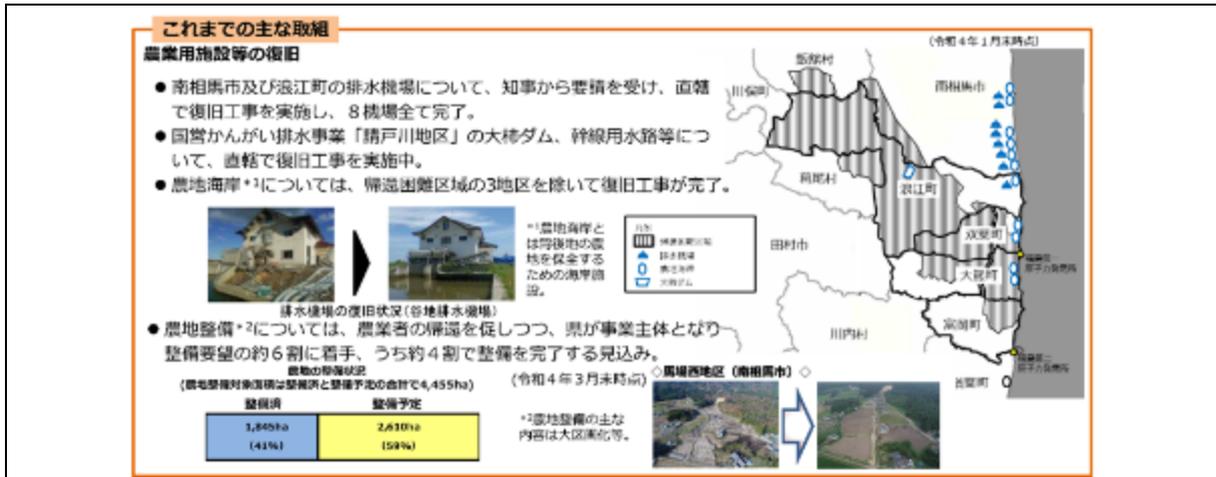
県名	市町村名	地区名
宮城県	南三陸町	南三陸地区
	石巻市	牡鹿地区、大川地区、北上地区
	七ヶ浜町	七ヶ浜地区
	気仙沼市	気仙沼地区
	山元町	山元東部地区
	亶理町	亶理地区
	東松島市	西矢本地区、奥松島地区
	名取市	名取地区
福島県	岩沼市	岩沼地区
	南相馬市	原町東地区、右田・海老地区、真野地区、井田川地区、八沢地区
2 県	10 市町	17 地区

Source) Ministry of Agriculture, Forestry and Fisheries, "Efforts to Support the Reconstruction of Agriculture, Forestry and Fisheries from the Great East Japan Earthquake" p.7 (December 2022)  
<https://www.maff.go.jp/kanbo/joho/saigai/attach/pdf/torikumi-50.pdf>

## 5) Recovering and reconstructing farmland, agricultural facilities, etc., in 12 nuclear power disaster-affected municipalities

Disaster recovery projects for farmland, agricultural facilities, etc., were implemented for the resumption of farming in 12 nuclear power disaster-affected municipalities. Support was provided so that disaster recovery projects for farmland, agricultural facilities, etc., by prefectural and municipal governments could proceed promptly. Based on the state of return of farmers, etc., the conversion to highly profitable crops and productivity improvements were promoted by implementing the expansion and generalization of farmland plots that will enable the securing of workers and sustainable management.

Figure 5-11-8 Disaster recovery projects for farmland, agricultural facilities, etc.



## 6) Countermeasures against radioactive materials in agricultural irrigation facilities, etc.

To reduce the effects of radioactive materials in agricultural irrigation facilities as a directly-controlled project for countermeasures against radioactive materials in agricultural irrigation facilities, the actual state of radioactive measures in agricultural irrigation facilities was grasped and countermeasures against radioactive materials in agricultural irrigation facilities, etc., were implemented in the national government-managed Ukedo River district.

About 23 km of covering work has been carried out (as of the end of FY2021) to prevent sediment from flowing into agricultural drainage channels in the national government-managed Ukedo River land improvement project district.

- Monitoring surveys are being carried out each year at the Ogaki Dam and about 100 reservoirs, and a "Technical Manual for Countermeasures Against Radioactive Materials in Reservoirs" was formulated in March 2014 based on the survey results.
- With regard to radioactive materials in the bottom mud of reservoirs, countermeasures to prevent the spread of radioactive materials, such as the removal of bottom mud, are being implemented through conservation and revitalization projects for agricultural irrigation facilities, etc., supported by Fukushima Revitalization Acceleration Grants.

## 7) Conservation and management of agricultural facilities in areas under evacuation orders

For agricultural facilities in areas under evacuation orders where farming has been suspended, Fukushima Revitalization Acceleration Grants have been used to implement the conservation and management of agricultural drainage facilities, etc., including inspections, patrols, weeding, cleaning, and management operations.

### (2) Removing salt from farmland

During the Great East Japan Earthquake, farmland in Pacific coastal districts centered on Iwate Prefecture,

Miyagi Prefecture and Fukushima Prefecture were inundated with seawater due to the tsunami, causing extensive damage to farmland and agricultural facilities. In particular, there were concerns in farmland about crop growth disorder due to residual salt in the soil, and salt removal became an urgent issue for the resumption of farming.

There are no regulations associated with the Land Improvement Act for salt removal projects, and prior to the Great East Japan Earthquake, temporary special subsidy measures were taken, but it was decided that salt removal projects related to the Great East Japan Earthquake would be deemed land improvement projects by the “Act on Special Measures for the Land Improvement Act for Dealing with the Great East Japan Earthquake” (Act No. 43 of 2011; hereinafter referred to as “Special Measures Act”) and that they would be implemented with high national treasury contribution<sup>4</sup>.

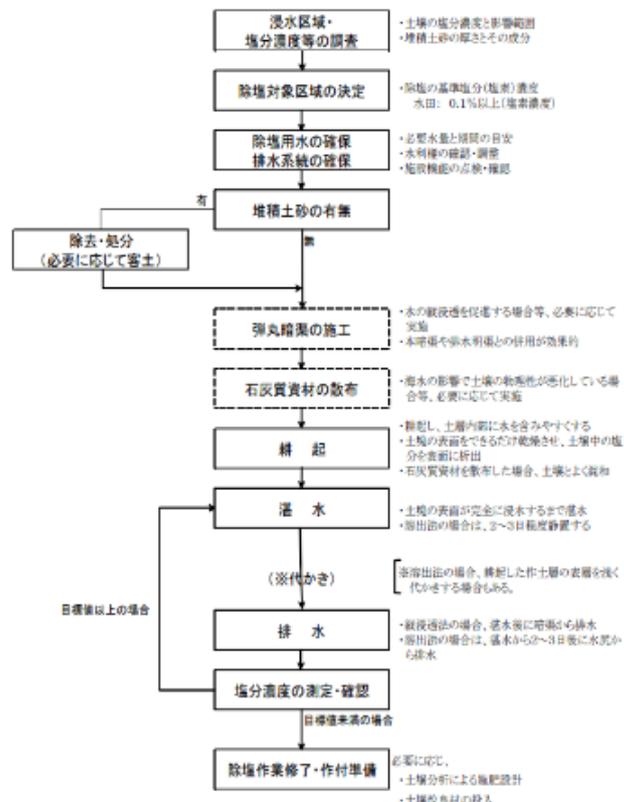
The “Farmland Salt Removal Manual” was prepared as a manual for people in charge of the practical work of salt removal, organizing salt removal operation procedures, technical points to keep in mind, etc., so that efforts to desalinate farmland could be advanced quickly and smoothly.

Figure 5-11-9 Reference: Excerpt from “Farmland Salt Removal Manual”

### 1. 除塩の基本的な考え方

土壌中に残留する過剰な塩分は、十分な量の真水で流し出すことを基本とする。この場合、ほ場内に十分な量の真水を湛水させ、その浸透水により土壌中の塩分を排除する方法と、土壌中の塩分を湛水中に拡散溶出させ、ほ場の水尻から排水する方法がある。いずれの方法においても、土壌中の塩分濃度が目標値に達するまで、湛水から排水に至る工程を繰り返す。また、海水中のナトリウムイオンの影響で土壌の物理性が悪化し、透水性が低下している場合は、石灰質資材を散布し土壌の物理性を改善した後、湛水から排水に至る一連の作業を行った方が除塩効果が大きい。

図-1 除塩作業フロー(水田の場合)



Source) Ministry of Agriculture, Forestry and Fisheries, “Farmland Salt Removal Manual, Rural Development Bureau” (p.2, p.9) (June 2011)

<https://www.maff.go.jp/j/press/nousin/sekkei/pdf/110624-01.pdf> (browsed July 31, 2023)

<sup>4</sup> The Japanese Society of Rural Development Engineers “Commentary on Disaster Recovery Projects” I Outline of the disaster

Figure 5-11-10 Examples of salt removal operation procedures



Source) Ministry of Agriculture, Forestry and Fisheries, “White Paper on Food, Agriculture and Rural Areas” (p.14) (FY2011)  
[https://warp.ndl.go.jp/info:ndljp/pid/12232574/www.maff.go.jp/j/wpaper/w\\_maff/h23/zenbun.html](https://warp.ndl.go.jp/info:ndljp/pid/12232574/www.maff.go.jp/j/wpaper/w_maff/h23/zenbun.html)  
 (browsed July 31, 2023)

[Example of salt removal work during a non-irrigation period (Sendai Higashi district)]

Residual salt in the soil was flushed out with fresh water, and if the salt concentration remained above the standard value, salt removal was implemented multiple times (a maximum of four times). In addition, because the irrigation period in the Sendai Higashi district was from April 25 to September 10, 2011, the mayor of Sendai applied to the Director General of the Tohoku Regional Development Bureau for permission under the River Act (application for permission under Article 23 of the River Act related to the use of water in the Hirose River in the Natori River system, a class 1 river), and salt removal was implemented during the non-irrigation period.

### (3) Recovering and reconstructing by the national government

Under the master plan for the reconstruction of agriculture and rural areas, based on the Special Measures Act, along with the disaster recovery projects and salt removal projects of farmland and agricultural facilities implemented on an emergency basis by the national government and others, land readjustment and other projects were implemented in combination to facilitate the early resumption of farming operations.

As of September 2022, directly-controlled projects had been completed in 12 of 13 districts, excluding the Ukedo River district.

#### 1) Directly-controlled disaster recovery project districts

- Jo River (Miyagi Prefecture): 2,775 million yen (project completed)
- Sendai Higashi (Miyagi Prefecture): \*87,096 million yen (project completed) \* Including directly-controlled projects related to disaster recovery
- Natori River (Miyagi Prefecture): 15,474 million yen (project completed)
- Watari Yamamoto (Miyagi Prefecture): 12,268 million yen (project completed)
- Aratozawa Dam upstream of the Hasama River (Miyagi Prefecture): 85 million yen (project completed)
- Hasama River upstream (Miyagi Prefecture): 209 million yen (project completed)
- Kanan (Miyagi Prefecture): 535 million yen (project completed)
- Shirakawa Yabuki (Fukushima Prefecture): 3,337 million yen (project completed)

- Abukuma upstream (Fukushima Prefecture): 646 million yen (project completed)
- Minamisoma (Fukushima Prefecture): 17,440 million yen (project completed)
- Haga Plateau (Tochigi Prefecture): 71 million yen (project completed)

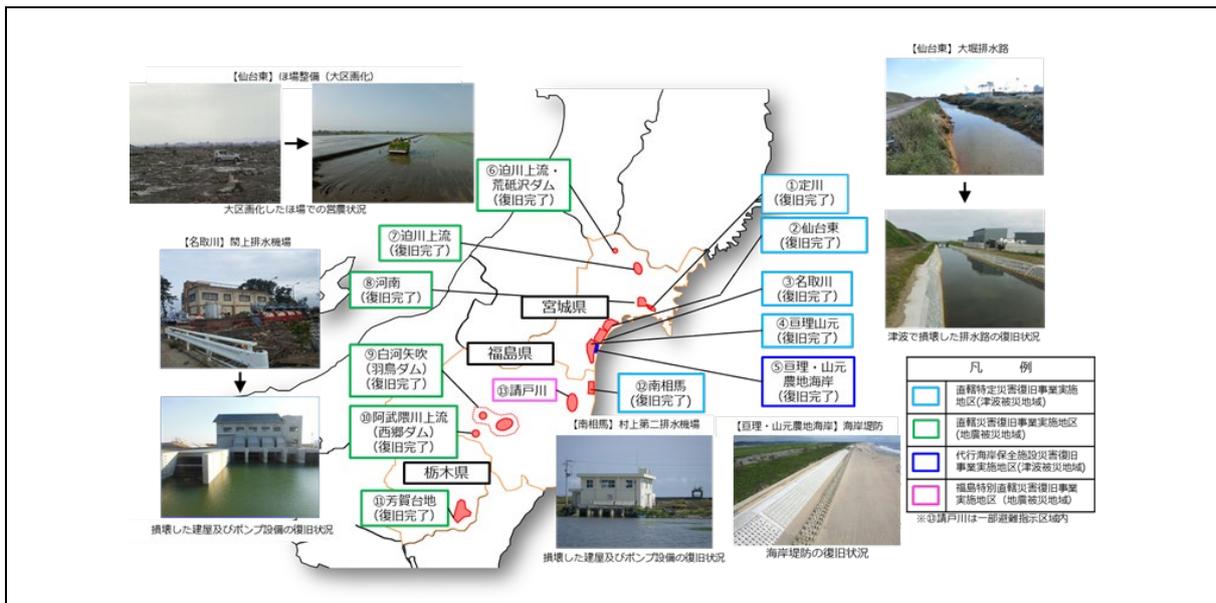
## 2) Substitute coastal conservation facility disaster recovery project district

- Watari and Yamamoto agricultural coast (Miyagi Prefecture): 16,295 million yen (project completed)

## 3) Fukushima special directly-controlled disaster recovery project

- Ukedo River (Fukushima Prefecture): 11,018 million yen (scheduled for completion in FY2023)

Figure 5-11-11 Directly-controlled disaster recovery projects for farmland and agricultural facilities



Source) Ministry of Agriculture, Forestry and Fisheries, "Efforts to Support the Reconstruction of Agriculture, Forestry and Fisheries from the Great East Japan Earthquake" p.5 (December 2022)  
<https://www.maff.go.jp/j/kanbo/joho/saigai/attach/pdf/torikumi-50.pdf> (browsed July 31, 2023)

#### 4) Recovering drainage pump stations in the Sendai Higashi district

The Sendai Higashi district is a project district developed in prefectural government projects, etc., and facilities are managed by Sendai City and the Sendai Higashi land improvement district, so in a normal disaster recovery project, the project entity for disaster recovery would be Sendai City or the Sendai land improvement district, but since the Great East Japan Earthquake was a major disaster beyond expectations, Sendai City and Miyagi Prefecture requested the handling of projects by the national government based on the Special Measures Act due to the implementation of disaster recovery in Sendai City being difficult from the viewpoints of manpower and technology, etc.

Because of this, it was decided to implement salt removal and the restoration of farmland and agricultural facilities in the Sendai Higashi district as “directly-controlled specific disaster recovery projects (Sendai Higashi district).”

Immediately after the disaster, four key drainage pump stations stopped functioning and it was no longer possible to drain about 2,300 ha of farmland and residences in the district, so at the request of Sendai City, the national government carried out drainage operations by loaning pumps for disaster emergency use to the key drainage pump stations and revived some pump functions.

In addition, the natural drainage function was reduced due to the impact of ground subsidence caused by the earthquake, so the government secured about twice the drainage capacity to that before the disaster.

#### 5) Readjusting land primarily by expanding farmland plots in the Sendai Higashi district

As the mayor of Sendai City also requested the development of expanded farm field in conjunction with the directly-controlled specific disaster recovery projects, adjacent farmland was incorporated into the Sendai Higashi district, and 1,900 ha of land readjustment was implemented as a “directly-controlled disaster recovery-related land readjustment project (Sendai Higashi district).”

On the other hand, since consensus building was required among farmers and others for the implementation of land readjustment, farmland recovery and other activities were implemented through directly-controlled specific disaster recovery projects in advance until the start of land readjustment. This was because JA, land improvement districts, etc., demanded the early recovery of farmland as measures until the start of land readjustment to stimulate and maintain farmers’ motivation to engage in farming.

The scale of management has been expanded and management streamlined by the use and concentration of farmland through land readjustment based mainly on the expansion of farmland plots, thereby enabling the improvement of agricultural productivity and the stabilization of agricultural management. In addition, the use of paddy fields as fields has been promoted by the establishment of culvert drainage by this project, and the introduction of high profit crops is advancing, which is expected to contribute to the expansion of production of local brands such as the “Sendai Ido onion,” which has acquired GLOBAL G.A.P. certification.

- Directly-controlled specific disaster recovery project  
Sendai Higashi district (salt removal, farmland recovery, facility recovery): 55,491 million yen (project completed)
- Directly-controlled disaster recovery related land readjustment project  
Sendai Higashi district: 31,604 million yen (project completed)

Figure 5-11-12 Farmland recovery and maintenance (production infrastructure)



(Source) Tohoku Regional Agricultural Administration Office, Ministry of Agriculture, Forestry and Fisheries, "State of Efforts by the Tohoku Regional Agricultural Administration Office, etc., for the Recovery and Reconstruction of Agriculture and Rural Areas" (p.4, p.9, p.10) (November 2021)  
[https://www.maff.go.jp/tohoku/osirase/higai\\_taisaku/hukkou/torikumi.html](https://www.maff.go.jp/tohoku/osirase/higai_taisaku/hukkou/torikumi.html) (browsed July 31, 2023)

Figure 5-11-13 Main work of the directly-controlled disaster recovery related land readjustment project

区分	受益面積	工種・数量		備考
区画整理	1,900ha	区画整理 末端用水路 末端排水路 揚水機 暗渠排水	A=1,900ha L=189km L=13km 18 箇所 1 式	

Figure 5-11-14 Main work of the directly-controlled specific disaster recovery project

区分	受益面積	工種・数量		備考
施設復旧	2,362ha	排水機場 用水路 排水路 農道	4 箇所 1 式 1 式 1 式	
農地復旧	1,810ha	堆積物土砂撤去 畦畔復旧 整地工 客土工	1 式 1 式 1 式 1 式	
除塩	1,393ha	湛水除塩工 石灰等散布工	1 式 1 式	

Source) Tohoku Regional Agricultural Administration Office, Ministry of Agriculture, Forestry and Fisheries, "Directly-controlled disaster recovery-related land readjustment projects, Holding of completion ceremony in Sendai Higashi District" (January 22, 2021)  
<https://www.maff.go.jp/tohoku/press/soumu/soumu/210122.html>

Figure 5-11-15 State of implementation of salt removal work in the Sendai-Higashi district



Source: Sendai Higashi Land Improvement and Construction Project Office, Tohoku Agricultural Administration Bureau, Ministry of Agriculture, Forestry and Fisheries, "Path of the Sendai Higashi district" (p.95) (March 2021)

## (4) Disaster recovery and reconstruction projects by prefectures

### 1) Overview

In Miyagi Prefecture and Iwate Prefecture, disaster recovery projects (Act on Temporary Measures) in tsunami disaster-affected areas where damage was large and complex were classified as prefectural projects, while projects in other surrounding districts were classified as municipal projects. In Fukushima Prefecture, disaster recovery projects on tsunami-affected farmland were implemented as municipal projects, and projects to develop farm field in combination with farmland recovery were implemented as prefectural projects.

- Subsidies for disaster recovery project costs (FY2011-FY2020)
  - Farmland disaster recovery projects: 50,497 million yen
  - Farmland facility disaster recovery projects: 66,926 million yen
  - Coastal protection, etc.: 63,257 million yen
  - Farmland disaster-related land readjustment projects: 1,095 million yen
  - Rural living environment facility recovery projects: 14,221 million yen
  - Disaster-related emergency landslide countermeasure projects: 193 million yen

### 2) State of recovery and reconstruction in Iwate Prefecture

#### a. Overview of recovery

Based on requests from eight coastal municipalities that suffered extensive damage, Iwate Prefecture decided to take the lead and implement “prefecture disaster recovery projects” for the restoration of farmland and agricultural facilities. At that time, the prefecture advanced recovery and maintenance as follows for the “revitalization of livelihoods.”

- (1) Following on from the completion of the national government’s disaster assessment, the prefecture started the “work to restore to their original condition” on farmland and agricultural facilities, including salt removal.
- (2) For large tracts of farmland, the prefecture promoted the introduction of “farm field development” integrated with disaster recovery and not limited to restoration to original condition.

#### b. Main content

### ア) Salt removal measures

After the Ministry of Agriculture, Forestry and Fisheries recognized salt removal as a land improvement project (disaster recovery project) based on the Special Measures Act, it established a salt removal project in the FY2011 supplementary budget and introduced the project in Iwate Prefecture as well. Iwate Prefecture applied for farmland disaster recovery projects and salt removal projects as follows based on the results of the damage survey.

- Cases of paddy fields: Recovery through salt removal by irrigation
- Cases of fields: Recovery through soil dressing work because water could not be obtained

### イ) Assessing disaster

- Disaster was assessed from May 20 to December 22, 2011, by 51 teams in 23 rounds, resulting in 1,074 assessments and 34.3 billion yen in assessed value against 37 billion yen applied, the largest ever in Iwate Prefecture.
- In the disaster assessments, the workload was reduced greatly by simplifying the assessment work, such as reducing the frequency of measurements of sediment thickness and crossings of roads and waterways, and by dispatching a total of 148 people from all over the country to assist in the assessment, which was completed by December 2011.

- In eight coastal municipalities (Rikuzentakata City, Ofunato City, Kamaishi City, Otsuchi Town, Yamada Town, Miyako City, Iwaizumi Town, and Noda Village) where damage was extensive, it was not possible to secure a disaster recovery project implementation system so projects were implemented as prefectural projects on behalf of the municipalities. Iwate Prefecture, the owner of the facilities, implemented the disaster recovery projects for agricultural coast protection facilities (10 locations) and the Koromo River No. 1 Dam (Oshu City).
- With regard to damage to agricultural coast protection facilities (levees), out of 10 coastal locations, four levees were completely destroyed and two were partially damaged for a total of six coastal locations breached, land subsidence (0.1 to 1.5 m) was confirmed at all coastal locations so because damage was so extensive it was decided to apply for recovery based on a certain plan.

### ウ) Recovering coastal protection facilities

- Iwate Prefecture established the “Iwate Tsunami Disaster Prevention Committee of Technology Experts” (Chairman: Shigeki Sakai, Dean of the Iwate University Faculty of Engineering) to study the direction of tsunami countermeasures, the development goal of tsunami countermeasure facilities and the creation of disaster-resistant cities and regions.
- Apart from the Rural Construction Section of the Iwate Prefecture Agriculture, Forestry and Fisheries Department, which has jurisdiction over agricultural coast protection facilities (levees), Forest Conservation Section, Fishing Port and Fishing Village Section, and the River Section of the Prefectural Land Development Department have jurisdiction over coastal protection facilities (levees), which are located in a series of bays (regional coast), in accordance with their purpose, so related sections of Iwate Prefecture’s government worked together to unify the approach on the setting of levee height and their structure, explained each coastal location to related municipalities and local residents, and determined the height to recover based on their opinions, etc.

#### c. Organizational structure (handling in FY2012)

- Iwate Prefecture made efforts to coordinate within the prefecture as much as possible to handle the enormous amount of disaster recovery-related work, including: ① shifting staff from inland departments; ② providing support for land use and land conversion work by issuing concurrent assignments; ③ providing support for the preparation of design documents through horizontal cooperation (Morioka to Miyako, the south of the prefecture to Ofunato); and ④ securing registered contract workers.
- Because handling the situation with Iwate Prefecture staff alone would have been difficult, a total of 268 staff were dispatched from each Regional Agricultural Administration Office and 33 prefectures nationwide from FY2011 through FY2018 to ensure the execution system<sup>5</sup>.

## 3) State of recovery and reconstruction in Miyagi Prefecture

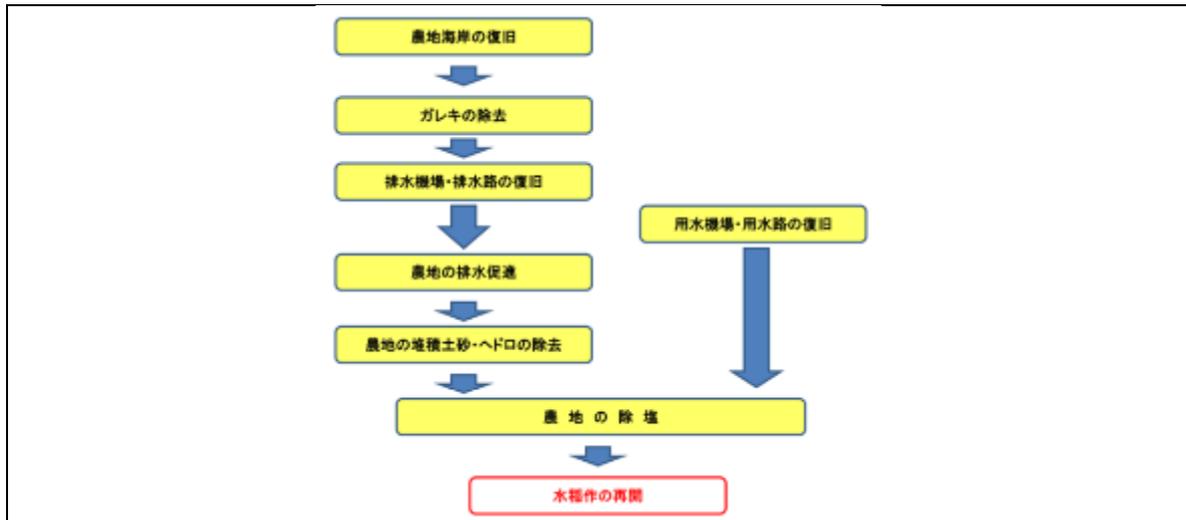
### a. Overview of recovery

In the restoration of farmland and agricultural facilities in tsunami-affected areas, the location and order of recovery work were adjusted based on the state of local damage and various measures were taken so that paddy rice planting could resume sequentially starting from places where that was possible.

In addition, projects were advanced under the following procedures while coordinating with the national government, prefectural government, municipalities, land improvement districts, JA, and other related organizations based on the state of local damage.

<sup>5</sup> Iwate Prefecture, “Progress Towards the Reconstruction of Agriculture and Rural Villages in Iwate, Land of Hope” (February 2021)

Figure 5-11-16 Procedures for the restoration of farmland and agricultural facilities in tsunami-affected areas



Source) Miyagi Prefecture “Miyagi’s Progress in the Recovery and Reconstruction of Agricultural and Rural Areas - From Revival to Creative Reconstruction - (updated edition)” (p.57) (March 2017)  
<https://www.pref.miyagi.jp/soshiki/nosonshin/ayumi.html> (browsed July 31, 2023)

## b. Main content

### ア) Emergency drainage measures

In coastal areas, emergency drainage measures were implemented because in addition to levees collapsing and damage to sluice gates and drainage pump stations due to the tsunami caused by the earthquake, the ground also subsided, making drainage impossible. In addition to the benefitting farmland, because the drainage facilities covered the drainage of villages and public facilities in upstream areas, and the delay in recovery had a major impact on rice paddy planting in upstream areas that were not damaged by the tsunami, there were also concerns over flooding in upstream areas in the event of heavy rainfalls so municipalities implemented emergency drainage measures using the Ministry of Land, Infrastructure, Transport and Tourism pumps for disaster emergency use, pumps leased from construction companies, etc.

#### イ) Emergency recovery measures

Of the pumping stations that were damaged by the tsunami, those with little damage to the pumps themselves and could be restored quickly by repairing were diagnosed at the same time with the cooperation of the respective pump manufacturers, and restored quickly with the minimum equipment configuration necessary for temporary operation.

As a result of implementing the emergency drainage and emergency restoration measures, drainage capacity was restored to about 30% of the pre-disaster level by the end of May 2011, and in the Ishinomaki jurisdiction, 1,300 ha of paddy rice planting was possible in upstream areas not damaged by the tsunami (Ishinomaki-Konan district), and salt was also removed from farmland. By the end of May of the same year, it became possible to plant about 1,136 ha of paddy rice and other crops throughout the prefecture.

#### ウ) Salt removal measures

Of the approximately 14,300 ha of farmland in the prefecture that were inundated by the tsunami, the area that required farmland restoration and salt removal measures totaled 13,000 ha.

Affected municipalities took the lead in salt removal projects on farmland with little damage that aiming to resume farming in FY2011, and they started on work prior to the assessment. From FY2012 on, salt removal projects were implemented mainly as prefectural projects.

A farmland restoration support team was established within the prefecture's Agriculture, Forestry and Fisheries Department and a support system put in place to quickly and accurately implement restoration measures for tsunami-affected farmland and technical measures for crops. Moreover, technical advice was received from Tohoku University, Miyagi University, Tohoku Agricultural Research Center, the National Research Institute of Agricultural Engineering, and other related organizations as needed, as well as materials from Kumamoto Prefecture, which has experience in salt removal measures on salt damage, and subsequently, two engineers were also dispatched to work on the restoration measures. In addition, for salt removal, it was necessary to repeatedly flood sites with fresh water (river water) and remove the water, and river water was used after consulting with river administrators.

### 工) Restoring farmland and agricultural facilities

- Drainage pump stations: The restoration of all 47 agricultural drainage pump stations damaged by the tsunami was completed by FY2020.
- Agricultural roads: Agricultural roads were damaged in 1,121 locations in the prefecture (351 in tsunami areas and 770 outside tsunami areas), and all restoration was completed by 2020.
- Rural community sewerage facilities: Of the rural community sewerage facilities damaged by the earthquake, sewage treatment resumed at all 93 facilities by FY2016, excluding those closed due to tsunami damage.
- Reservoirs: Work on all of the 126 reservoirs that were damaged by the earthquake and required restoration was completed by FY2015.
- In the execution of the projects, inter-district diversions and budget additions were carried out at an early stage in response to fluctuating project volumes in each district and projects were able to progress smoothly.

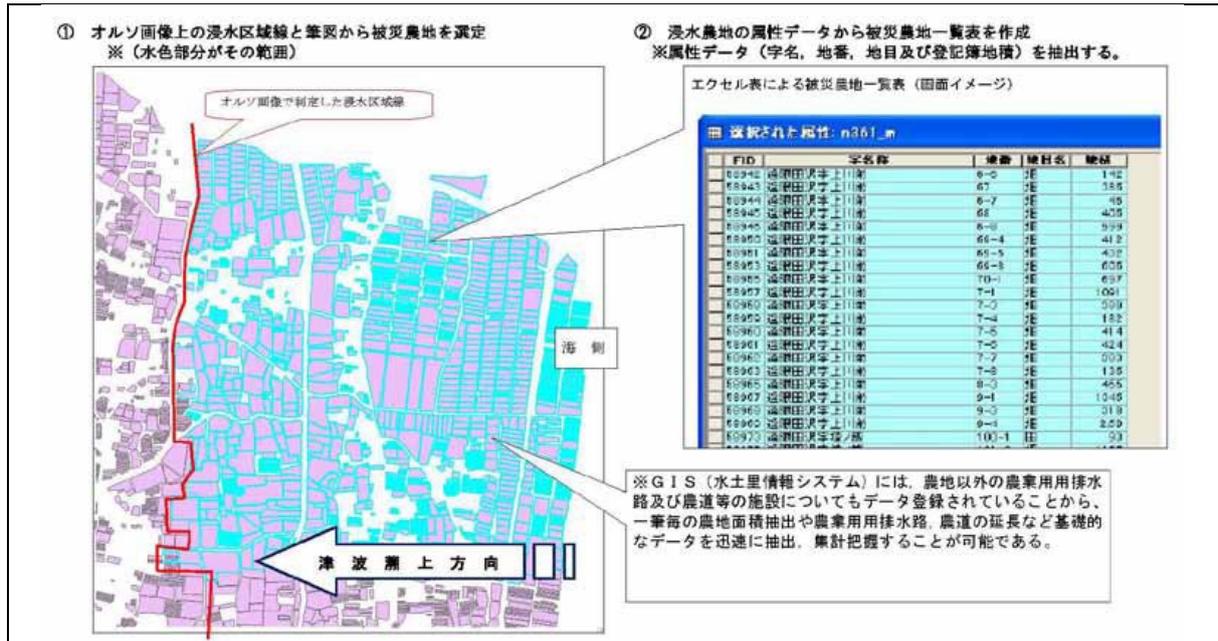
### オ) Use of a GIS (geographic information system)

Miyagi Prefecture's water, soil and land information system is managed and operated by the Miyagi Prefecture Land Improvement Organization Association, maintaining a database of orthophotos, topographic maps, agricultural, irrigation and drainage facilities, and brush and plot maps of farmland as "agricultural and rural infrastructure maps."

GIS can be used effectively for disaster recovery because it can import the results of field measurements using GPS instruments in addition to map measurements, and can take photos at a scale of 1/2,500; so it was decided that GIS would be used in the disaster assessment of tsunami-affected farmland and agricultural facilities (branch lines, small drainage canals, and branch line farm roads).

Inundation damage due to the tsunami is classified into salt-affected districts inundated only with seawater, and sediment-affected districts where sediment was deposited on farmland and irrigation and drainage channels. Field surveys can be conducted based on inundation maps prepared using the GIS to identify salt-affected and sediment-affected districts. In addition, it is also possible to extract farmland information such as farmland area within an area.

Figure 5-11-17 GIS (geographic information system)



Source) Miyagi Prefecture “Miyagi’s Progress in the Recovery and Reconstruction of Agricultural and Rural Areas - From Revival to Creative Reconstruction - (updated edition)” (p.64-65) (March 2017)  
<https://www.pref.miyagi.jp/soshiki/nosonshin/ayumi.html> (browsed July 31, 2023)

### c. Organizational structure

- Because damage was extensive, it was decided to implement the response to the disaster while sharing roles among the national government, prefectures and other organizations, and a “Farmland and Agricultural Facility Disaster Response Team” was formed within the prefecture’s Agriculture, Forestry and Fisheries Department immediately after the disaster. The team continued to reorganize and respond flexibly to various issues thereafter.
- Miyagi Prefecture tried to deal with the lack of manpower related to the earthquake disaster, such as by prioritizing assignment of staff to coastal offices, but because it would have been difficult to handle everything with Miyagi Prefecture staff alone, a total of 949 staff were dispatched from Regional Agricultural Administration Offices and 31 prefectures throughout Japan from FY2011 through FY2020<sup>6</sup>.

<sup>6</sup> Miyagi Prefecture Agriculture, Forestry and Fisheries Department “Miyagi’s Progress in the Recovery and Reconstruction of Agricultural and Rural Areas - From Revival to Creative Reconstruction - (updated edition)” (March 2017)  
 The number of dispatched staff to FY2020 is based on interviews with the Miyagi Prefectural Government.

## 4) State of recovery and reconstruction in Fukushima Prefecture

### a. Overview of recovery

In June 2016, Fukushima Prefecture published “Utsukushima Fukushima: Memories of Agricultural and Rural Reconstruction and Revitalization - Experiences and Methods to Pass on to the Next Generation -.” In it, the prefecture presented the following policy for recovery from the Great East Japan Earthquake, under which it promoted disaster recovery.

### b. Main content

#### ア) Formulating the “Action Plan for Recovery from the Disaster on Farmland, etc.” in Agriculture, Forestry and Fisheries Department

The Great East Japan Earthquake caused extensive and complex damage over a wide area, and because it is necessary for the prefecture, municipalities, land improvement districts and other related parties to work together and do their utmost for the prompt restoration of farmland and agricultural facilities, the department clarified the basic policy to advance disaster recovery projects, the work schedule, etc., and formulated an action plan on April 7, 2011. The overview is as follows.

##### ① Basic policy on disaster assessment

The regional classification of the assessment was planned based on three major groupings. With regard to the timing of implementation of the assessments, it was decided that assessments would be carried out sequentially, starting from those where it was possible to start on work, taking into consideration the extent of damage and the systems of the municipalities.

- Group 1 •••• Aizu, Nakadori (earthquake)
- Group 2 •••• Hamadori (earthquake, outside a 30km radius from the nuclear power plant)
- Group 3 •••• Hamadori (earthquake and tsunami, inside a 30km radius from the nuclear power plant)

##### ② Disaster recovery schedule

Since the earthquake, tsunami, and nuclear power station accident happened at the same time in this disaster, and the state damage differed depending on the area, at the time the action plan was formulated, it was decided to advance disaster recovery efforts divided into the following categories by cause of damage.

- Earthquake Disaster recovery projects for farmland and agricultural facilities damaged by the earthquake outside of a 30km radius from the nuclear power plant will be implemented promptly.
- Tsunami Agricultural lands and facilities damaged by the tsunami will be dealt with after the reconstruction plan expected to be formulated is actually formulated.
- Districts affected by radiation Because it is not possible to enter and assess damage in districts affected by radiation due to the nuclear power station accident, damage recovery will be advanced after implementing damage surveys sequentially starting from areas where related municipalities have established disaster recovery systems as of when the nuclear power station accident has been brought under control and entry to those municipalities is possible.

#### イ) Recovery policy for evacuation zones

From May 15, 2012 on, evacuation zones were reorganized into difficult-to-return zones, restricted residential areas and areas under preparation for lifting evacuation orders according to the air dose rate, and disaster recovery implemented as follows.

- ① Difficult-to-return zones Disaster assessment and restoration projects have not been implemented because the air dose rate is high in these zones.
- ② Restricted residential areas Disaster assessment and restoration projects are being implemented where the air dose rate has been reduced by decontamination. However, projects for the recovery of coastal protection facilities, drainage pump stations, reservoirs, and rural community sewerage facilities have been implemented with priority from the perspectives of agricultural disaster prevention and the promotion of the return of local residents.
- ③ Areas under preparation for lifting evacuation orders Disaster assessments and recovery projects are being

implemented for all types of farmland and agricultural facilities towards the resumption of farming<sup>7</sup>.

### c. Organizational structure

A “Farmland Recovery” team was added at Soso Agriculture and Forestry Office, where tsunami damage was extensive, from April 1, 2012 to advance the restoration and reconstruction of farmland and agricultural facilities efficiently.

Moreover, from April 1, 2014, the “Fujinuma Lake Restoration” team was added at the Prefectural Central Agriculture and Forestry Office to handle restoration work at Fujinuma Dam, which was starting in earnest. In addition, at the Soso Agriculture and Forestry Office, a “Group Guidance” team was added to provide guidance and advice on disaster restoration work to municipalities, departments responsible for prefectural disaster recovery projects were established for recovery and reconstruction, with “Section 1” for coastal recovery, “Section 2” for farmland recovery and “Section 3” for pump stations and facilities recovery; and teams were established to look after the “north” and “south” areas in Section 1 and Section 2.

Because of the enormous amount of work related to disaster restoration, handling it would have been difficult for Fukushima Prefecture staff alone so a total of 530 staff were dispatched from the national government and 27 prefectures by the end of FY2022 to ensure the execution system.

A total of 1,414 people were dispatched by the Ministry of Agriculture, Forestry and Fisheries to municipalities in the prefecture by the end of FY2021, in line with the requests for support from Fukushima Prefecture. This means an average of 118 agricultural civil engineers were dispatched each year.

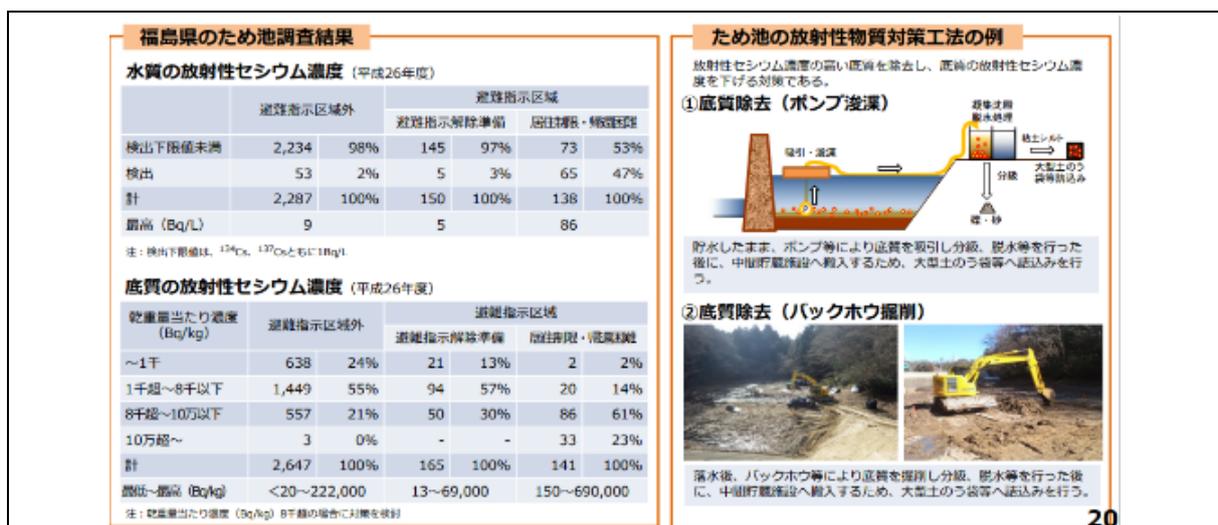
### d. Countermeasures against radioactive materials in reservoirs

Due to the accident at the TEPCO Fukushima Daiichi Nuclear Power Station, a wide range of reservoirs and other agricultural water facilities were contaminated by radioactive materials.

In Fukushima Prefecture, monitoring surveys were carried out at reservoirs to grasp water quality and the state of distribution of radioactive materials in bottom sediment (FY2013-FY2018), and technological demonstrations to reduce the impacts on use and management and effectiveness evaluations were carried out.

Based on these efforts, Fukushima Prefecture and municipalities are implementing countermeasures against radioactive materials in reservoirs using “Fukushima Revitalization Acceleration Grants,” with technical support from the Ministry of Agriculture, Forestry and Fisheries.

Figure 5-11-18 Surveys of the impacts due to radioactive materials on reservoirs, etc., and countermeasures



Source) Ministry of Agriculture, Forestry and Fisheries, “Efforts to Support the Reconstruction of Agriculture, Forestry and Fisheries from the Great East Japan Earthquake” p.20 (December 2022)  
<https://www.maff.go.jp/j/kanbo/joho/saigai/attach/pdf/torikumi-50.pdf> (browsed July 31, 2023)

<sup>7</sup> Fukushima Prefecture Agriculture, Forestry and Fisheries Department “Utsukushima Fukushima: Memories of Agricultural and Rural Reconstruction and Revitalization - Experiences and Methods to Pass on to the Next Generation -” (June 2016)

#### 4. Issues that arose in project implementation and responses

- (1) Pumps for disaster emergency use
  - Immediately after the disaster, requests from drainage pump stations to borrow pumps for disaster emergency use came in rush all at once, so pumps for disaster emergency use and other equipment were procured from all over Japan to implement drainage. Securing the required number of pumps for disaster emergency use and related materials and equipment in preparation for disasters, etc., and establishing a system for cooperation with related organizations are important.
- (2) Simplification of assessment of disaster recovery projects, etc.
  - In light of the enormous damage caused by the Great East Japan Earthquake, apart from allowing the preparation of plan overviews based on general unit prices and expanding the scope of desk-based assessments, measures were taken to allow simplification of the drawings attached to plan overviews through the use of GIS and aerial photographs if confirmation of the state of damage in tsunami disaster-affected areas, etc., was difficult, and to allow estimates based on a standard cross-section method to speed up the disaster assessment process.
- (3) Early ordering for drainage pump stations
  - Efforts were made for early ordering, such as ordering works by design-build package ordering method (design-build: the basic conditions are presented and the detailed design and construction work are done together using the contractor's technical capabilities), to make orders promptly for restoration work on damaged drainage pump stations whose implementation design had not yet been completed.
- (4) Support systems at times of disaster recovery
  - An enormous amount of disaster restoration work was generated after the region was hit by the disaster, and the national and prefectural governments dispatched agricultural civil engineering staff to provide support related to restoration and other work on farmland, agricultural facilities, etc. When a large-scale disaster occurs, it is necessary to provide support to municipalities that need it in timely fashion. Since FY2020, the Ministry of Agriculture, Forestry and Fisheries has been implementing push-type efforts in which its staff (MAFF-SAT) visit disaster-affected municipalities to judge the need for technical assistance (disaster triage), and it is important to explain these sorts of efforts to municipalities during normal times and advance relationship building.
- (5) The importance of recovery support agreements
  - On surveys of the state of damage, which are implemented first in disaster recovery work, the input of large numbers of staff in a short period of time was required, but the overall number of staff was insufficient to handle the enormous number of damage assessments quickly. Based on such lessons learned, Miyagi Prefecture has implemented efforts so that a quick response is possible in future by concluding a new disaster agreement with the Miyagi Association of Planners and Surveyors to enable quick recovery support at times of emergency.
  - Because it has not been possible in recent years to secure survey and design consultants in some regions, the Ministry of Agriculture, Forestry and Fisheries has concluded agreements with private organizations whose members are survey and design consultants nationwide since 2020 to establish a system that will secure survey and design consultants from a wide area beyond the scope of local authorities.
- (6) Collection of past know-how, etc.
  - In disaster assessments in Miyagi Prefecture, positive use of advice from other prefectures was effective in advancing the response to the disaster quickly, such as the application of GIS and the standard cross-section method based on advice from Niigata Prefecture, and the implementation of salt removal based on support from Kumamoto Prefecture, which has experience with salt damage.
- (7) Decontamination measures for farmland
  - The “Technical Book on Farmland Decontamination Measures” (February 2013) was compiled based on the findings obtained in studying the “Guide on Work Removing Radioactive Materials from Agricultural Soil (Decontamination Techniques)” (March 2012) and the demonstration work on farmland decontamination measures, and through studies by experts to establish the survey, design, construction and estimate methods for decontamination work for farmland.

## (8) Countermeasures against radioactive materials in reservoirs

- It was decided that basically, decontamination of the bottom sediment of reservoirs, where radioactive materials accumulate, will not be carried out because the water has a shielding effect and the impact on the air dose rate is small. However, when bottom sediment is raised, people working at the site could be exposed to external radiation, which could interfere with maintenance work. Because of this, the Ministry of Agriculture, Forestry and Fisheries, in cooperation with Fukushima Prefecture, decided to promote countermeasures against radioactive materials in reservoirs through Fukushima Revitalization Acceleration Grants projects from the perspectives of the resumption of farming and agricultural reconstruction.
- The Ministry of Agriculture, Forestry and Fisheries, in cooperation with Fukushima Prefecture, the Institute for Rural Engineering of the National Agriculture and Food Research Organization, and others, has been working to grasp the actual situation and impacts of radioactive materials in reservoirs and on the implementation of demonstration projects, and compiled the “Technical Manual for Countermeasures against Radioactive Materials in Reservoirs (1st edition)” (March 2014) based on the findings obtained and following studies by experts.