

## 2. Overview of Damage

### (1) Inundation and Land Subsidence

Tsunamis caused by the 2011 Earthquake Off the Pacific Coast of Tohoku devastated Pacific coastal areas in eastern Japan. According to a report by the Geospatial Information Authority of Japan, the total inundated area for 64 municipalities in six prefectures (Aomori, Iwate, Miyagi, Fukushima, Ibaraki, and Chiba Prefecture) was 561 km<sup>2</sup>. When classified by prefecture, Miyagi had a largest inundated area of 327 km<sup>2</sup>, followed by Fukushima with 112 km<sup>2</sup>. Iwate Prefecture stands at 58 km<sup>2</sup>. With the Sendai Plain accounting for a significant part of land, Miyagi Prefecture had the largest inundated area by far. The coastal area of Iwate Prefecture was higher in inundation height but lower in inundated area as it is a Rias coast with little lowlands. In Miyako City, an area of 10 km<sup>2</sup> out of the total area of 1,260 km<sup>2</sup> was submerged (Fig. 10).

Ground subsidence and liquefaction also occurred in various places with liquefaction causing serious damage in eight prefectures (Iwate, Miyagi, Fukushima, Ibaraki, Gunma, Saitama, Chiba, and Kanagawa Prefecture) and Tokyo Metropolis. Analysis results of electronic reference points by the Geospatial Information Authority of Japan revealed significant ground subsidence in the Pacific coast of the Tohoku region (Fig. 11). Among Iwate, Miyagi, and Fukushima prefectures, the largest subsidence of -84 cm was observed in Otomo-cho, Rikuzentakata City. In Miyako City, the largest subsidence of -50 cm was observed in Fujiwara Pier, Sokei, followed by -44 cm in Motomachi, -42 cm in Chiwari 11, Tsugaruishi (Komagata-dori), and -33 cm in Chiwari 9, Tsugaruishi (Shinmachi). Because of the ground subsidence, flood including submersion of crops and fields occurs in coastal areas during high tides, when the tidal level changes greatly by the ebb and flow. As a result of this, civil work is in progress to raise the height of harbors.

### (2) Casualties and Building Damage

In 12 prefectures, including Hokkaido and the Metropolis, the Great East Japan Earthquake and Tsunami left 15,859 people dead and 3,021 missing (according to a release by the National Police Agency on May 30, 2012; Fig. 12), causing serious damage only surpassed in the post-Meiji Era by the Great Kanto Earthquake (about 105,000 people dead or missing) in 1933 and the Meiji Sanriku Earthquake and Tsunami (about 22,000 people dead or missing) in 1896. In Iwate Prefecture, over 4,670 people died and over 1,140 people are missing (Fig. 12). In three prefectures of Iwate, Miyagi, and Fukushima, 92.4% of the victims were drowned (“White Paper on Disaster Management” for fiscal 2011).

According to a release from the General Disaster Management Office, General Affairs Department, Iwate Prefecture, the number of deaths including related deaths stands at 5,089 in the prefecture with 1,144 people missing, 209 people injured, and 25,023 houses destroyed (as of Sep. 30, 2013; Fig. 13). A survey from the Iwate prefectural government found 467 people dead, 94 people missing, 33 people injured, and 4,098 houses destroyed in Miyako City. According to a release by Miyako City (as of Nov. 6, 2012), when calculation was made it was based on the place of residence at the time of disaster, the number of deaths in the City stands at 517 with 94 people missing and 4,005 houses destroyed (houses that are more than partially destroyed).

### (3) Overview of Damage in Miyako City

Let us look at the state of damage released by Miyako City (pp. 36-37). Classifying the 517 deaths by age group reveals that senior citizens aged 60 or more account for 64%, or about two out of three with 126 people (24.4%) being aged 70-79, 122 people (23.6%) aged 60-69, and 83 people (16.1%) aged 80-89. When the deaths are classified by place of residence, 181 people (35.0%) were from the Taro neighborhood, 68 people (13.2%) from the Miyako neighborhood, 65 people (12.6%) from the Sokei neighborhood, 57 people (11.0%) from the Kuwagasaki and Tsugaruishi neighborhoods respectively, and 48 people (9.3%) from the Omoe neighborhood.

Across the City, 9,088 houses sustained damage, which consisted of 4,449 dwellings and 4,639 non-dwelling houses. There were 2,677 dwellings that were completely destroyed, which represent 60.2% of the affected dwellings, illustrating the strength of this tsunami and the severity of damage. For reference, the number of houses (including non-dwelling houses) in the City as of the tsunami disaster was 39,907 according to the tax book.

The total amount of damage in Miyako City exceeds 245.6 billion yen (excluding damage to national/prefectural government facilities, and that related to railroad, telecommunications, and electric operators). With the expenditure of general accounts of Miyako City being 29,606,417,000 yen for fiscal 2010, the amount of damage is more than eight years' worth of its annual total budget. Among the amount of damage, damage to housing represents the largest proportion with 149.6 billion yen, which accounts for about 60% of the total amount before mentioned. Damage to commercial- and labor-related facilities is 28.1 billion yen, fisheries-related damage 21.5 billion yen, damage to fishing harbors 15.0 billion yen, that to tourist facilities 13.6 billion yen. and that to public civil facilities such as rivers, roads, and bridges 7.7 billion yen.

[Table. 10] 2011 Earthquake Off the Pacific Coast of Tohoku: Inundated Area by Municipality

Prefecture	Municipality	Inundated area (km <sup>2</sup> )	Municipal area (km <sup>2</sup> )	Photographing date
Aomori		24	844	
Iwate		58	4,946	
	Miyako City	10	1,260	Mar. 13, Apr. 1, 5
	Ofunato City	8	323	Mar. 13, Apr. 1, 5
	Kuji City	4	623	Mar. 13, Apr. 5
	Rikuzentakata City	13	232	Mar. 13, Apr. 1
	Kamaishi City	7	441	Mar. 13, Apr. 1, 5
	Otsuchi Town	4	201	Mar. 13, Apr. 1
	Yamada Town	5	263	Mar. 13, Apr. 1, 5
	Iwaizumi Town	1	993	Mar. 13, Apr. 1, 5
	Tanohata Village	1	156	Apr. 5
	Fudai Village	1	70	Mar. 13, Apr. 5
	Noda Village	2	81	Mar. 13, Apr. 5
Hirono Town	1	303	Mar. 13	
Miyagi		327	2,003	
Fukushima		112	2,456	
Ibaraki		23	1,444	
Chiba		17	689	
	Total	561	12,382	

\* Inundated area is calculated by determining the occurrence of flooding to paddy fields and neighborhoods based on aerial photos ((Ei) standing for satellite image) and detecting inundated places by traces of debris (lakes, ponds and other inland waters are included in these figures).

\*\* All areas of the Pacific coast (from Shimokita Hachinohe coast, Aomori Prefecture (south of Monomizaki) to Chiba Prefecture (Kujukurihama Coast)), which are considered to have sustained flooding damage, are subject to the survey.

\*\*\* Areas of municipalities are from "Nationwide Municipal Area Survey (as of Oct. 1, 2010; the Geospatial Information Authority of Japan)." (Source: The Geospatial Information Authority of Japan. "2011 Off the Pacific Coast of Tohoku Earthquake: Inundated Area by Municipality (Summary Figures) Fifth Report." Apr. 18, 2011.)

[Table. 11] List of Ground Subsidence Survey Results at Observation Stations in Iwate Prefecture

Name of municipality	Location	Amount of change ( cm )	Station name	Station type
Miyako City	Motomachi	- 44	6884	Grade 1 benchmark
Miyako City	Chiwari 9, Tsugaruishi	- 33	6879	Grade 1 benchmark
Miyako City	Chiwari 4, Sokei	- 50	Fujiwara Pier	Grade 4 triangulation point
Miyako City	Chiwari 11, Tsugaruishi	- 42	Miyako	Electronic benchmark
Yamada Town, Shimohei District	Chiwari 16, Funakoshi	- 41	6870	Grade 1 benchmark
Yamada Town, Shimohei District	Chiwari 2, Funakoshi	- 43	6868	Grade 1 benchmark
Yamada Town, Shimohei District	Chiwari 10, Funakoshi	- 53	Uranohama	Grade 4 triangulation point
Yamada Town, Shimohei District	Orikasa	- 54	Yamada	Electronic benchmark
Otsuchi Town, Kamihei District	Chiwari 13, Kirikiri	- 35	6866	Grade 1 benchmark
Kamaishi City	Chiwari 3, Heita	- 56	6808	Grade 1 benchmark
Kamaishi City	Odaira-cho 3-chome	- 66	Kamaishi Daikannon	Grade 4 triangulation point
Kamaishi City	Kasshi-cho	- 56	Kamaishi	Electronic benchmark
Ofunato City	Aza Chinomori, Ofunato-cho	- 60	6789	Grade 1 benchmark
Ofunato City	Aza Tomioka, Ikawa-cho	- 73	Miyata	Grade 3 triangulation point
Ofunato City	Aza Nakamichishita, Sakari-cho	- 72	Sakari	Grade 4 triangulation point
Ofunato City	Aza Torisawa, Akasaki-cho	- 76	Ofunato	Electronic benchmark
Rikuzentakata City	Aza Takahata, Yonesaki-cho	- 58	6784	Grade 1 benchmark
Rikuzentakata City	Aza Nishinobo, Otomo-cho	- 84	Nishinobo	Grade 4 triangulation point
Rikuzentakata City	Aza Sugoroku, Kesen-cho	- 53	Sugoroku	Grade 4 triangulation point

Remarks: A benchmark has an accuracy of about 10 cm and an electronic benchmark an accuracy of about 1 cm.  
 (Source: The Geospatial Information Authority of Japan. *Ground Subsidence Survey for the 2011 Off the Pacific Coast of Tohoku Earthquake*. Apr. 14,2011.)

[Fig. 12] List of Casualties and Building Damage Nationwide

Type of damage	Casualties					Building damage								Road damage	Bridge damage	Landslide	Bank trips	Railroads	
	Killed	Missing	Injured			Completely destroyed	Partially destroyed	Swept away	Completely destroyed by fire	Partially destroyed by fire	Inundated above floor level	Inundated below floor level	Partially damaged						Non-dwelling houses damaged
			Seriously injured	Slightly injured	Total														
People	People	People	People	People	Houses	Houses	Houses	Houses	Houses	Houses	Houses	Houses	places	places	places	places	places		
Hokkaido	1			3	3		4			329	545	7	469						
Tohoku	Aomori	3	1	25	86	111	308	701				1,006	1,402	2					
	Iwate	4,673	1,144			212	18,460	6,563		33		6	14,191	5,401	30	4	6		
	Miyagi	9,537	1,297			4,148	82,896	155,095		135		7,796	222,824	28,745	390	12	51	45	
	Akita			4	7	11							3	3	9				
	Yamagata	2		8	21	29							21	96	21		29		
Fukushima	1,606	207	20	162	182	21,192	73,034		77	3	1,061	338	166,834	1,117	187	3	9		
Tokyo	7		20	97	117	15	198		1				4,847	1,101	295	55	6		
Kanto	Ibaraki	24	1	34	678	712	2,626	24,238		31	1,799	779	185,531	19,923	307	41			
	Tochigi	4		7	126	133	261	2,118					73,180	295	257		40	2	
	Gunma	1		13	26	39		7					17,246		36		9		
	Saitama			7	38	45	24	199		1	1		1,800	33	160				
	Chiba	21	2	29	229	258	801	10,117		15	157	731	54,884	660	2,343		55	1	
	Kanagawa	4		17	121	138		41					459	13	160	1	2		
	Niigata				3	3							17	9					
	Yamanashi				2	2							4						
	Nagano				1	1													
Shizuoka			1	2	3							5	13	9					
Chubu	Gifu														1				
	Mie				1	1					2		9						
Shikoku	Tokushima										2	9							
	Kochi				1	1					2	8							
Total	15,883	2,652		6,149	6,149	126,583	272,315		297	3,352	10,218	742,867	59,285	4,198	116	207	45	29	

\* Prepared based on the Emergency Disaster Patrol Department, the National Police Agency, *State of the Damage from the 2011 Earthquake Off the Pacific Coast of Tohoku and Police Measures*, Oct. 10, 2013.

\* Includes unconfirmed information.

\* Includes damage by the earthquake that occurred on Apr. 7 with the hypocenter being off the coast of Miyagi Prefecture, the earthquake that occurred on Apr. 11 with the hypocenter being at Hamadori, Fukushima Prefecture, the earthquake that occurred on Apr. 12 with the hypocenter being at Nakadori, Fukushima Prefecture, the earthquake that occurred on May 22 with the hypocenter being at the northeastern part of Chiba Prefecture, the earthquake that occurred on Jul. 25 with the hypocenter being off the coast of Fukushima Prefecture, the earthquake that occurred on Jul. 31 with the hypocenter being off the coast of Fukushima Prefecture, the earthquake that occurred on Aug. 12 with the hypocenter being off the coast of Fukushima Prefecture, the earthquake that occurred on Aug. 19 with the hypocenter being off the coast of Fukushima Prefecture, the earthquake that occurred on Sep. 10 with the hypocenter being at the northern part of Ibaraki Prefecture, the earthquake that occurred on Oct. 10 with the hypocenter being off the coast of Fukushima Prefecture, the earthquake that occurred on Nov. 20 with the hypocenter being at the northern part of Ibaraki Prefecture, the earthquake that occurred on Feb. 19, 2012, with the hypocenter being at the northern part of Ibaraki Prefecture, the earthquake that occurred on Mar. 1 with the hypocenter being off the coast of Ibaraki Prefecture, the earthquake that occurred on Mar. 14 with the hypocenter being off the eastern coast of Chiba Prefecture, the earthquake that occurred on Jun. 18 with the hypocenter being off the coast of Miyagi Prefecture, the earthquake that occurred on Aug. 30 with the hypocenter being off the coast of Miyagi Prefecture, the earthquake that occurred on Dec. 7 with the hypocenter being off the coast of Sanriku, and the earthquake that occurred on Jan. 31, 2013, with the hypocenter being at the northern part of Ibaraki Prefecture.

[Fig. 13] List of Casualties and Building Damage in Iwate Prefecture

	No. of people killed			No. of people missing	No. of deaths with certificate	No. of people injured	No. of houses destroyed (dwellings more than partially destroyed)
	Directly-related deaths	Related deaths	Total				
Rikuzentakata City	1,556	42	1,598	215	209	Unknown	3,341
Ofunato City	340	74	414	79	75	Unknown	3,934
Kamaishi City	888	98	986	152	151	Unknown	3,655
Otsuchi Town	803	50	853	433	429	Unknown	3,717
Yamada Town	604	67	671	149	147	Unknown	3,167
Miyako City	420	47	467	94	94	33	4,098
Iwaizumi Town	7	3	10	0	0	0	200
Tanohata Village	14	3	17	15	15	8	270
Fudai Village	0	0	0	1	1	4	0
Noda Village	38	1	39	0	0	19	479
Kuji City	2	1	3	2	2	10	278
Hirono Town	0	0	0	0	0	0	26
Coast subtotal	4,672	386	5,058	1,140	1,123	74	23,165
Inland subtotal	0	31	31	4	4	135	1,858
Total	4,672	417	5,089	1,144	1,127	209	25,023

Source: the General Disaster Management Office, General Affairs Department, Iwate Prefecture. *State of Damage for the Main Shock and Aftershocks on Mar. 11, 2011 and the Aftershock on Apr. 7*. As of Sep. 30, 2013.

\* Among the number of deaths, directly related deaths were counted by the Iwate Prefectural Police and related deaths by the Iwate Regional Bureau of Reconstruction.

\*\* For the number of houses destroyed, those completely destroyed and partially destroyed were counted.

## A. Taro Area

Located in the northern part of the City, the Taro area is a fishery town facing the Pacific Ocean with urban areas centering on the Taro Fishing Harbor. Relatively small communities, such as the Settai and Koborinai neighborhoods, are widely scattered from the coastal area to the mountainous area. The key industry is fishing. Beach fishing of ear shells and sea urchins, as well as farming of wakame seaweed and konbu-tangles, is flourishing. Since efforts to increase salmon, which had disappeared due to polluted water from Taro Mine, brought back salmon to the Taro River, the River and the Tsugaruishi River have enjoyed the No. 1 position on Honshu Island in terms of salmon catch.

Taro is also known as “Tsunami Taro” for having sustained devastating damage from tsunamis in 1611, 1896, and 1933. Its history may be defined as a struggle with tsunamis. After the Showa Sanriku Earthquake and Tsunami, land readjustment in urban areas and the construction of dikes started. Completed in 1979, the huge dikes with a total length of 2,433 m were sometimes referred to as the “Great Walls of China in Taro.” Furthermore, people in Taro worked for disaster prevention from both the hardware and software points of view, establishing wireless communication for disaster prevention and tsunami evacuation routes and passing down tsunami experiences, eventually proclaiming to be a “Town of Tsunami Disaster Prevention” in 2003. Despite these efforts over the years as the “Town of Disaster Prevention,” the massive tsunami in 2011 flew over the first and third dikes and destroyed the second, recording a tsunami inundation height of 16.6 m in urban areas and a tsunami run-up height of 20.72 m.

Flowing over the dikes and destroying urban areas, the tsunamis caused inundation across the entire flat areas and swept away all buildings in areas of O-hira to the Osanai River. Over 1,300 people evacuated due to this devastating damage. Forest fires broke out in Aozari, Wano, Otobe, and near the Kumano Shrine in Ariya, which were finally extinguished in Mar. 16.

While Taro Daiichi Elementary School sustained no damage, the garage of Taro General Office facing the road was damaged. At Taro Daiichi Junior High School, the school building was inundated 30 cm above floor level with the schoolyard being completely filled with debris. Principal facilities, such as Taro Fish Market, Taro

Nursery, National Health Insurance Taro Clinic, and Miyako Fire Station Taro Branch Station, were completely destroyed. The first and second floor of the Taro Fishery Cooperative building was completely destroyed but was subsequently repaired and rehabilitated.

In the Settai neighborhood, the Ear Shell Breeding Center of the Settai Fishing Harbor was completely destroyed. On the Settai coast, the door of the floodgate was destroyed and carried upstream of the Settai River. Although the Shimosettai Bridge was swept away, Taro Daisan Elementary School was not inundated.

### **B. Miyako Area**

Miyako City has been regarded as central city of the Rikuchu Coast in Iwate Prefecture. Urban and industrial infrastructure development has been carried out in the Miyako area, which serves as the center of the extended Miyako living sphere. Being close to the Sanriku fishing grounds and endowed with rocks of the rias coast and a sandy beach at the mouth of the Hei River, Miyako Bay boasts rich and diverse fish resources. Protected from the rough waves of the Pacific Ocean by Omoe Peninsula, the bay constitutes a fine harbor by nature. With a governor's office established already in the Edo period, Miyako Harbor in Nanbu became the most flourishing town of Morioka clan. Boasting the largest catch in Honshu Island of salmon known as "Nanbu crooked-nose salmon," the area is home to various marine products at all seasons, such as salmon, sauries, ear shells, sea urchins, and wakame seaweed. The area has continued to develop as a fishing and trading town after the Meiji Restoration. Subsequent to the Sanriku Earthquake and Tsunami in 1933, Miyako developed greatly with a copper refinery and lime manufacturing plant being established under the state policy and National Railway Yamada Line coming into service. When the Fujiwara Pier was built after the war, it became a harbor for sending in materials as companies in the lumber industry mainly engaged in plywood established bases in the hinterland of the harbor. With companies related to metal molds and connectors having been also invited, they now form key industries of the area along with the fishery and lumber.

The Miyako Area may be divided into central urban areas with an accumulation of commercial facilities centering on JR and Sanriku Railway Miyako Stations; the Atago, Tsukiji, and Koganji neighborhoods where offices of financial institutions and electric and communications operators line the streets; the Kuwagasaki neighborhood with a fish market, an accumulation of seafood processing facilities, and a scenic spot Jodogahama Beach; the Sakiyama neighborhood interspersed with scenic spots including Shiofukiana and Anegasaki and tourist facilities such as Nakanohama Camp; the Fujiwara neighborhood with harbor facilities and logistics facilities; the Sokei neighborhood dotted with Civic Culture Hall, Prefectural Miyako College of Miyako, a commercial high school, and a fisheries high school; the Takahama and Kanehama neighborhoods with residential areas and the Miyako-minami Interchange on the Sanriku Coast Road; the Tsugaruishi and Akamae neighborhoods with an accumulation of electronic component-related companies; and the Horinai and Shirahama neighborhoods being fishing village communities.

#### **(i) Central urban areas**

The tsunami this time engulfed the Desaki Pier and flew over the dike at Tsukiji and Shinkawa-cho, inundating up to the second floor of the City Hall and sweeping away six girders from the JR Yamada Line railroad bridge over the Hei River. The tsunami spread from Mukai-machi and Odori to Miyako Stations, Motomachi, Aramachi, Kurota-machi, and Suehiro-cho, leaving fishing boats aground in the Chuo-dori shopping street. Motomachi and Suehiro-cho shopping streets were also inundated to a height of 1.5 m with heaps of vehicles and debris left behind. Central urban areas sustained extensive damage.

#### **(ii) Atago, Tsukiji, and Koganji neighborhoods**

In the Tsukiji neighborhood where land was reclaimed after the Meiji Restoration and the Desaki Pier, which was completed in 1937, dwelling houses were swept away. Buildings such as those of Iwate Bank, NTT, and Tohoku Electric Power withstood the tsunami, but most of them had the first floor inundated. National Highway Route No. 45 was blocked by debris. In the Atago neighborhood, houses facing the Route were completely destroyed

with more than half of the buildings in the neighborhood being inundated.

### **(iii) Kuwagasaki neighborhood**

As the Kuwagasaki neighborhood had no dike to stop tsunamis, flat areas were almost entirely devastated. The tsunamis that destroyed the fish market facing the quay of the fishing harbor and seafood processing-related facilities were met with the tsunamis that flew over the ridge of Tokonohama at Takonohama-cho. The Jodogahama Tourist Pleasure Boat that had been under maintenance in the dock landed in Minato-machi. At Kuwagasaki Elementary School, the schoolyard and the entrance to the school building were flooded with the gymnasium being inundated above floor level.

### **(iv) Sakiyama neighborhood**

The floodgate at Onatsupe Beach was destroyed, causing more than half of the community to be inundated and the Miyako Farming Fishery Center to be completely destroyed. Also, Nakanohama Camp was swept away, the quay of the Yado Fishing Harbor was destroyed, and almost the entire Hideshima neighborhood was inundated.

### **(v) Fujiwara neighborhood**

In the Fujiwara neighborhood, the floodgate before Nakaya Shipyard Company was destroyed. The tsunami crossed the dike at Fujiwara Pier to go inland, crossing National Highway Route No. 45 to reach JR Yamada Line railroads. In the vicinity of Route 45 and areas closer to the sea, seafood processing-related plants and houses, including the former Fujiwara Nursery, sustained major damage. At Fujiwara Elementary School, the schoolyard was inundated.

### **(vi) Sokei neighborhood**

In the Sokei neighborhood, not only plywood plants and transportation/storage facilities at the pier that is closer to the sea than the dike, but also properties along National Highway Route 45, such as Northern Sanriku Forest Management Office and Miyako Civic Culture Hall, sustained severe damage. The tsunami crossed JR Sokei Station to inundate areas up to and including Sokei-nishi and Wamura areas. Along the Yagisawa River, areas up to and including plywood plants and Miyako Fisheries High School were also flooded. Furthermore, the Rias Harbor was completely destroyed and lumber (logs) carried away from the lumber stock.

### **(vii) Takahama and Kanehama neighborhoods**

In Takahama and Kanehama, which had also suffered severe damage from the Chilean Earthquake Tsunami in 1960, National Highway Route 45 was blocked with debris, leaving the community isolated without vehicle access from the outside. In Takahama, the tsunami flew over the dike on which National Highway Route 45 ran to flood the area, causing major damage along the bus route with Takahama Community Center being completely destroyed. At Takahama Elementary School, the schoolyard was inundated. In the Kanehama neighborhood, the dike was damaged for a length of about 30 m, causing dwellings in flatland to be almost completely destroyed. Kozanji Temple was inundated. At Kanehama Shrine, the Shinto shrine archway was destroyed.

### **(viii) Tsugaruishi and Akamae neighborhoods**

In Tsugaruishi, the tsunami passed the floodgate to go upstream of the Tsugaruishi River, submerging the Inari Bridge. In the Norinowaki neighborhood, almost all houses were swept away with a railroad train being derailed near Tsugaruishi Station. Tsugaruishi Branch Office and Tsugaruishi Public Hall were completely destroyed. In Motomachi, dwelling houses were completely destroyed or inundated to a height of 1.5 m above floor level. While Tsugaruishi Nursery was completely destroyed, damage to Tsugaruishi Elementary School was limited to the inundation of the schoolyard. The tsunamis that went upstream of the Tsugaruishi River entered the Neisawa River, also causing damage to the Shin-machi-shimo neighborhood.

In the Akamae neighborhood, the tsunami coming from the north engulfed the Sports Park, advancing straight to the south. Washing away dwellings in flatland, the tsunami brought a huge amount of debris to the schoolyard of Miyako Technical High School, inundating even the hatchery.

### **(ix) Horinai and Shirahama neighborhoods**

The Kamagasawa neighborhood was inundated almost in its entirety. Furthermore, in the Koborinai, Horinai,

and Shirahama neighborhoods, more than half of the community was inundated. With the Omoe Peninsula Line coming to be submerged under seawater during high tide and the storm surge due to ground subsidence, construction work for raising the ground level is being carried out.

### C. Omoe Area

Sticking out into the Pacific Ocean from the Sanriku Coast, the Omoe Peninsula is home to the rich fishing ground of Sanriku where the Japan Current meets the Kurile Current. For fish resources, such as wakame seaweed, tangles, sea urchins, ear shells, and salmon, the area boasts the highest catches along the Sanriku Coast both in terms of quality and quantity. Omoe also features rich natural environments of sea and mountains, including the Aneyoshi Camp Site, the gateway to the Todogasaki Lighthouse known as the eastern edge of Honshu Island that served as locale for the film *Yorokobi mo Kanashimi mo Ikutoshituki* (Times of Joy and Sorrow), Mt. Gassan commanding a whole view of the Miyako Bay, and Mt. Junishin with its primeval forest.

Most of the peninsula being mountains and forests, many people live in the hinterland of fishing harbors and nearby hills, such as Omoetate, Omoesato, Otobe, Aneyoshi, Chikei, and Ishihama. As is typical with rias coasts, the peninsula is lined with deep inlets and high cliffs. Starting from Akamae and running along the coast as the main local road of the area, the Omoe Peninsula Line includes many curves and uphill/downhill climbs to connect communities.

Because of facing the open sea, the area sustained severe damage in the Meiji and Showa Sanriku Earthquake Tsunamis. With almost all the population in Aneyoshi having been annihilated in the two tsunamis in the Meiji and Showa periods, people built a tsunami monument and relocated to a hill. Thus, although the tsunami this time recorded a maximum tsunami run-up height of 40.5 m in Aneyoshi, there were no houses swept away.

The tsunami hit all fishing harbors on the western side of the peninsula facing Miyako Bay, such as Shirahama, Uranosawa, and Oikiri, as well as those facing the open sea, such as Tatehama, Uiso, Aramaki, Omoe, Otobe, Aneyoshi, Chikei, Ishihama, and Kawashiro, to destroy dikes and seawalls. The pickup site, load handling site, refrigerators, seafood processing facilities, and seedling production facilities for salmon and ear shells were completely destroyed. Across the City, 2,629 fishing boats sustained damage.

At Otobesato and Omoesato, most dwelling houses were swept away. The Mukaiwatari Bridge in Omoesato broke down, leaving Aneyoshi, Chikei, and Ishihama isolated. At Chikei, the tsunami reached the Ueno Grocery along the prefectural road Omoe Peninsula Line with about half of the community in Ishihama also inundated. At Uiso Elementary School, the first floor of the school building was inundated, while Chikei Elementary School had up to the second floor of the school building inundated.