

# **The Great East Japan Earthquake Study Tour**

**27. Feb.2018**

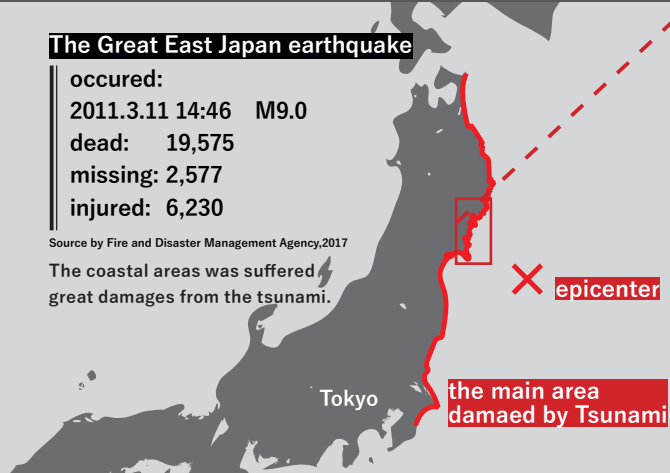
# Overview of the Great East Japan earthquake

## The Great East Japan earthquake

occured:  
2011.3.11 14:46 M9.0  
dead: 19,575  
missing: 2,577  
injured: 6,230

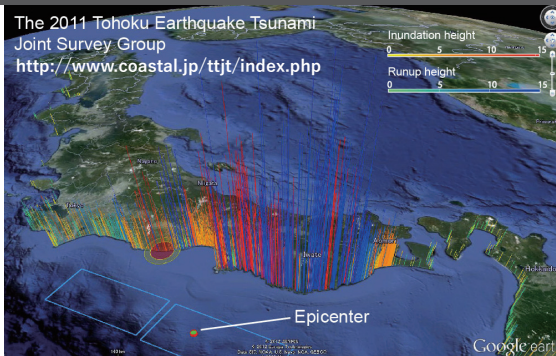
Source by Fire and Disaster Management Agency,2017

The coastal areas was suffered great damages from the tsunami.



## The damage of tsunami attack

The 2011 Tohoku Earthquake Tsunami  
Joint Survey Group  
<http://www.coastal.jp/tjtj/index.php>

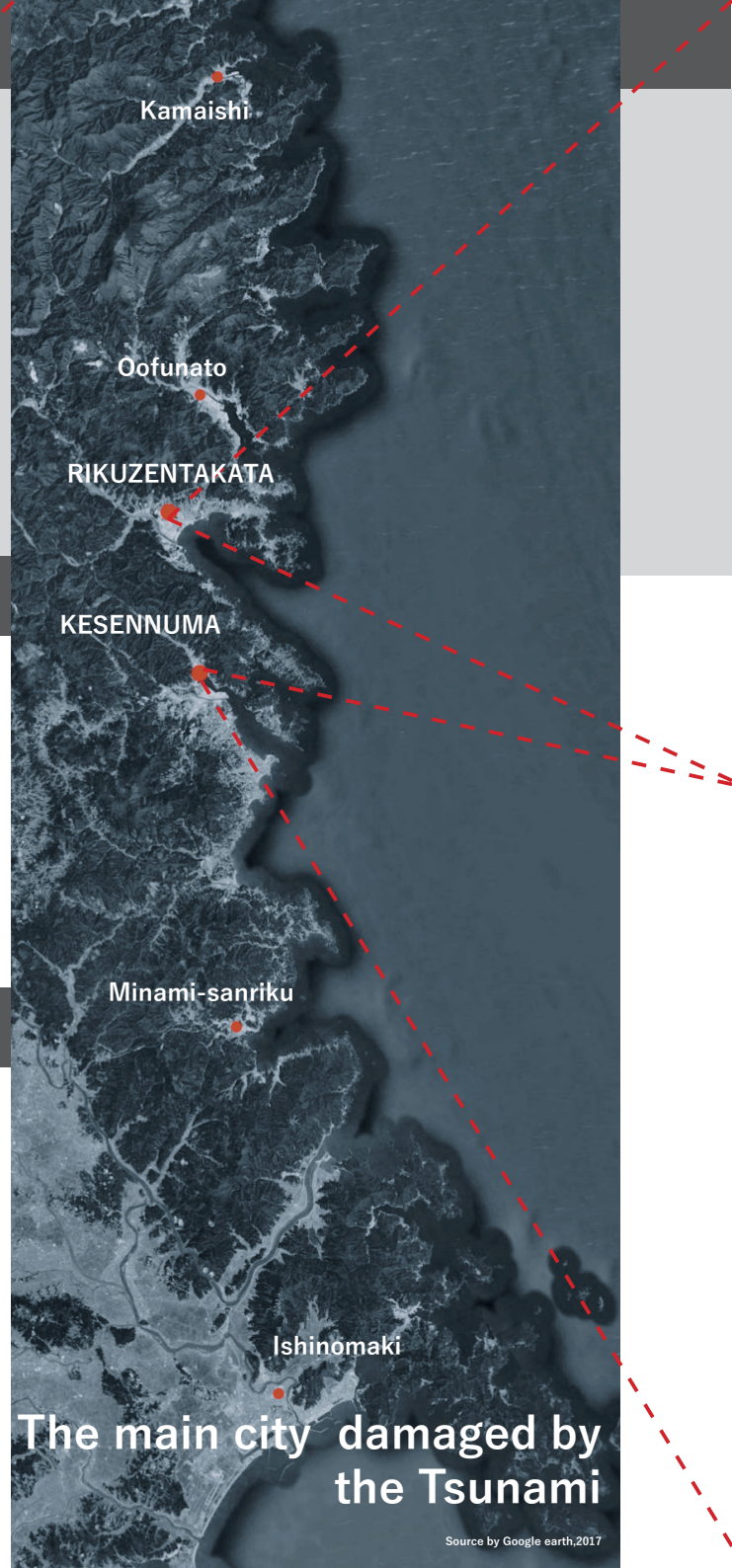


On the northern rias coast, a gigantic tsunami exceeding 30 meters has been attacked.  
On the other hand, the tsunami has penetrated from the coast to the inland by several kilometers, although the plain area is about 10 m, flooding damage is caused in a wide area.

## The past Tsunami attack

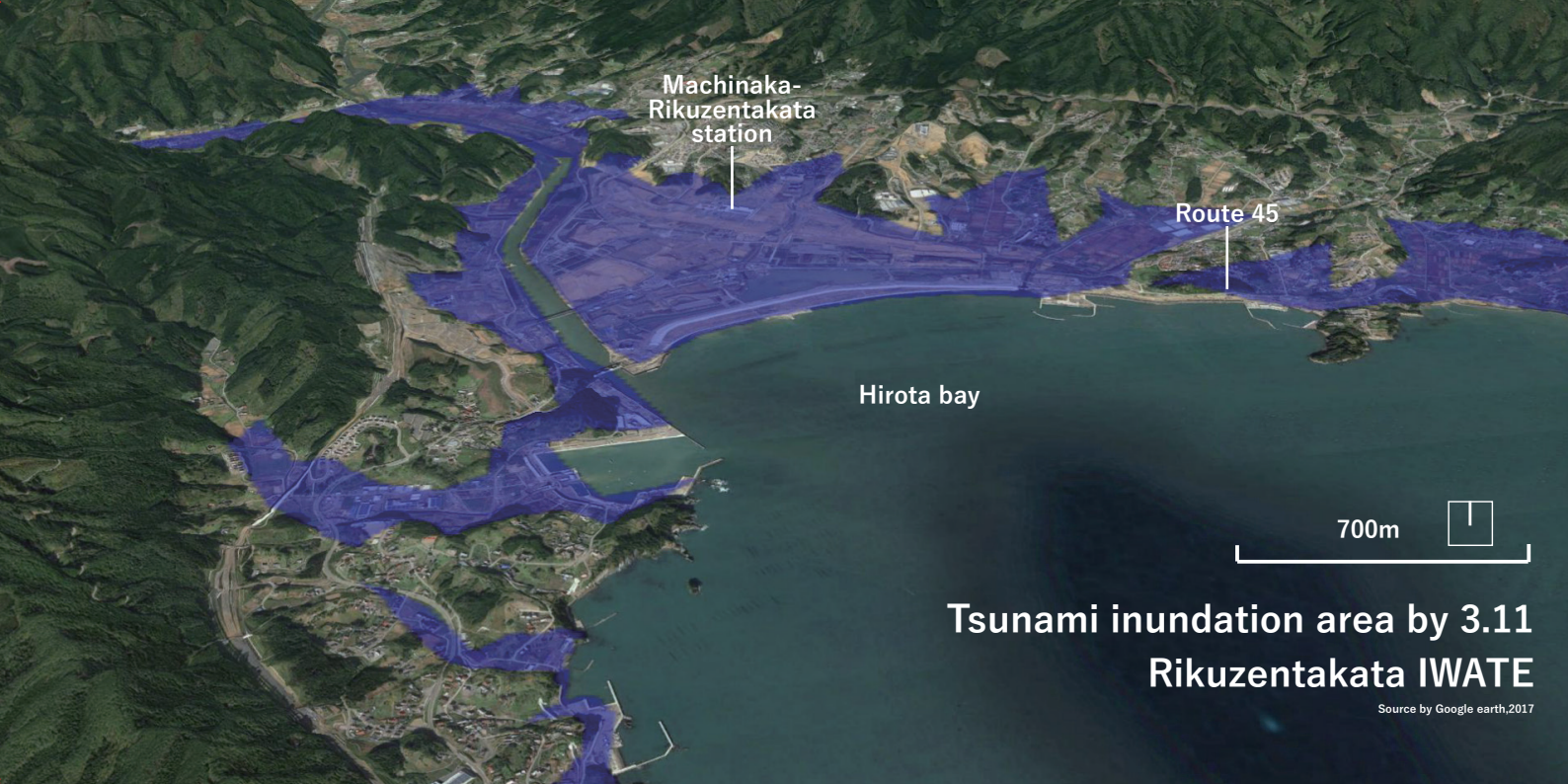
The coastal area has been suffering from the tsunami many times in the past. Since entering the modern era, the coastal area was damaged four times by the tsunami. Every time the city was devastated by the tsunami, the urban formation has been changed.

1896	Tsunami after Meiji Sanriku earthquake	dead: 21,953 houses drained by tsunami: 10,370
37years		
1933	Tsunami after Showa Sanriku earthquake	dead: 1,823 missing: 1,140 houses drained by tsunami: 6,837
27years		
1960	Tsunami after Chile earthquake	dead: 119 missing: 20
51years		
2011	Tsunami after the Great East Japan earthquake	



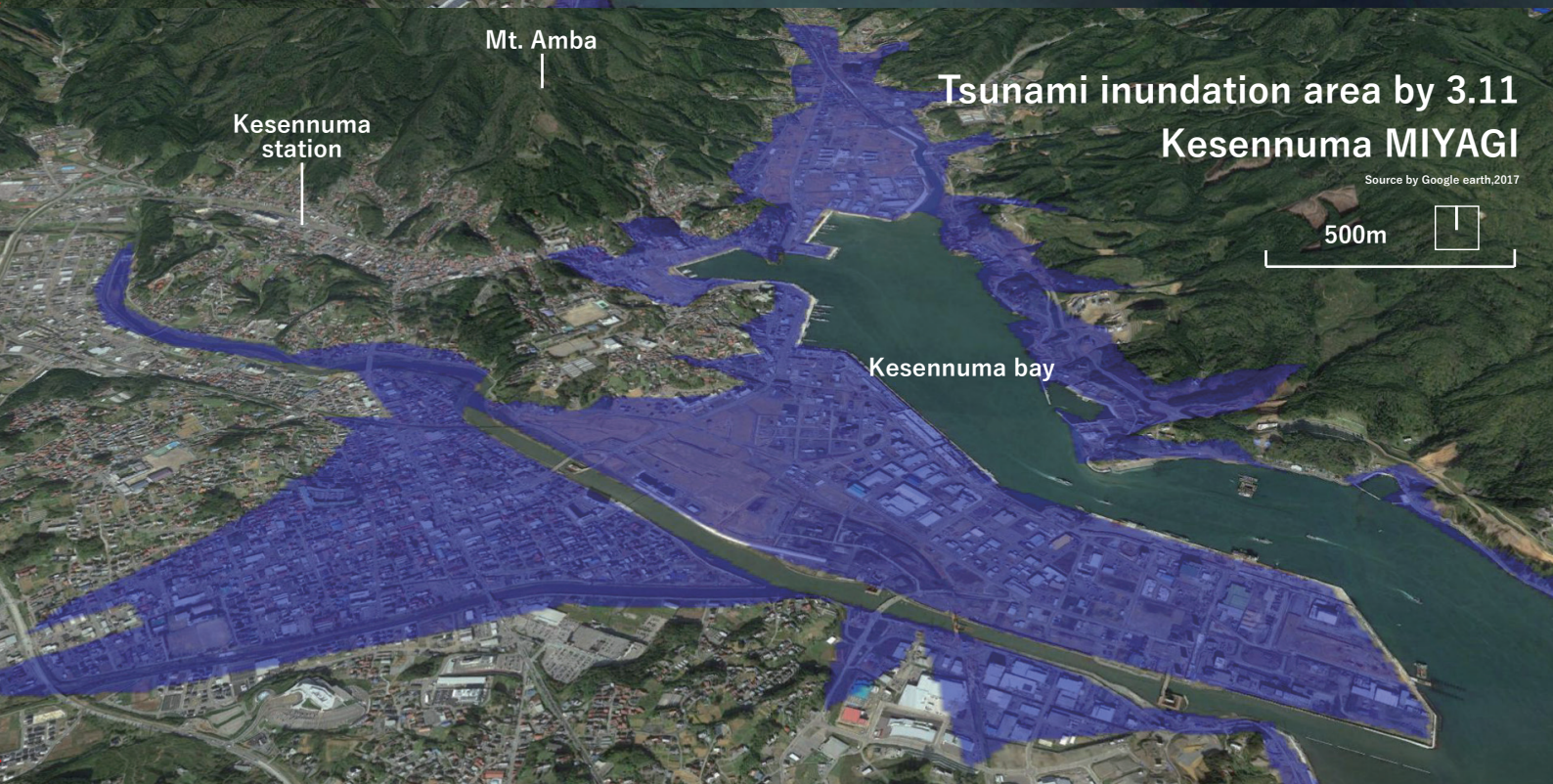
The main city damaged by the Tsunami





**Tsunami inundation area by 3.11  
Rikuzentakata IWATE**

Source by Google earth,2017



**Tsunami inundation area by 3.11  
Kesenuma MIYAGI**

Source by Google earth,2017



## General

Kesennuma city is located at the northeast end of Miyagi prefecture, the main urban area is in the innermost part of Kesennuma Bay, Amba-san (altitude 239 m) rises behind the city, which is the branch of the Kitakami Mountain Range. Okawa river flows in the southwest of the city area, and it is poured into Kesennuma Bay.

Kesennuma was once called Kesema, and although it is still disputed, there is a theory that it originates from the Ainu language, hence it is the place of residence of the Ainu people (one of the indigenous people of Japan) in prehistoric times, and after the Edo period, Kesennuma enjoyed prosperity by bonito fishing and sardine fishing. Immediately after the Meiji Restoration (1868), it was a small city with a population of less than 5000, but the population rapidly increased in the 1900s due to the rise of fisheries processing industry, and in 1980 the total population was 92,246. After that, the population rapidly decreased due to the declining birthrate and the aging population and the impact of the Great East Japan Earthquake, and the population as of 2015 is 64,988.

Currently, the major industries of Kesennuma City are fishery industry and tourism, and Kesennuma Port is one of the important fishing ports in Japan. The value of landings before the earthquake was No. 1 in the Tohoku region.

## Urban formation history

Kesennuma City has expanded by reclaiming the innermost part of Kesennuma Bay. Because of that, the residential land is narrow, and there are also climatic conditions of strong winds, therefore the central urban area has been plagued by the fire than the tsunami. Actually, in the Meiji Sanriku Tsunami in 1896 and the Showa Sanriku Tsunami in 1933, the central urban area was hardly damaged, but in the conflagration in 1915, 1,064 houses were burned and most of the city area was destroyed. Only 14 years later, in the next conflagration in 1929, 902 houses were burned, again the city area was reduced to ashes.

Kesennuma, which was later reborn after the reform of the block to prevent the fire, started development as one of Japan's most famous port cities, becoming one of the designated port of the Home Ministry. and Kesennuma Station of the Ofunato line was established in 1929.

However, in the Chile earthquake-tsunami in 1960, there was large flood damage, 2,096 households suffered in the whole city, and there was also a flooding damage in the central urban areas. However, as the south Kisenuma station of the Kesennuma line opened, the lowland area near the coast was developed as the urban area around the 1970s in order to manage the rapidly growing population due to the prosperity of Kesennuma Port. As the bypass road passed through the lowland part, suburbanization advanced rapidly, and the lowland part, which was not originally inhabited area, became the center of the city. This urban formation process resulted in a major damage by the tsunami of the Great East Japan Great Earthquake.

## General

Rikuzentakata city is located at the southern end of Iwate prefecture, the urban area is located on the plain facing Hirota Bay. Behind the urban area, Hikami-san with an altitude of 874 m rises, and the Kesen River flows in the southwest of the city area and divides the urban area of Rikuzentakata.

Since ancient times there was a gold mine called Tamayama-Kinzan in Rikuzentakata, and it is said that gold was used also for The Great Buddha of Nara and Konjiki-do in Chusonji (both are listed as UNESCO World Heritage Site). In addition, the center of Rikuzentakata flourished as a lodging town because it was located at the junction of the main road in the Edo period, and since the daimyo office was established in Imaizumi district, it prospered as the center of the politics and economics of the Kesen region. Although the largest number of the population was 32,833 in 1955, the population has continued to decrease after that, and due to the earthquake disaster, the population as of 2015 is 19,758.

Rikuzentakata is one of the most devastated areas by the Great East Japan Earthquake.

1656 people deceased, which was 6.8% of the population at the time of the earthquake. Because the main urban areas have been completely annihilated by the tsunami, The old urban areas are all raised by the embankment in order to restore its function.

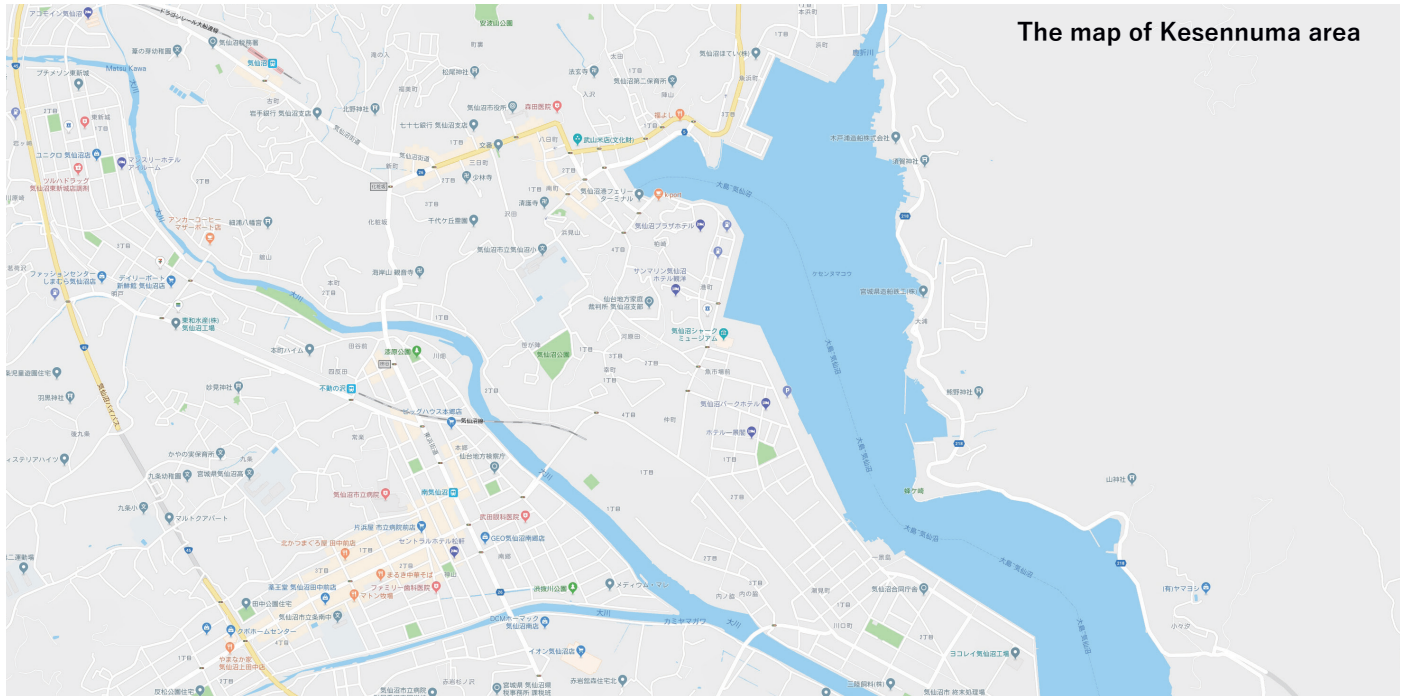
## Urban formation history

In Rikuzentakada city, the original urban area is originated from the lodging town, so it is formed along the Imazumi road, in a place away from the coast. For that reason, the Meiji Sanriku tsunami in 1896 and the Showa Sanriku tsunami in 1933 hardly damaged the city. But before the opening of the National Railways Ofunato line in 1933, the installation position of the station became an object of the dispute.

Originally the new station was scheduled to be installed at the southern end of Takada Town, but there is a demand from the neighboring Kesencho town to shift it towards Kesencho, and as a result, Takada station was established in the current position, at the boundary between the two towns and much closer to the coastline. Although the Chile earthquake-tsunami of 1960 did not reach the urban area, the damage was greater compared with the Meiji Sanriku Tsunami and Showa Sanriku Tsunami, the 683 households were affected and the damage to the paddy field was great, so the damage amounted to more than 2.5 billion yen. After that, tsunami countermeasures are begun to implement, the tide forest was restored, and two tide embankments were constructed. On the other hand, the focus of urban planning has always been on the coast side of the old town since the late 1950s, moving the city office to the south and at the same time, the land readjustment program is executed in front of the station where the house was only sparsely built before 1950s. The station street became a new shopping district after the program. Since then the urban development was also proceeded on the south side of the railway, as a result, the urban area extended to the coastline side, resulting in a major damage in new urban areas by the tsunami of the Great East Japan Great Earthquake.

# Appendix

The map of Kesenuma area



The map of Rikuzentakata area

