

## **Implementation of the Disaster Risk Reduction Program in Japan as an Effort for Disaster Risk Reduction in Indonesia**

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### **Abstract**

*The natural disasters that occurred in Japan have caused losses both financially and in terms of casualties. Based on data from the Japanese government, the total losses experienced by the country from 1980 to 2010 amounted to US\$ 208,230,800. Meanwhile, the number of recorded fatalities was 8,568 people, with an average of 276 fatalities per year due to natural disasters in Japan. This study aims to focus on the development of a disaster information system to reduce disaster risk in Japan which can also be implemented in Indonesia. The research method used in this study is a qualitative approach. In this approach, researchers use descriptive methods to collect data. This approach was chosen because this research was conducted during an Overseas Work Lecture through a Video Conference from Japan on May 30, 2023. The conclusions from this study indicate that the Japanese government has changed its approach to natural disasters and prioritized disaster risk reduction (DRR) programs. They focus on better regional planning, building earthquake-resistant buildings, and raising community awareness. In addition, the disaster management system in Japan involves various government ministries and agencies working together in planning, implementing, and supervising disaster management operations. The Japanese government has a strong commitment to the DRR program and regards investment in disaster risk reduction as an important measure to protect the country's life and economy. Through improving urban planning, strict construction regulations, disaster education, and active community participation, Japan is trying to live side by side with disasters and has strong resilience against these threats.*

**Keywords:** *Disaster Information System, Disaster Risk Reduction, Japan*

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## **INTRODUCTION**

Japan has a long history of dealing with disasters. The country is frequently hit by various types of disasters such as earthquakes, typhoons, landslides, and tsunamis. Japan's geography and climate make it vulnerable to disasters such as volcanic activity, earthquakes, blizzards, and so on. The location of Japan in the circum-Pacific region causes continuous volcanic and seismic activity (Satake, 2008). As a result, earthquakes periodically and frequently hit Japan. According to data released by the Japan Meteorological Agency, as much as 20.5% or 212 of a total of 1036 earthquakes with magnitudes above 6.0 SR occurred in Japan (Bisri, 2020).

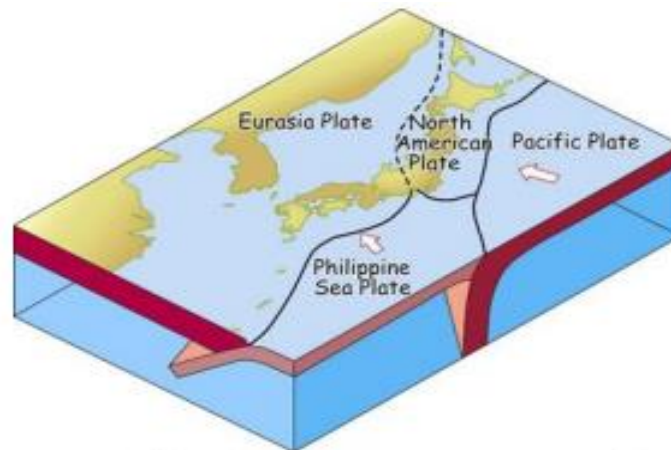


Figure 1. Plates in Japan , : USGS (2005)

On the other hand, about 7% of the total number of active volcanoes in the world are in Japan. This is because Japan is located on the Pacific Ring of Fire. The Pacific Ring of Fire is a line along which volcanoes are scattered around the world. The geological disaster in Japan occurred due to the meeting of the North American plate and the Eurasian plate. Often, strong earthquakes in this region generate tsunamis which also pose a threat to Indonesia. One of the earthquake events in Japan which became a turning point in earthquake management was the Kobe earthquake that occurred on January 17, 1995 (Satake, 2008). This earthquake had a magnitude of 7.2 on the Richter scale and shook for 20 seconds in the morning at 5.46 local time. More than 6,400 people died as a result of falling buildings and fires after the earthquake. The damage caused by the earthquake hit 10 cities and 10 towns, with the heaviest damage occurring in Hyogo prefecture. This earthquake also had a broad impact, covering an area of 1,700 km<sup>2</sup> with a population of around 3.6 million people (Julius, et al, 2017).

The natural disasters that occurred in Japan have caused significant losses, both in terms of finances and the number of victims. According to data obtained from the Japanese government, the total losses experienced by the country from 1980 to 2010 amounted to US\$ 208,230,800. In addition, the number of recorded fatalities reached 8,568 people, with an average of around 276 fatalities each year due to natural disasters in Japan (Sekimov, 2012). The earthquake in Kobe caused losses estimated at US\$ 120 million, with most of the damage to industrial buildings. The area affected by the earthquake was an industrial area that contributed 12.4% to Japan's Gross Domestic Product (GDP) in 1995. As a result of the earthquake, Japanese industrial production decreased, although it recovered in the following months.

The Japanese government contributed financial aid of 3.4 trillion yen in the form of loans to the reconstruction endeavor (Sekimov, 2012). In March 2011, an earthquake with a magnitude of 9.0 occurred in the southeast of Honshu Island, around 130 km from Sendai's shore. One of the largest earthquakes ever recorded occurred at that time. A tsunami that rose up to 40 meters in height and damaged a 561 km<sup>2</sup> region was also brought on by this earthquake. It wrecked areas up to 10 kilometers inland. More than 14.8 million people were affected by this earthquake, which also caused more than 120,000 structures to collapse, 278,000 buildings to sustain partial damage, and 726,000 buildings to sustain minor damage. Along with damage to buildings, public infrastructure such as cut-off or damaged roads, trains, and bridges also sustains damage. (Awotama, 2014).

Meanwhile, according to data for June 2016, the number of fatalities due to this earthquake reached 15,894 people, with more than 2,500 people still missing. More than 500,000 people are estimated to have lost their homes as a result of the damage, while millions of other

people have also become indirect victims due to the interruption of water and electricity supplies. The earthquake and tsunami that followed also damaged some of the coolers at the Fukushima Nuclear Power Plant, which resulted in an explosion several days after the disaster. This explosion caused the spread of radiation and radioactive contamination. The Japanese government revealed that there were 177,503 people within a 20 km radius of the power plant who were at risk of being exposed to very dangerous radiation (Awotama, 2014).

The earthquake that hit Japan has caused enormous losses for the country. Losses experienced can be divided into several sectors. First, this earthquake destroyed about 138,000 buildings, causing losses of US \$ 360 billion. In addition, the earthquake also occurred in the northeastern region of Japan which is a 6-8% contributor to Japan's total production, which automatically reduces the country's production income. It is estimated that it will take up to seven years to rebuild damaged infrastructure. Second, the earthquake also damaged 11 of Japan's 50 nuclear power plants, resulting in the closure of the power plants. As a result, the country's electricity supply was reduced by 40%. In addition, forced use of the remnants of the power plant also caused damage to 22 other nuclear power plants. This requires Japan to import oil to replace nuclear energy. These oil purchases caused a deficit in Japan's trade balance for several years (Moroney, et al, 2013).

One of the natural disaster events that had a significant social and political impact on Japan was the earthquake and tsunami in 2011. This earthquake caused many fatalities and damaged nuclear power plants which are the main source of electricity in Japan. The impact of this nuclear disaster is not only limited to economic losses and loss of life but also affects the social aspects of society and Japanese domestic and foreign political conditions (Tanaka, 2014). Based on this background, this research will focus on developing a disaster information system that aims to reduce disaster risk in Japan and can be implemented in Indonesia.

## **RESEARCH METHODS**

This study adopts a research method with a qualitative approach. In this qualitative approach, researchers use descriptive methods to observe existing phenomena. A descriptive method is a research approach that is based on empirical facts or phenomena that exist in the language of the speakers so that the results are in the form of a picture that describes the situation as it is (Sudaryanto, 1992).

In compiling this manuscript, the researcher uses the library research method which involves collecting reading material that is relevant to the topics discussed, then analyzing it carefully and carefully to obtain research findings. As a research supporter, the authors conducted an in-depth literature study using a descriptive approach. The data collected in this paper is secondary data obtained from literature and documentation studies. The analytical method used is descriptive qualitative.

The data collection method used in this study was an online interview. The researcher chose this approach because the research was conducted during an Overseas Work Lecture (KKLN) through a Video Conference from Japan on May 30, 2023. In the context of KKLN, this study raised the topic "The Importance of Risk-Based Governance in Disaster Risk Reduction," with Dr. Aulia Febianda Anwar Tinumbang, Assistant Professor, Hydrology and Water Resources Research Laboratory, Department of Civil Engineering and Earth Resources, Kyoto University.

## RESULT AND DISCUSSION

### **Background of the DRR (Disaster risk reduction) program in Japan**

Like Indonesia, Japan is also a country that often faces disasters. Its geographical location adjacent to the Pacific Ocean and along the Ring of Fire, makes Japan have to deal with disasters on a regular basis. Disasters such as volcanic eruptions, earthquakes, tsunamis, and typhoons are frequent occurrences in the country. This fact makes Japan a country that has a high risk of natural disasters.

Natural disasters are a serious threat to the Japanese government because they can cause damage to various aspects of life. The impact can be felt in the economic, political, and social fields. An example is the Kobe Earthquake in 1995. According to a report from Britanica on January 10, 2022, an earthquake with a magnitude of 7.3 on the Richter scale occurred at 05.46 in the morning. The earthquake lasted for 20 seconds and caused the death of 6,433 people and tens of thousands of people left their homes. This earthquake was one of the worst disasters in Japanese history. The great impact of the earthquake completely destroyed the Japanese government's economy that year.

Seeing the dire impact of natural disasters, the Government of Japan began to change its approach to the threat of disasters in their region. They are slowly starting to pay special attention to natural disaster risk reduction programs, taking into account risk analysis in each region. Policies related to urban planning have also begun to be improved so that they are more in line with existing disaster threats. Various studies on earthquake-resistant building construction have been carried out intensively, and these steps have been gradually implemented in national development. It aims to make houses and public infrastructure more earthquake resistant to a certain degree.

In Osaka, a city located on the seashore and facing directly to the Pacific Ocean, the road infrastructure and public buildings are designed in such a way that water can flow efficiently. In addition, a coastal defense system was also built to protect the city from storm surges (Kompas, 2018). Basically, the Japanese government realized that they could not fight destiny because their country was in an area that was vulnerable to various threats of natural disasters. Therefore, they continue to move forward, innovate, and take action to ensure that the Japanese people have strong resilience in facing the threat of disaster in their country.

### **Disaster Management System in Japan**

The disaster management system in Japan is different from that in Indonesia. Unlike in Indonesia which has a National Disaster Management Agency (BNPB) or in America which has a Federal Emergency Management Agency (FEMA), Japan does not have a similar special institution. However, in Japan, there is a disaster management system that is similar to what existed in Indonesia before BNPB was established, or like the Disaster Risk Management Consultant approach used in the Philippines. Under this system, they are responsible for managing the budget, designing structured programs, managing disaster management strategies at various regional levels, and ensuring the consistency of government programs in managing and calculating disaster risk.

Japan has a Prime Minister who oversees 24 ministries to formulate and implement disaster management operations plans at local and national levels and controls other government organizations to carry out these plans. Several ministries involved include the Ministry of Justice, Ministry of Agriculture, Ministry of Economy, Environment, Defense, and others. In Japan, there are various disaster threats that must be planned by the central government and local governments. At the national level, the Prime Minister manages the Central Disaster Management Council to draft the Basic Disaster Management Plan. There are 24 ministries and

56 agencies, including the Japanese State-Owned Enterprises and the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Within it, there is a Disaster Management Division that regulates Disaster Operation Plans, as well as norms, standards, procedures, and criteria established and implemented in disaster management.

In Japan, the initial steps in the education sector are following regulations similar to the Regulation of the Head of the National Disaster Management Agency (BNPB) Number 4 of 2012 concerning schools safe from disasters. This system involves the Governor, prefectural Disaster Management Council, as well as local government organizations whose aim is to design local-level disaster management plans (RPB). This RPB includes a regulation that requires schools with two floors or more to be equipped with evacuation routes that children can use to reach a safe place. In addition, schools can also function as temporary shelters when students' homes are damaged by an earthquake.

According to a report from the BBC (2011), generations of Japanese children after the Kobe earthquake in 1995 were required to become familiar with earthquake disaster mitigation drills. Every time an alarm goes off, children at school are taught to seek cover under desks to protect themselves from falling debris and building materials. Such exercises are carried out every month. If they are outside the building, they are taught to immediately run to an open place to avoid the ruins of buildings and other city facilities. The Japanese Fire Department also provided earthquake simulation equipment which aims to familiarize school children with the sensation of an earthquake so that they are more sensitive in taking self-rescue measures. Thus, the Japanese government can ensure that all schools in the country are Disaster Safe Schools.

The next step is to carry out mitigation both structurally and non-structurally. Structural mitigation is carried out through the construction of various facilities such as earthquake-resistant houses, strong coastal embankments, and other infrastructure. As for non-structural mitigation, the approach is carried out through education, campaigns, and other efforts. Furthermore, Japan invested resources in technology and strictly enforced the law. Japan has succeeded in proving that despite the disaster, its economy and life are not destroyed and are still running as well as possible. In addition, disaster education continues to be carried out thoroughly, not only limited to students at schools but also involving housewives who are trained to prepare emergency bags and learn how to turn off the gas to avoid fires.

Japan also has civil servants (PNS) who work in institutions responsible for formulating disaster management policies. Each ministry in Japan has a special staff tasked with developing disaster management standards. For example, the Ministry of Education, Science, and Culture has a special department that deals with disaster issues. Nonetheless, the ultimate decision regarding the status and management of the disaster remains with the Prime Minister. An example is in the case of the 2011 Tohoku tsunami disaster, the Prime Minister determined the phases of response, such as the rehabilitation and reconstruction phase.

In addition, in Japanese society, there are science and technology education efforts carried out by organizations such as the United Nations University (UNU) to prepare students in this field. They also conduct capacity-building programs for sustainable development goals and disaster risk reduction. Thus, the management system in Japan, which involves the government and community participation from childhood to adulthood, provides strict regulations in managing disaster risks and creates a strong awareness of coexistence with disasters.

### **Commitment of the Japanese Government to the DDR (Disaster Risk Reduction) program**

Located along the Pacific Ring of Fire Zone, Japan has unstable soil conditions. The Japan Ring of Fire region is a meeting place for four tectonic plates that meet each other, namely the North American, Pacific, Eurasian, and Philippine plates. Minor earthquakes occur almost

daily, with about 1,500 of them hitting Japan each year. In addition, the threat of typhoons is also common around the Pacific Ocean and mainland Japan, which can cause significant damage.

Realizing the massive impact of natural disasters, the Government of Japan has made a serious commitment to disaster risk reduction programs. At the 2011 Global Platform meeting, the Secretary General of UNISDR said that every US dollar invested in disaster risk reduction can save seven US dollars. This means that investing in disaster risk reduction programs can save a larger amount than the amount invested. The initial step in broad reforms in the disaster risk reduction program is through in-depth studies and research in each area as well as mapping of areas at risk of being affected by disasters. In 1997, the government issued a Disaster Prevention Basic Plan that included strategies for disaster risk reduction, emergency response, relief and reconstruction, and large-scale earthquake and tsunami countermeasures. Research on disasters, particularly earthquakes, and tsunamis, is encouraged, including a survey of 98 active faults in Japan. A total of 3,000 new seismometers were installed at 1,800 locations.

After collecting adequate data and information regarding disaster risk, the Government of Japan began to make improvements to urban and regional planning so that they have high resilience against disaster threats. For example, in Osaka, roads and public buildings are designed to allow for the efficient flow of water. In addition, coastal defenses were also strengthened to protect the city from storm surges (Kompas, 2018). The redevelopment of urban area planning also pays attention to emergency evacuation planning. Signs indicating evacuation routes have been installed on various street corners to direct people to predetermined assembly points within a certain radius. Public facilities that can be used as gathering points are equipped with clean water reservoirs and other emergency facilities that are always ready to be used in an emergency situation.

In 1995, the Government of Japan passed the Seismic Rehabilitation Act to strengthen existing buildings, with the aim of making them more earthquake resistant. The government is actively disseminating this law to the public. Some local governments even provide subsidies to their citizens to repair houses to make them more earthquake resistant. In Japanese building construction regulations, all buildings to be built must comply with the rules set by the government. Buildings must meet two requirements, which are guaranteed not to collapse due to earthquakes in the next 100 years and guaranteed not to be damaged within 10 years of construction. In addition, all materials used in construction must comply with strict rules set by the authorities (Liputan6, 2018)

In facing the threat of flooding caused by global climate change, the Government of Japan has changed its policies regarding water management. Previously, the approach used was the conventional method in which the government was responsible for ensuring waterways were free of dirt, sediment, and other matters. However, currently, the government has taken development steps that involve various stakeholders to actively participate in reducing flood risk. Several companies are involved in the construction of water storage reservoirs, while other institutions are involved in research on the management of flood-free areas. All of this is well coordinated and planned, and disseminated to the community so that they all have a good understanding. The Japanese government has broadened its approach to involve all parties involved in flood risk reduction efforts, recognizing that this is a challenge that must be faced together. Thus, they seek to build solid cooperation and increase public awareness regarding this issue.

Furthermore, the Japanese Government is also trying to utilize information technology to disseminate disaster-related information to the public. In disaster management efforts, the use of technology and other infrastructure in providing information will be more effective if the information is disseminated to related parties in accordance with the stated objectives. Dissemination of information related to disasters and efforts to overcome them, especially in terms of early warning, is very important to disseminate widely. The aim is to build shared

awareness of the existing disaster conditions and the efforts that can be made to reduce the risk. Community awareness in dealing with disasters is also very dependent on the cooperation of the various parties involved.

They also developed a Shared Information Platform for Disaster Management (SIP4D) or an information-sharing platform for disaster management. SIP4D is the first platform used for disaster management in Japan. In 2018, the Information Support Team (ISUT) was also introduced, inspired by NIED and SIP4D. ISUT's goal is to support the organization of disaster-related information for affected local governments, especially when a major disaster occurs. (Azizah, 2021).

### **Commitment of Stakeholders in the DDR (Disaster Risk Reduction) program**

The problem of natural disasters in Japan is a national issue that requires a collective resolution. In this context, it is not only the government that bears losses due to disasters, but also impacts on the economic, industrial, and social sectors. Realizing this, all relevant parties in Japan are always competing and innovating to make useful contributions to reducing disaster risk.

Students and lecturers at various universities also play an important role in conducting studies and research on the development of disaster information in Japan. They compete to develop interesting and useful research proposals, thereby obtaining budgetary support from the Government.

Large companies in Japan also contribute to research and research to reduce disaster risk. They compete with each other in researching and designing earthquake-resistant buildings. Companies that succeed in producing the best research will be able to apply the results in development projects in Japan. In addition to getting prestige and a good reputation, these companies also have the opportunity to get construction contracts from the Japanese government.

In addition, companies in Japan also have special programs, similar to the Corporate Social Responsibility (CSR) program in Indonesia, which can be used and combined with existing disaster risk reduction programs. They can support research by collaborating with educational institutions as well as providing support to other government programs.

### **Exemplary Points in the Implementation of the DDR (Disaster Risk Reduction) Program in Indonesia**

One of the main differences between the Government of Indonesia and the Government of Japan in dealing with Natural Disasters is the mindset. Currently, Japan has focused on disaster risk reduction programs aimed at protecting more valuable things from potential damage caused by natural disasters. On the other hand, the Government of Indonesia has not yet fully prioritized disaster risk reduction programs. Apart from this awareness, our government still pays little attention to programs related to disaster risk reduction.

One example that can be taken from the Government of Japan in implementing disaster risk reduction programs is by changing the perspective and approach to the threat of natural disasters. All parties involved must be prepared and strong in dealing with potential natural disasters that can occur at any time. Therefore, disaster risk reduction must be the government's main program in dealing with disasters. Making the right and planned investments in disaster risk reduction programs will save asset values, and lives and prevent other possible losses from the devastation caused by natural disasters.

Next is the need for synergy, solidity, and commitment from the government, relevant stakeholders, and the community in facing the threat of disaster. Representatives of each element must sit together and formulate a program and concrete targets in disaster risk reduction efforts that can be implemented in an integrated manner. With this in mind, it is hoped that innovative

and sustainable programs will emerge and continuously evaluate the programs that have been implemented.

And the last thing that the Government of Indonesia can emulate is the use of information and communication technology to disseminate disaster-related information in each region. So that people from all walks of life can understand this information, it is necessary to socialize it massively in various kinds of social media, electronic media, and face-to-face. So that all information regarding disaster vulnerability can be accessed and understood by all levels of society.

## CONCLUSION

Japan is at high risk of natural disasters due to its geographical location which is prone to earthquakes, tsunamis, and other threats. The Japanese government has also changed its approach to natural disasters and prioritized disaster risk reduction (DRR) programs. They focus on better regional planning, the construction of earthquake-resistant buildings, and raising community awareness. Then the disaster management system in Japan involves various ministries and government agencies working together in planning, implementing, and supervising disaster management operations. In this case, the Government of Japan has a strong commitment to the DRR program and considers investment in disaster risk reduction as an important step to protect the country's life and economy. Through research, improved urban planning, strict construction regulations, disaster education, and active community participation, Japan strives to live side by side with disasters and have strong resilience against these threats.

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