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Kamojing Dam Crisis Communications Model as an Effort to Mitigate Dam Failure Disaster

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Abstract: Karawang stands as the third district most at risk from flooding. The Kamojing Dam, serving as a reservoir and regulator of water flow in the Cikampek area of Karawang Regency, plays a crucial role in controlling flood disasters. Currently over a century old, the Kamojing Dam is susceptible to disasters such as dam failures and ruptures, which can lead to sudden flooding. Therefore, disaster mitigation efforts are needed in an effort to minimize the risk due to disasters, one of which is through risk communication. This study aimed to investigate the role of risk communication in mitigating the disaster caused by the Kamojing Dam failure. This study employs a qualitative research method, utilizing in-depth interviews. The study's results show that Kamojing Dam uses both internal and external communication systems to communicate dam conditions through the WhatsApp Group, thereby minimizing disaster risks. External risk communication involves various stakeholders who act as liaisons between dam managers and the community. Additionally, the dam implements an early warning system through various media

Abstrak: Karawang merupakan kabupaten ketiga yang paling rentan terhadap banjir. Bendungan Kamojing, yang berfungsi sebagai bendungan penampungan dan pengatur aliran air di wilayah Cikampek, Kabupaten Karawang, memainkan peran krusial dalam mengendalikan bencana banjir. Saat ini berusia lebih dari satu abad, Bendungan Kamojing rentan terhadap bencana seperti kegagalan bendungan dan retakan, yang dapat menyebabkan banjir tiba-tiba. Oleh karena itu, upaya mitigasi bencana diperlukan untuk meminimalkan risiko akibat bencana, salah satunya melalui komunikasi risiko. Studi ini bertujuan untuk menyelidiki peran komunikasi risiko dalam mitigasi bencana yang disebabkan oleh kegagalan Bendungan Kamojing. Penelitian ini menggunakan metode penelitian kualitatif dengan wawancara mendalam. Hasil penelitian menunjukkan bahwa Bendungan Kamojing menggunakan sistem komunikasi internal dan eksternal untuk menyampaikan kondisi bendungan melalui grup WhatsApp, sehingga dapat meminimalkan risiko bencana. Komunikasi risiko eksternal melibatkan berbagai pemangku kepentingan yang bertindak sebagai perantara antara pengelola bendungan dan masyarakat. Selain itu, bendungan menerapkan sistem peringatan dini melalui berbagai media.

Keywords: Kamojing Dam Crisis Communications Model, Effort, Mitigate Dam Failure Disaster

INTRODUCTION

Rencana Induk Penanggulangan Bencana (RIPB) has projected the danger of flood disasters in Indonesia. According to RIPB 2015-2045, the potential for human exposure, physical loss, economic loss, and environmental loss will continue to increase in 2030 and 2045 as a result of flood disasters. RIPB 2015-2024 also explains that in the Java-Bali region, the districts/cities that have the greatest risk from flooding place Karawang Regency in third place after Indramayu and Sidoarjo (Rencana Induk Penanggulangan Bencana 2015-2045, 2018).

The Karawang Regency area is geographically located between 107˚02'- 107˚40' East Longitude and 5◦ 56'6◦ 34' South Latitude, including a relatively low plain area, and has variations in regional altitude between 0-1,279m above sea level. The area of Karawang Regency is 175,327 ha; this is 3.73% of the area of West Java Province (37,116.54 km2) and has a coastline of 84.23 km. Karawang Regency is traversed by several rivers that empty into the Java Sea. The Citarum River is separated between Karawang Regency and Bekasi Regency, while the Cilamaya River is the territorial boundary of Subang Regency. Geographically, Karawang is traversed by several rivers, such as the Cibeet River, Citarum River, Cilamaya River, and Ciherang River (Widodo, 2023). Apart from floods, Karawang Regency has the potential for other disasters, such as landslides, abrasion, tornadoes, and drought. However, according to data from the National Disaster Management Agency (BNPB), floods accounted for up to 52% of all disasters that occurred in Karawang from 2015 to 2024(*Data Informasi Bencana Indonesia (DIBI)*, 2024). This data can be seen in the diagram below:

Figure 1. Types of disasters in Karawang Regency

Source: (*Data Informasi Bencana Indonesia (DIBI)*, 2024)

Based on the 2015-2024 database, Karawang experienced flood disasters 30 times. On average, the cause of flooding in Karawang is due to the high intensity of rainfall. Government Regulation Number 37 Article 1 of 2010 defines a dam as a building in the form of earth, rock fill, concrete, and/or stone masonry that is built in addition to holding and storing water; it can also be built to hold and accommodate mining waste (tailings) or accommodate mud so that a reservoir is formed. The Kamojing Dam is located in Kamojing Village, Cikampek District, Karawang Regency, West Java Province, on the flow of the Cigelam, Gandasoli, and Cileundi Rivers, as well as the Iplik and Cigebang Drain Channels, Citarum River Region. This dam began operating in 1912, during the Dutch East Indies era. This dam is managed by the Citarum River Regional Office. The Kamojing Dam is known by residents as Situ Kamojing, which has a storage area of 20 ha.

Figure 2. Kamojing Situ
Source: Researcher Documentation, 2024

Perum Jasa Tirta II, a state-owned enterprise (BUMN), plays a crucial role in distributing Citarum river water throughout the Karawang Regency area through the Jatiluhur reservoir. One of the dams managed by Perum Jasa Tirta II is the Kamojing Dam, which plays a role in regulating the water flow in five rivers located in the Cikampek area. During the rainy season, the regulation of opening and closing dams becomes crucial because it requires precision to prevent flooding in areas flowed by the five rivers and to prevent dam failure. Even though the water from the Kamojing Dam is not the main cause of the flood disaster in the Cikampek area, it is still a concern for the community if the dam fails at the Kamojing Dam. In 2019, the people of Cikampek were shocked by fake news (hoax), which stated that the Kamojing Dam had broken. This news quickly spread in society and panicked the affected people. As the fake news spiraled out of control, the Purwasari District Head took action by distributing a voice recording in which he stated that the news of the Kamojing dam breaking was false.

The spread of fake news in 2019 does not mean that it is guaranteed that this will never happen. Cikampek, as part of Karawang Regency, is currently an area that has the potential to experience flood disasters due to high rainfall. However, another potential disaster that could occur is a large volume of water suddenly reaching residential areas caused by the full capacity of the Kamojing Dam or even the Kamojing Dam breaking down. We need to anticipate this as early as possible, and one way to do so is through communication. The context of communication in disasters is related to pre-disaster activities consisting of preparedness, early warning, and mitigation (P. Lestari, 2018a). This is done long before a disaster occurs to minimize casualties and material losses.

Potential disasters cannot be separated from the risks that are likely to arise as a result of the disaster that occurs. To deal with emerging risks, risk management is needed, one of which is managing information used to determine the actions to be taken to deal with risks (P. Lestari, 2018b). Decisions that have been taken must be communicated to interested parties through risk communication. Risk communication is communication that consists of building relationships with audiences, sharing information about the nature of risks, and working to reach consensus in an effort to find the best way to overcome risks (Walaski, 2011). Risk communication is basically a traditional communication model that involves a communicator (source) communicating something that could be risky (message) using media (channel) that can be read or heard by the public (recipient).

Disaster management activities are an interconnected cycle. The cycle consists of pre-disaster, during the disaster, and post-disaster. These stages indicate a disaster management paradigm shift. Disaster management is carried out not only during disaster emergency response but starts from the planning stage to reduce disaster risk at the pre-disaster stage. Disaster risk reduction is one of the stages carried out in situations where a disaster does not occur. At this stage, participatory planning and developing a disaster awareness culture are implemented(Nurjanah et al., 2013). Law No. 24 of 2007 concerning Disaster Management states that efforts to reduce disaster risk are not only carried out through physical development but also through increasing capabilities in dealing with disaster threats.

Karawang, which has the potential for flood disasters, is in a potential disaster situation during the rainy season. This situation requires disaster preparedness, which is an estimate of disasters and the resources needed when they occur. Preparedness provides a vigilant attitude for communities in disaster-prone areas. Appropriate and effective steps are management efforts to anticipate disasters(Nurjanah et al., 2013). The preparedness phase involves testing the early warning system. Early warning is not only a series of data collection and analysis processes but also includes the dissemination of information about dangers and danger escalation(Nurjanah et al., 2013). Developing strategies for dealing with potential disaster emergencies is crucial. The aim of early warning is to reduce the effects of disasters on victims, both in terms of the number and level of damage caused by the disaster. The principle of disseminating disaster information must be accessible to the public, have an emergency aspect (immediate), be clear and integrated (coherent), and be officially recognised. Therefore, disseminating information related to disaster warnings is one of the functions of disaster management, which is carried out collaboratively by the government and other relevant stakeholders (Nurjanah et al., 2013).

The description of the conditions above confirms that communication factors are an inseparable part of disaster management. The primary focus of risk communication implementation is to convey risk messages to various parties, with the aim of minimizing risks resulting from disasters. Various stakeholders must be involved in the implementation of effective risk communication to arrive at dependable decisions. Furthermore, effective risk communication must collaborate and communicate openly between various parties, such as government, society, experts, the media, and industry (Park & Sohn, 2013).

The Sendai Framework mandates four disaster risk reduction priorities: understanding disaster risk, strengthening disaster risk governance, investing in disaster risk reduction, and improving disaster risk management (Harijoko et al., 2021).

In these four priorities, it is emphasized that the integration of various sectors in reducing disaster risk is important. Furthermore, this integration not only ensures the systematic dissemination of information but also ensures that the public and private sectors play an active role in reducing disaster risk, including the allocation and distribution of resources at every level and sector(Harijoko et al., 2021). Based on this background, the researcher formulated the problem in this research, namely how to implement risk communication for the Kamojing Dam as an effort to mitigate dam failure. The 2017-2045 National Research Master Plan (RIRN) and the Unsika Faculty of Social and Political Sciences roadmap both identify disaster risk reduction mitigation as a research topic. Therefore, this research is multidisciplinary and roadmap-based. The research topic will be analyzed and explained based on the perspectives of communication science and government science.

The research method used in this research is qualitative to explore facts, data, and information. Qualitative data collection was carried out through in-depth interviews with informants to obtain an in-depth understanding of social problems (Sugiyono, 2020). Data collection technique used in this research is observation, which aims to obtain actual phenomena that occur. In addition, this study also employs the use of secondary data sources, such as scientific journals, academic books, official reports from relevant agencies, articles, and newspapers. The selection of informants was carried out using purposive sampling, including the head of the dam management unit, manager, dam operator officer, and regional interpreter.

The data analysis process is carried out, which according to Milles & Huberman consists of three types of activities, namely data reduction, data display, and conclusions. Data reduction is carried out by focusing the discussion, designing themes and patterns, and discarding unnecessary data. The next step involves the display or presentation of data, which involves compiling descriptions, relationships, and charts between different categories. Finally, draw conclusions that can address the formulation of the problem (Milles & Huberman, 1994). This research provides an in-depth analysis of risk communication practices at the Kamojing Dam, with the specific aim of mitigating potential disasters caused by dam failure. The contribution of this study lies not only in enriching the theoretical discourse on disaster risk communication by offering a contextualized model at the dam management level, but also in its practical relevance for stakeholders such as dam managers, local governments, and disaster management agencies in strengthening early warning systems, improving coordination, and reducing public vulnerability. Furthermore, disaster risk reduction mitigation is recognized as a strategic research topic in the 2017–2045 National Research Master Plan (RIRN), making this study aligned with national research priorities.

RESULTS AND DISCUSSION

Kamojing Dam has a storage capacity of 265,726 m3 at normal reservoir water level conditions with a reservoir pool area of 62.61 ha. The Kamojing Dam functions as a reservoir for water originating from Purwakarta. Apart from storing water, the Kamojing Dam must regulate the flow, which will be channeled to irrigation channels in various villages in the Cikampek area. The community uses irrigation water from the Kamojing Dam to irrigate rice fields and various other household activities. Apart from the household sector, irrigation water from the Kamojing Dam is also utilized by industries located in the Cikampek area, especially the BIC and KIIC industrial areas.

Currently, ownership of the Kamojing Dam is under the Ministry of Public Works and Public Housing, which is managed by the Citarum River Regional Office. The Kamojing Dam began operating in 1912 and was built during the Dutch East Indies era. Therefore, this dam, more than a century old, poses a significant risk of disaster. A potential disaster that might arise at the Kamojing Dam is its collapse, which holds 265,726 m3 of water. Based on data from the Kamojing Dam Emergency Action Plan, it is explained that the danger class downstream of the dam in the event of dam failure and the dam collapse is included in the very high danger class.

There are four types of dam failure, each indicating a potential threat to dam safety before it develops into a collapse.

1. Seepage failure: A small seepage through the dam body and foundation is a normal occurrence. However, excessive and uncontrolled seepage can lead to internal erosion and pipe flow, potentially triggering dam collapse.
2. Landslides on the dam body or foundation typically start when cracks or swelling appear on the slopes of the dam body. If the landslide occurs with progressive movement, it will result in the collapse of the dam body.
3. Structural failure: This type of failure manifests as the collapse of one or more major components of the spillway building or spillway gate, potentially leading to the loss of reservoir water. If the spillway structure fails to merge with the dam, it can result in the dam collapsing.
4. Failure due to overtopping: dam overflow will result in erosion of the dam top.

It is estimated that if the Kamojing Dam collapses, the victims will include 190,529 people or 66,381 families who live in flood areas. The area of flood inundation in the event of a dam collapse or failure is 9,056 ha. The areas affected if a dam collapse occurs include Cikampek District, Kotabaru District, Tirtamulya District, Purwasari District, Jatisari District, Banyusari District, and Cilamaya Wetan District. In general, the area passes through several rivers that drain the Kamojing Dam, including the Cijalu River, Cikaranggelam River, Ciwaringin River, and the Lower River, which is parallel to the North Tarum Channel.

The impact of the dam collapse is expected to affect public facilities such as crossing bridges over the draining river and the railway line between Cikampek Station, Dawuan Station, and Kosambi Station, with an estimated flood arrival time of 0.5 hours. Disaster mitigation efforts have also been made in such a way as to minimize the risks that occur as a result of dam failure.

One of them is that a flood inundation map has been created as an illustration of the affected areas when a dam fails. The dam collapsing has other consequences that you must consider and protect if the following happen:

1. Rainstorm or adverse weather

   A rainstorm, or what in meteorological terms is called a cloudburst, is a rainstorm phenomenon with an unusually heavy or very heavy rainfall intensity and usually lasts for a short period of time. Usually this unusually heavy rainfall is accompanied by hail and lightning and can result in floods, flash floods, and landslides. Rainfall resulting from a rainstorm can be very high, reaching more than 50 mm per hour. For example, 25 mm of rainfall is equivalent to 25,000 tons per one square kilometer (km2).

2. Tornado

   A tornado is a rapidly rotating column of air that forms a connection between a cumulonimbus cloud or, in rare cases, the base of a cumulus cloud and the ground surface. Referring to the BMKG, puting beliung is also a more familiar word used in Indonesia for a small-scale tornado. Tornadoes come in many sizes but generally take the form of a well-visible condensation funnel whose tip that touches the earth narrows and is often surrounded by a cloud carrying debris. Generally, tornadoes have wind speeds of 177 km/h or more with an average range of 75 m and travel several kilometers before disappearing. Some waterspouts that reach wind speeds of more than 300–480 km/h are more than a mile (1.6 km) wide and can stay on the surface for more than 100 km.

3. Earthquake

   An earthquake is a phenomenon of shaking the ground surface due to the sudden release of energy beneath the lithosphere that causes seismic waves. Earthquakes can vary in intensity, from very weak earthquakes that cannot be felt to powerful earthquakes that throw objects into the air, damage important infrastructure, and cause destruction throughout cities. Earthquake activity at a particular location is the average rate of seismic energy release per unit volume.

4. Sabotage

   Sabotage is an act of destruction carried out in a planned, deliberate, and hidden manner against equipment, personnel, and activities of the target area that is to be destroyed in the midst of society; the destruction must cause major psychological effects. According to Regulation No. 6 of 2016 by the Head of the National Strategic Installation Agency of the Ministry of Defense, sabotage is an activity aimed at causing casualties in a large area. Sabotage can also be directed toward a limited goal, with the aim of thwarting security efforts.

The Kamojing Dam is more than 100 years old and was built by the Dutch East Indies government for the purpose of irrigating rice fields. However, the Kamojing Dam also has the potential to cause disaster for communities around the river flow connected to the Kamojing Reservoir if a dam failure occurs, such as a dam collapse. Therefore, the management of the Kamojing Dam has designed emergency measures, such as communication and dissemination of disaster information, to minimize risks when a disaster occurs. Risk can be understood as the way humans, as individuals and groups, view their environment and the things that can threaten their lives. These risks must be understood, managed, and communicated with the aim of living a joyful and healthy life (Heath & O.Hair, 2010).

The Kamojing Dam has three emergency levels, namely alert, alert, and watchful conditions. Each emergency level has a different communication flow that has been adapted to the level of potential danger and needs. Of course, the communication flow for the Kamojing Dam crisis involves various parties. Effective risk communication at a macro level requires collaboration (Badri, 2021). In an alert condition, the Kamojing Dam has a crisis communication flow starting from the Head of the Dam Management Unit as the leader in carrying out operations, maintenance, and monitoring of the dam in emergency situations.

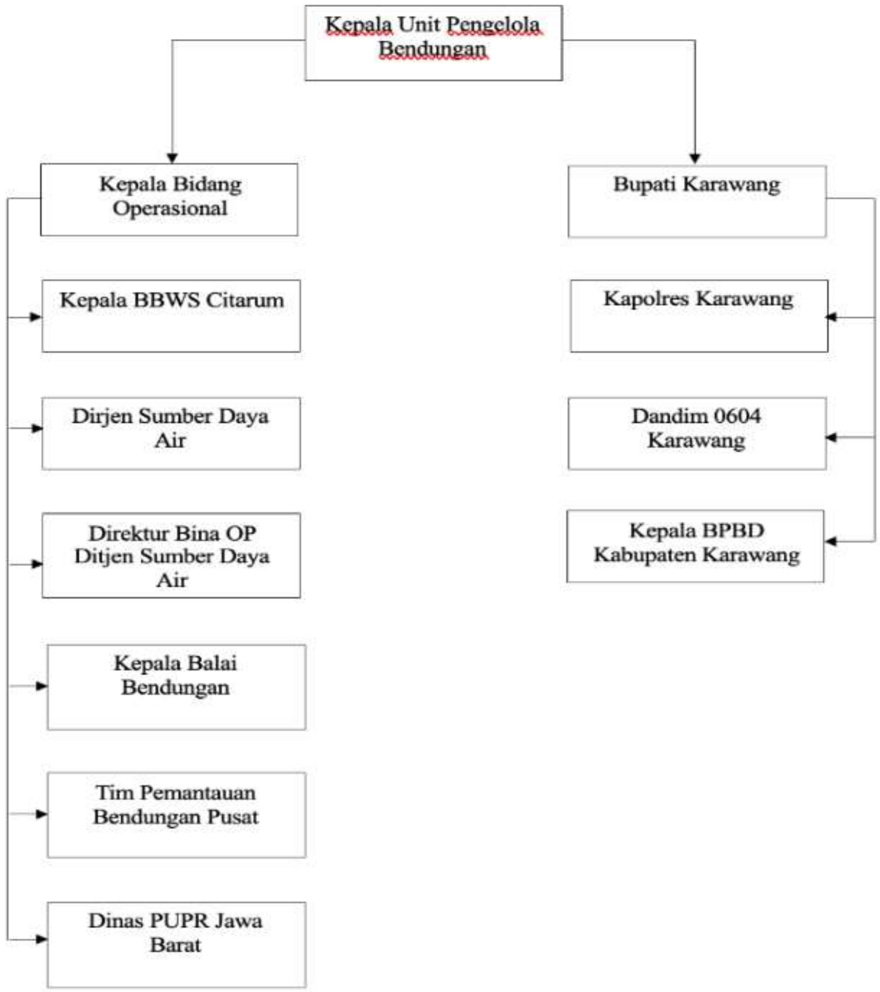

Figure 3. Crisis Communication Flow Alert Status of Kamojing Dam

Source: (Pengelola Bendungan: Balai Besar Wilayah Sungai Citarum, 2018)

The Head of the Dam Management Unit is responsible for monitoring the overall condition of the dam and overseeing the Kamojing Dam. The position of Head of the Dam Management Unit was created specifically for the benefit of the dam. Therefore, the Head of the Dam Management Unit serves as an organizational structure independent of formal positions. Meanwhile, the Head of Operations is responsible for dam maintenance.

Before the Head of the UPB determines whether the condition of the dam's water level is classified as alert" or watchful, it has gone through a communication process at the unit level first. At the unit level, it provides information regarding water levels, which is carried out three times a day. TMA determination can be determined through various measurement tools and reports, which are carried out three times a day. Apart from that, there are weekly and monthly reports. Through this report, dam condition can be analyzed. The party whose role is to record the TMA is the weir operator, which will then be validated by the Kamojing

Dam Supervisor.

Communication is related to message production activities that are deliberately designed with the aim of obtaining a public response connected by mass communication channels through persuasion techniques that rely on credibility, which aim to minimize danger and increase public safety (Reynolds & W. Seeger, 2005). The communication system is designed in such a way to minimize the risks caused by disasters.

The communication system in the Kamojing Dam failure disaster was designed using various media, namely telephone lines, social media, and couriers (dam officials). This medium is used to build a communication system between stakeholders in the crisis communication flow. The use of communication media stems from its unique characteristics, particularly its high speed in conveying information. Apart from that, the information system designed at Kamojing Dam uses WhatsApp Group. The parties who joined the WhatsApp group consisted of sub-district heads and village heads who were served by the Cikaranggelam channel, BPBD, Polsek, and Kodim. The message conveyed in the WhatsApp group was related to information on the Kamojing Dam disaster.

On the WhatsApp group, information is shared regarding Kamojing Dam Water Level reports, rainfall reports, and photos of conditions. Apart from that, the WhatsApp group is used to share information about various activities, such as trash cleaning at the Kamojing Dam discharge stream. The flow of communication does not only come from the dam management; information can also come from other members of the WhatsApp group. This information is usually related to water conditions in the area concerned. This can be used as data for monitoring water conditions in affected areas. Apart from that, the WhatsApp group is used to minimize the spread of fake news in society. The WhatsApp Group serves as a platform for dam managers to provide clarifications to stakeholders who are members of the group.

The communication system built by the Kamojing Dam is also related to pre-disaster activities, including early warnings. Pre-disaster communication is built to provide information to the community regarding the necessary preparedness and various activities that must be carried out when a disaster occurs(Nuriman et al., 2023). The Kamojing Dam early warning system has been designed in the Kamojing Dam Follow-up Plan regarding a series of actions to provide warnings as quickly as possible to the public containing messages of possible disasters. The aim of the early warning system is to provide timely warnings so that preparation and evacuation of the population can be carried out.

The early warning system was delivered to various agencies, such as regional government and BPBD. Apart from that, early warnings must also be conveyed to people living downstream of the dam, conveyed through the regional government involving various agencies such as BPBD and dam managers. The WhatsApp group owned by Kamojing Dam is a reliable medium for conveying the latest information regarding disasters. Other media used to disseminate early warning information are television, radio, danger warning cars, mosque loudspeakers, and others. In addition, alarm signals, dam sirens, public sirens, church bells, traditional danger warnings, and other methods can be used as early warning signals for the Kamojing Dam. Residents using citizen journalism (tagging official information on Instagram) provide reports.

The information conveyed in the early warning is (1) Dangerous territory; (2) The danger warning level is represented by the disaster status (alert, alert, or danger); (3) Estimated time of disaster; (4) Rainfall conditions, water levels when announced, and predictions for the next few times; (5) Estimate the direction in which the disaster originated; (5)Direction/evacuation route; (6) Other information is considered important.

The Kamojing Dam early warning system has also designed statements that are made before a disaster occurs. This statement can be used in the event of a disaster. This is done to ensure that the crisis handling team doesn't have to spend extra time preparing a statement in response to a crisis. When a crisis arises, we need to react swiftly and efficiently. PT Garuda Indonesia has a template for responding when a crisis occurs.

The template creation was carried out to hone the Garuda Indonesia crisis communications team's ability to make statements. This ensures that crafting a statement during a crisis doesn't consume a significant amount of time (Salma, 2018). The preparation of statements on the Kamojing Dam uses different templates at each level of disaster status.

Kepala BBWS Citarum menyatakan bahwa Bendungan Kamojing dengan No.Registrasi 10 1925 0015 pada Jam ......, Tanggal....... dalam **KONDISI WASPADA**. *[Jelaskan dengan detail kondisi dan masalah yang terjadi]*. Pada kondisi ini telah muncul indikasi potensi keruntuhan bendungan, tetapi belum ada bahaya yang segera terjadi.

[Jelaskan tindakan apa yang dilakukan untuk memantau dan mengendalikan masalah yang terjadi]. [Jelaskan debit yang keluar dari waduk].

Figure 4. Alert Condition Statement Template

Source: (Pengelola Bendungan: Balai Besar Wilayah Sungai Citarum, 2018)

Pemberitahuan keadaan darurat. Kepala BBWS Citarum menyatakan bahwa Bendungan Kamojing dengan No.Registrasi 10 1925 0015 pada Jam....... Tanggal........ dalam **KONDISI SIAGA**. *[Jelaskan dengan kondisi dan masalah yang terjadi].* Pada kondisi ini kemungkinan bendungan dapat runtuh. Saat ini sedang dilakukan upaya-upaya perbaikan, tetapi tidak dapat dipastikan keberhasilannya.

[Jelaskan tindakan apa yang dilakukan untuk memantau dan mengendalikan masalah yang terjadi].

[Jelaskan debit yang keluar dari waduk].

Figure 5. Alert Condition Statement Template

Source: (Pengelola Bendungan: Balai Besar Wilayah Sungai Citarum, 2018)

Awas ! Pemberitahuan sangat penting. Kepala BBWS Citarum menyatakan bahwa Bendungan Kamojing dengan No.Registrasi 10 1925 0015 pada Jam....... Tanggal....... dalam **KONDISI AWAS**. Diperkirakan bendungan akan runtuh dalam waktu *[.......]* jam.

[Jelaskan tindakan apa yang dilakukan untuk memantau dan mengendalikan masalah yang terjadi].

Figure 6. Alert Condition Statement Template

Source: (Pengelola Bendungan: Balai Besar Wilayah Sungai Citarum, 2018)

The image above serves as a template that outlines the alert and watchful condition of the Kamojing Dam. Under the alert condition, individuals residing in the dangerous zone, specifically along the Cijalu River, Cikaranggelam River, Ciwaringin River, and Lower River, which runs parallel to the North Tarum Channel, are required to evacuate. Evacuation of people living in dangerous zones is carried out by BPBD and related agencies.

Berita Darurat. Bendungan Kamojing dengan No.Registrasi 10 1925 0015 telah runtuh pada *[jam ....tanggal.........]*. Penduduk yang berada di daerah sepanjang Sungai Cijalu, Sungai Cikaranggelam, Sungai Ciwaringin, Kali Bawah yang sejajar dengan Saluran Tarum Utara di Kabupaten Karawang sudah harus mengungsi. Aliran banjir sudah mencapai *[jalan ......]* dan *[jalan ....]*. Pemberitahuan tambahan akan disampaikan secepatnya.

Figure 7. Dam Collapse Statement Template

Source: (Pengelola Bendungan: Balai Besar Wilayah Sungai Citarum, 2018)

The image above serves as a template that outlines the emergency conditions of the Kamojing Dam in the event of a dam failure, specifically a collapse. In this situation, people must evacuate immediately due to the rapid flow of floodwaters.

In the event of a dam failure, such as a dam collapse, the Kamojing Dam has an evacuation plan. If a dam failure occurs at the Kamojing Dam, a crisis communication flow must be implemented. Apart from what is stated in the dam crisis communication flow, communication from BPBD is also forwarded to the public via telephone, cell phone, radio, and television. Regional officials such as sub-district heads, police chiefs, Koramil, village heads, and others were instructed to immediately disseminate early warnings to the community, as well as RW/RT administrators, mosque administrators, church administrators, youth organizations, NGOs, mass organizations, and others to assist in disseminating the information. early warning. Dissemination of early warnings can be done through modern or traditional communication means, such as mosque loudspeakers, church bells, and so on. Dam managers also play a significant role in disseminating early warnings to people residing near the dam, using various communication methods such as mobile lighting vehicles and dam alarms/sirens. The affected areas include the areas along the Cijalu River, Cikaranggelam River, Ciwaringin River, and Lower River, all of which run parallel to the North Tarum Channel. The affected areas have also been depicted on the map of affected locations attached to the Dam Emergency Action Plan.

Another action if there is a dam failure in the form of a dam collapse is to close bridges that are likely to be flooded, including road bridges. This is done so as not to endanger road users. Apart from that, the railway line between Cikampek Station, Dawuan Station, and Kosambi Station was closed.

In the event of a dam failure, 11 evacuation points have been prepared, which are located at the Kamojing Village Office, Kamojing Elementary School (Cikampek District), Mandiri Industrial Vocational School (Klari District), Al-Hikmah Mosque, Kamurang Village Office (Tirtamulya District), Wancimerkar 1 Elementary School (Kotabaru District), North Cikampek Village Office (Cikampek District), Asy-Syuhada Mosque (Cikampek District), Village Office Pacing (Jatisari District), Jayamukti Middle School (Banyusari District), Cikalong Village Office (Cilamaya Wetan), Police Station (Cilamaya Wetan), and Cilamaya 4 Middle School (Cilamaya Wetan).

Discussion

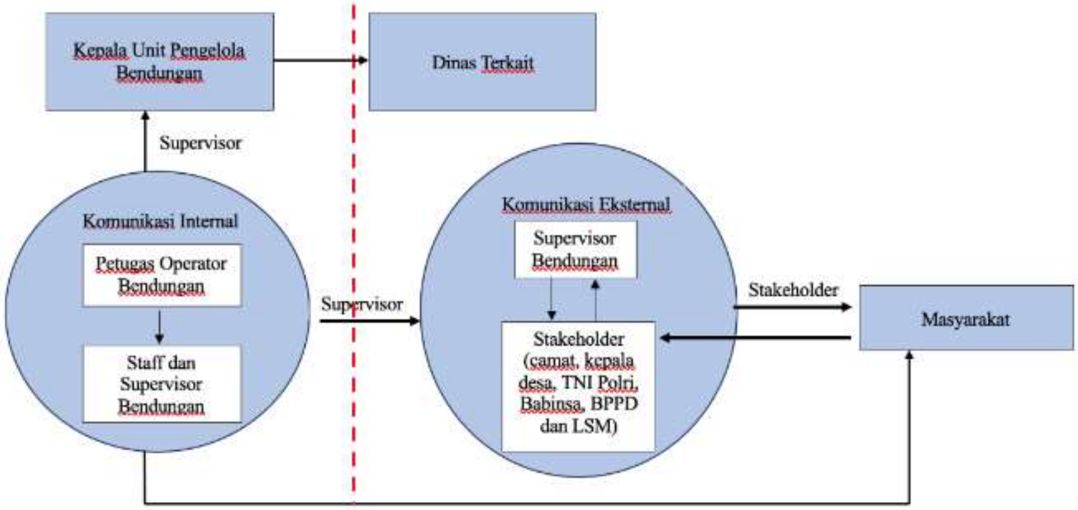

Figure 8. Kamojing Dam Crisis Communication Model

Source: Researcher Findings, 2024

Risk communication at the Kamojing Dam is carried out to clarify the process of disseminating information related to disasters. Risk communication is also carried out in an effort to minimize the negative impacts caused by disasters. The dam risk communication process can be depicted in the Dam Communication Model image above as a result of the findings in this research. This model is referred to based on the results of in-depth interviews, observations, and emergency action plans owned by the Kamojing Dam. In general, the dam risk communication model shares similarities with other risk communication models in that it involves stakeholders in building communication. For example, Zang's Wuhan Risk Communication Model involves three stakeholders in problem solving, namely the public, government, and experts. Government-public communication: The government bears the responsibility of disseminating accurate information to the public in an open and transparent manner, also known as external communication. The primary component of risk assessment and decision-making is government-expert communication (internal communication). And expert-public communication functions to bridge the gap between expert and public views through strategic communication (external communication) (Zhang et al., 2020).

In the dam communication model, internal communication begins with the dam operator officer (POB), who sends messages to the dam staff and supervisor. Dam operator officers have the duty to record water levels (TMA) regularly. Recording is carried out three times a day, namely at 07.00 WIB, 12.00 WIB, and 17.00 WIB. The TMA records are given to dam staff and supervisors so they can be known and analyzed together. The process of conveying the message takes place in a circle that depicts a shared medium in the form of a WhatsApp group. Through an internal WhatsApp group, there is a process of exchanging information between dam operator officers, staff, and dam supervisors regarding TMA in real time. Data regarding the TMA is analyzed jointly by staff and supervisors in determining the safety thresholds for the TMA and dam.

According to this data, the supervisor verifies the TMA and dam condition to send to the Dam Head Unit Head. The flow of communication will stop at that stage if the dam is in normal condition. However, if there is a potential for a dam failure disaster such as an overflow of the TMA or a dam breaking, then at the next stage the Head of the Dam Head Unit will forward the information to the relevant agencies such as the Regent, BBWS, PUPR Service Chief of Police, Dangdim, and BPBD, as in the crisis communication flowchart in the Action Plan Kamojing Dam Emergency. Apart from that, the supervisory level will send information regarding the condition of the TMA and dam to stakeholders who are members of the external WhatsApp group. The stakeholders consist of the sub-district head, village head, TNI Polri, Babinsa, BPPD, and NGOs who are thought to be fed by the Kamojing Dam drainage channel. The information conveyed by the supervisor is in the form of facts that occur at the dam and estimates of the impacts that will occur. This information should reach the community through regional stakeholders. This ensures that the information is sourced from a reliable and trustworthy source. In the context of disaster communication at the Mataram City BPBD, it is crucial to identify reliable sources of information, such as communicators or community figures, to ensure effective disaster communication (Safitri et al., 2020). Also, this is done to correct public misinformation.

However, the dam supervisor also needs additional information regarding the affected areas. The community is given the opportunity to convey conditions in the field to stakeholders, which will then be forwarded by stakeholders on the external WhatsApp group. Apart from that, staff and supervisors can also directly communicate with the community to obtain information about the conditions of affected areas through field visits. For example, risk communication in the COVID-19 case was mainly intended to disseminate information about health risks and to avoid confusion, uncertainty, or panic that could result in wrong decision-making (Lestari et al., 2021). In contrast, the findings of this study highlight a different phenomenon, namely the integration of real-time information exchange through digital platforms (WhatsApp groups) combined with structured stakeholder coordination in dam management. This approach not only clarifies information but also functions as a verification mechanism to prevent misinformation and hoaxes, which were found to be a significant issue during previous crises in the Kamojing area. Thus, this research contributes a contextual model of disaster risk communication that differs from the health-oriented focus of Lestari et al.

The internal and external communications carried out in the Kamojing Dam risk communication model also aim to build positive relationships. As was done by PT Garuda Indonesia during the crisis, it maintained a positive reputation by building favorable relationships with both external and internal parties (Leliana et al., 2020). However, the significant finding of this study lies in the different orientation of such relationships. While in the corporate context Garuda Indonesia's communication strategy was primarily directed at safeguarding company reputation, in the case of the Kamojing Dam, internal–external relationship building is oriented toward urgent disaster mitigation. Here, communication flows serve not only to maintain trust but also to ensure accurate information exchange, rapid coordination, and immediate community preparedness, which directly impact public safety rather than corporate image. This difference demonstrates that relationship-building in disaster risk communication carries a life-saving dimension that distinguishes it from corporate crisis communication practices.

CONCLUSION

The Kamojing Dam, which regulates the water flow to several rivers in the Cikampek area of Karawang Regency, faces various potential disasters, including the possibility of dam failure, such as a dam breaking. Even though maintenance and monitoring continue to be carried out, it is possible that a sudden disaster will occur. The dam, a legacy of Dutch colonialism, is over a century old. Therefore, disaster mitigation efforts to minimize disaster risks have been prepared as thoroughly as possible. Kamojing Dam has an Emergency Action Plan manual, which serves as a guide when a disaster occurs. One crucial aspect of the Kamojing Dam disaster mitigation effort is the risk communication system, which has been systematically designed. Kamojing Dam risk communication consists of an early warning system and disaster communication flow. The Kamojing Dam early warning system has a statement template that can be used in alert, standby, and danger conditions. The statement template is prepared so that when a crisis situation occurs, it does not take a long time to provide a statement to stakeholders and the public. Apart from that, the Kamojing Dam Emergency Action Plan book has determined the communication flow that must be carried out in a crisis situation by involving various stakeholders.

Furthermore, researchers obtained intriguing findings from the crisis communication system at the Kamojing Dam, which led to the formulation of the Dam Risk Communication Model. In the Dam Risk Communication Model, it was found that in a crisis situation the first communication flow is internal communication in the form of analyzing and verifying messages regarding the condition of the dam. Before messages are distributed to external parties, message screening is carried out to determine the types of messages that can be shared with external parties containing stakeholders. WhatsApp Group serves as the medium for both internal and external communication. Stakeholders who receive the message also have the responsibility to forward it to the community, and they are also responsible for conveying public complaints back to Kamojing Dam management.

The significant contribution of this model is not only its value as an academic framework but also its practical role in raising public awareness of the importance of anticipating potential disasters from the Kamojing Dam. By providing structured communication flows and involving multiple stakeholders, this model encourages the community to be more vigilant, responsive, and prepared in the face of dam-related disaster risks.

However, this research still has shortcomings, which opens opportunities for further studies to consider other communication components in building a more comprehensive dam risk communication model. The study does not exclude the potential involvement of other communication dimensions that could further strengthen disaster preparedness.

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