

## DISASTER PREPAREDNESS OF THE HISTORIC CHURCHES (HOUSE OF WORSHIP) IN THE PROVINCE OF CAVITE

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**Abstract.** Cavite is a historical province in the Philippines the province is also known for historical Churches. This study assessed the disaster preparedness of the historical churches. The method is qualitative in nature and utilized interviews as the instrument of the study. The respondents are representatives of each historical church. The results show that NHCP is aware of the ancient churches' vulnerability to disasters based on their findings. Disaster response is a problem since historical churches aren't given priority and because of the geographical characteristics that rendered them vulnerable. Due to their significance to religion, culture, history, and identity, historic churches have social significance. Due to its age, worth to the community, and importance, historic museums must be prepared for disasters. While local governments have developed measures to reduce flooding, floods can be avoided provided that government policies and regular water level monitoring are put into practice. Earthquakes can cause the historical churches to shake. For disaster readiness in the event of ground shaking, the NHCP and the local government coordinate. Finally, since ground shaking cannot be entirely avoided, precautions like routine structural inspections are made.

**Keywords:** *cultural heritage site, disaster, disaster preparedness, historical church*

### Introduction

Disasters and calamities can occur at any time, posing a serious threat to human lives as well as physical structures. As a result, various buildings and establishments need to be prepared for emergencies. Older structures, such as shrines that are important cultural heritage sites, should have disaster preparedness strategies even if they are more vulnerable to harm when a disaster comes. A disaster risk management plan has proven crucial in minimizing and reducing the threat of damage, whether it is natural or artificial. Several disaster risk management strategies have been adopted, ranging from large-scale frameworks of various nations to a small-scale implementation of disaster risk management in commercial firms, educational institutions, healthcare facilities, and other settings. Nonetheless, the primary goals of disaster management are to save lives, alleviate suffering, safeguard and restore livelihoods, and lessen the danger that disaster-affected populations face (World Vision Official Portal, 2019). Natural or man-made disasters that occur seriously impair society and the community's ability to function normally. A disaster could have a variety of repercussions, including financial loss, environmental harm, and socio-cultural effects on welfare and wellbeing (Jigyasu, 2019). Various organizations have adopted disaster management plans at the local, regional, and global levels. They have also implemented several approaches to catastrophe risk reduction. Preventive measures, readiness, relief, and rehabilitation are typically included in a disaster risk management plan (WCPT, 2016).

The Hyogo Framework served as the primary framework for disaster risk management. 168 governments worldwide have endorsed this framework, which

focuses on guiding principles, action priorities, and doable ways to increase catastrophe resilience for vulnerable people. The Philippines likewise embraced the Hyogo Framework as the framework for disaster risk reduction management. It is a 10-year global plan for natural risk reduction management (UNDRR, 2019). Cultural Heritage Site Disaster Management particularly the historical structures such as buildings can be hard to maintain. This is due to the fact that these structures are old and the restoration process is very time-consuming and expensive due to the materials that are needed to match the old structure in order for this structure to stay true to their composition. Therefore, disaster management on cultural heritage sites focus on maintaining and repairing the structure even with small present structure risk (Bosher et al., 2020). However, the threat of climate change when it comes to cultural heritage sites poses a major threat to the cultural heritage sites because the rising sea levels and extreme weather makes the management of the cultural heritage sites more challenging due to the old structure and the threat that the cultural heritage sites could be under sea level in the future and the risk of typhoons and warm weathers could have an effect on the structural integrity of the cultural heritage sites (Pavlova et al., 2017). Therefore, the focus on the Cultural Heritage sites disaster management plan is focused on pre-disaster efforts, during which is the response and the recovery part in case a cultural Heritage site has been affected by a disaster or a calamity. Pre-disaster planning involves identifying the risk and prepared some tools that is needed in order to minimize the damage a disaster that could affect the cultural heritage site, response is about the appropriate action that is required in order for the cultural heritage site to be receptive once a disaster strikes and the recovery in which it addresses the need of a cultural heritage site once there is a damage that was done (Florentin et al., 2022).

Due to the structures' age, cultural heritage sites are especially vulnerable to calamities. Earthquakes and even warfare are the main causes of these catastrophes. Syria is one instance where numerous historic sites have suffered destruction. These cultural heritage monuments have been around for a very long time, going back to the beginning of human civilization. Despite this, earthquakes and man-made calamities like fires and wars have destroyed the sites, and in more recent times the government has ignored them for a variety of reasons (Vafadari et al., 2017). The Filipino Disaster Risk Reduction and Management (DRRM) Act of 2010 is a law enacted to strengthen disaster management in the nation and serves as the primary legal foundation for disaster risk management in the Philippines. The law also provides a framework for the distribution of resources that will help the federal government, local governments, and other interested parties such as the local communities should be able to create communities that can withstand disasters (Rey, 2015). However, the cultural heritage site application in disaster risk management is another law. This is RA 10066, also known as the Natural Cultural Heritage Act which states the need to preserve historic buildings that are over 50 years old, creating the Philippine Registry of Cultural Property. The NHCP (National Historical Commission of the Philippines) has identified the historical churches as the focus of the research as a level II which means that the management of the historical churches is done by the agency in regards with the structural integrity and preservation of the historical churches (National Historical Commission of the Philippines, 2023).

Cultural heritage sites have never been preserved due to urbanization and agglomeration of economic activity, where disaster risk management of such heritage sites was not maintained; hence disaster risk management of such sites is of vital

importance. The cultural heritage places play a significant role in a local community's ability to connect with its history and identity. Historic sites also aid in economic development and increased community resiliency to uphold tradition and social and cultural values (GFDRR, 2017). There has always been a serious risk in cultural heritage site disaster preparedness that has been neglected for the past years. Cultural heritage sites have been vulnerable to climate change as cultural heritage site preservation needs specific special attention. It is also challenging for the cultural heritage site to be restored due to the cost of restoration and the difficulty to obtain the structure's original material (Dalisay and Landicho, 2018). The gap of the research is the application of Disaster Risk Management to cultural heritage sites because not all disasters, either natural or man-made, are suitable on a cultural heritage site. In addition, the geographic situation of a cultural heritage site plays an important role in which disaster risk management should apply. The Philippines, on the other hand, is highly prone to natural disasters, both earthquake and typhoons. This problem is because of the geographic location of the country which situates it in the typhoon belt and close to plates' boundary; moreover, the Philippines is also vulnerable to flooding due to numerous coastal areas. An example of damage to a cultural heritage site due to the natural disaster was the Bohol earthquake of 2013 where many historical churches in the area collapsed and the damage cost was estimated to be 30 million USD (Calipusan-Elnar and Abocejo, 2021).

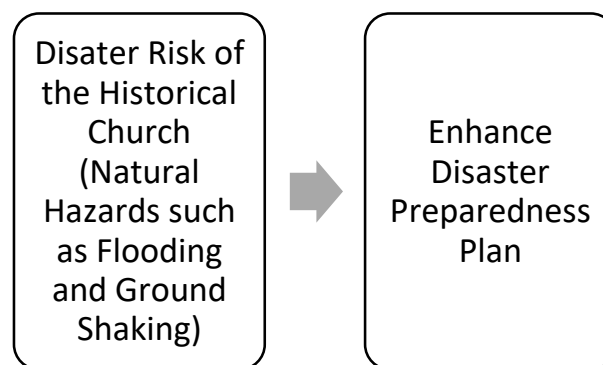
The province of Cavite has a rich historical background due to different historical events such as the declaration of Independence of the Philippines on June 12, 1898 in the Aguinaldo Shrine located in the town of Kawit and the historical churches in the province particularly the Churches of Bacoor, Kawit and the Imus Cathedral in which these structures were established during the Spanish colonization period (The Official Website of the Province of Cavite, 2020). Based on secondary data the researchers have obtained, the municipality of Kawit, Cavite, the city of Bacoor and Imus Cavite is vulnerable to flooding and ground shaking (earthquake) as all its Barangays are prone to these natural hazards most likely due to the elevation of the towns and city in which they are near the coastal areas (The Official Website of the Province of Cavite, 2020). The topic of the research is the historical churches (house of worship) properties of the National Commission of the Philippines (NHCP) in Cavite province. There is a lot of historic churches under the management of the NHCP but the research will focus on 3 churches particularly the churches in the lowland area of the province of Cavite. The first is the Kawit Church "Simbahan ng Kawit" in which it was established in 1737 the church was made of stones in which the original structure stones was still standing today the property was under the NHCP management in the year 1990. The second historic church is the Church of Bacoor "Simbahan ng Bacoor" which was established in the year 1774. The church was expanded in the year 1870 and was under the management of the Roman Catholic Church in 1906 until the NHCP declared the church as a NHCP historic house of worship property in the year 2020. The last house of worship included in the research to be assessed is the Imus Cathedral which was established in 1795 expanded in 1823 and was declared as a cathedral in the year 1961 and was under the management of the NHCP in the year 2008.

The proposed study would attempt to assess the disaster preparedness of the historic church (house of worship) Kawit Church, Bacoor Church and Imus Cathedral through an interview with the management of the shrines regarding the disaster risk preparedness of the shrines based on the secondary data on disaster vulnerabilities

obtained from the Government of Cavite. The proposed study sought to answer the following: (1) how do the respondents assess the different sites relative to disaster management?; (2) what are the disaster preparedness measures of the different historical churches (house of worship) properties of NHCP in terms of disaster vulnerabilities such as flood and ground shaking; and (3) based on the findings, what enhanced disaster preparedness plan can be proposed? The scope of the study is the historical museum under the management of NHCP and their disaster risk management plan additionally the historic churches that will be subjected to the study are the churches that are located in the lowland portion of the province of Cavite such as the towns of Kawit, Bacoor and Imus. Meanwhile, the study will be limited to the disaster hazards vulnerabilities applied as suggested by the secondary data obtained from the Government of Cavite such as Flood and Ground Shaking. In order to create a better disaster risk management plan in order to conserve and maintain the shrine, the study will be essential to the administration of the ancient churches Kawit Church, Bacoor Church, and Imus Cathedral. The study is crucial for the local community to understand the calamities that historic churches (houses of worship) are susceptible to and to learn what to do in the event of a disaster. Furthermore, the study will be significant for visitors so they can understand the significance of disaster risk management strategies for cultural heritage places. This strategy can compel visitors to safeguard the shrine's historic and recreational significance so that present and future generations can continue to enjoy it.

### ***Conceptual framework***

The *Figure 1* shows the research paradigm of the study. The study's main concept is the disaster risks. The study, which was conceptualized by Jigyasu (2019), focuses on the disaster risk management of cultural heritage sites particularly the historic church (house of worship) with the application of the secondary data obtained from The Official Website of the Province of Cavite (2020) on the natural hazards vulnerabilities of the province of Cavite. The conceptual framework shows the threats to the heritage sites and which vulnerabilities each site must deal with. This is followed by a risk analysis of natural hazards, which is also conducted by the government of Cavite, to arrive with the secondary data in which hazard vulnerabilities are applied into each municipality subject to the study. These municipalities are Bacoor, Kawit and Imus, which are both prone to flooding and ground shaking.



***Figure 1. Conceptual framework.***

## Materials and Methods

The study used a qualitative method. The study is divided into three phases. The first phase is to do a secondary data compilation on disaster vulnerabilities of the historic churches (house of worship) under the management of NHCP. The second phase is an interview with the representative of NHCP on the disaster preparedness of the historic museums. Specifically, the second phase is the interview with the management of the historic churches (house of worship) with an in-depth discussion with the management. The researchers selected Kawit Church, Bacoor Church and Imus Cathedral as the setting of the study for it is considered as a national shrine with an antiquated structure. Lastly, the third phase is the interview data analysis and the development of the enhanced disaster preparedness plan for the historic churches (house of worship) under the management of NHCP. The respondents of the study are composed of the representatives of the NHCP for each historic church (house of worship). The first respondents, which is the management, are the representatives of historic church (house of worship) subjected to an interview regarding the disaster preparedness of the historic churches under the management of NHCP. The second respondent are representatives of the Local Government Unit of Kawit, Bacoor and Imus, Cavite, particularly the Municipal Disaster Risk Reduction Management office. The sampling technique used in the study is expert sampling. This strategy specifically sought experts regarding the disaster preparedness of the Historic Church (House of Worship) such as the management and the local government unit.

The study used the interview as the instrument for the management of Historic Church (house of worship) and the local government unit representative. The interview design is open ended questions. Moreover, interview questions and checklists are validated by the thesis adviser. Proposal letter regarding the study that was conducted in the area is submitted to the management of each historic church (house of worship) under the management of NHCP which is under the control and supervision of NHCP. The researchers also gathered pictures for photo documentation. The data is then further gathered and analyzed. The interview with the management was conducted by schedule. The researchers then asked the questions to the management staff of each historical church site and they then answered vocally. The researchers used voice recorders to record the response. After the interview, the data gathered was analyzed further the data gathered will be treated with confidentiality and shall only be used for educational purposes only. The interview data was transcribed and presented in a narrative analysis approach. The researchers identified the relevance of the responses and then formulated propositions regarding the Disaster Preparedness in which it is described as a deductive approach and a narrative analysis.

## Results and Discussion

*Table 1* shows the interview results with the representatives of each of the historical churches from the NHCP. The result shows that when it comes to the disaster vulnerabilities of the historical churches (House of Worship), the respondents cited that they are aware of the vulnerabilities of the historic museum to natural disasters. The most cited reason has the theme that the historic churches are prone to disaster because the structures are very old; thus, these structures, overtime, become more prone to damage. Historic churches and other pieces of cultural heritage are highly vulnerable to disasters, according to Vafadari et al. (2017). This is due to the structures' age because

they were constructed in the past. In addition, the materials employed in these structures may have degraded over time, which explains why historical churches and other cultural heritage monuments are vulnerable to natural disasters. According to the respondents, a soundness test should be carried out in place of the intended outcome in order to evaluate the durability of the structure and look for lime and magnesia oxide deposits that could affect the structure and cause cracks and damage to the overall structure. According to the responders, the NHCP's restoration and modernisation activities are another important method for disaster preparedness.

**Table 1. Disaster preparation of the historical churches (House of worship).**

Kawit church	Bocoor church	Imus cathedral
The Kawit Church is vulnerable to disasters because of the old materials of the structure Measurement that is done is regular monitoring of structure and awareness of incoming disasters. The last soundness test was done in 2005 according to the representative	The Church of Bacoor Shrine is very prone to disasters because of the age of the structure and the flood prone area. Coordination with the local government and regular monitoring of the structure. Monitoring the building's condition but the soundness test was done a long time ago.	The Imus Cathedral is vulnerable to disasters because the structure is old and more prone to damage over time. .Coordination with the local government and regular monitoring of the structure. There is an annual structural checkup done by the local government.
There is coordination between the NHCP, LGU of Kawit, MDRRMO.	There is a coordination between the NHCP, LGU of City of Bacoor and CDRRMO, when it comes to Disaster Preparedness.	There is a coordination about disaster preparedness between the NHCP and the local government of City of Imus
The problem when it comes to disaster preparedness is the response because historical churches are not a priority.	The problem that is needed to address is the soundness test because it has been done for so long.	The problem when it comes to disaster is the response because the priority in disaster response when it comes to disaster is life and not historical churches The geography is the main reason for the vulnerability to disasters
The reason of vulnerability to natural disaster is the geographic location very prone to flooding and the structure which is old Historical Churches are important because this is the identity of Filipino Culture and Spirituality as Catholics. The Historical Museum is disaster prepared because of continuous restoration and modernization projects that the NHCP has.	The geographic location is a main factor for the disaster vulnerabilities because the historical church lies on very low and is very prone to flooding Historical Churches are important because it shows our past it shows the history and our identity The Historical is disaster prepared because of the restoration projects and modernization programs	Historical Churches are important because this is a part of the spirituality of the locals. The Cathedral is disaster prepared because there are regular structural checks
Major structural renovations were done in the 1990 to fortify against earthquakes. Minor structural repairs are done regularly. Disaster Preparedness in historical churches is important because this a part of the spirituality of the town therefore it needs to be preserved and conserved	The original structure and the materials are still present. Minor structural repairs are done regularly Disaster preparedness for historic churches is very important because this needs to survive in the future so that the future catholics of the city of Bacoor will benefit from it.	The last major restoration project was the modernization of the altar in 2011, minor repairs are done regularly Disaster preparedness for historic churches is important because this is a cathedral, a diocese in which the center of religion in the province of Cavite it is a center of worship as people from different parts of the province visit the cathedral.

As mentioned by Jigyasu (2019), in order for a cultural site to be disaster prepared, there is a need for regular checking on the structural integrity and to do restoration as necessary in order for a cultural heritage site to be more resilient whenHowever, the outcome showed that the historical churches' soundness examination had already happened in the distant past. The representative of the Kawit Church and the Bacoor Church, where the original building materials were still intact, brought up this problem. The Imus Cathedral representative, however, did not offer any information regarding the results of the Imus Cathedral's soundness test. Each of the historical museums is examined annually, according to all of the representatives of historical churches. it comes to natural disasters. The regular inspection of the structures' integrity, which is applicable to tangible cultural heritage sites, is the most crucial component of

sustainability when it comes to cultural heritage sites (Florentin et al., 2022). Every five years should be the recommended frequency for doing the soundness test to ensure the structural integrity of the building. Even if the structure established by the NHCP is examined annually, a regular soundness examination should still be performed. The outcome also demonstrates that, in terms of disaster preparedness, the NHCP and the municipal governments of each of the Historical Church locations coordinate. Typically, this collaboration between the NHCP and the local government focuses on disaster preparedness, including participation in drills like fire and earthquake drills as well as lectures.

According to Dalisay and Landicho (2018), when it comes to disaster preparedness, one of the keys for disaster preparedness is excellent coordination between the local government unit and the people participating in disaster preparedness. In the case of the result, the coordination is between the government agencies and the employees of the NHCP as the people who participate on such drills, practicing good coordination between different stakeholders. When it comes to the problems of the disaster preparedness of the historical churches, the respondents have varied points of view. However, the most important point of view could be that even if an institution is disaster prepared and a disaster occurred, the priority is not the property nor the cultural heritage sites but the lives of the people. Other issues presented here are the regular checkup needed to be conducted, such as the soundness check. Because some lawmakers either do not focus on cultural heritage or are less aware of the cultural importance of the heritage site's survival and disaster-resiliency, as mentioned by Ravankhah et al. (2017), a challenge to cultural heritage disaster risk management was the lack of government support for these structures. This means that the need for the government to intervene in this situation is urgent. According to Calipusan-Elnar and Abocejo (2021) the need for the government to increase their awareness and actions when it comes to disaster preparedness when it comes to historical structures should be given importance such as historical churches. In light of the findings, every respondent concurred that the topography plays a major role in the cultural heritage site's vulnerability to disasters. According to the historical church representatives, the majority of these historical churches are located close to a river or other body of water, making them vulnerable to flooding and other natural calamities. All of the selected towns in the study are vulnerable to water and earthquakes, according to The Official Website of the Province of Cavite (2020). In particular, the town of Kawit, and the city of Bacoor in which is at a very low level and serves as a catchment area during severe downpours. The settlement of Kawit is targeted by the water flow, which makes it quite vulnerable to flooding while the City of Bacoor has also problems with flooding due to low lying area and drainage problems. However, based on the findings, it is clear that historical churches (house of worship) are highly essential since they are a part of local history, culture, social identity, and most importantly their spirituality. There is a need for these historical churches to survive in the future and be preserved for future generations to enjoy since they bring sociocultural and historical significance and the religious aspect to the towns of Kawit, the City of Bacoor, and Imus.

According to GFDRR and the World Bank Group (GFDRR, 2017), cultural heritage sites are an integral element of a community since they add to the region's cultural and historical diversity. These cultural historical sites must therefore be preserved, renovated, and protected because they also foster a sense of community. In light of the findings, the historical churches representatives are confident that historical churches

are prepared for disasters because of ongoing restoration and modernization programs carried out by the NHCP and their coordination with the LGU in addition to routine structural inspections. Overall, these techniques suggest that historic museums might be adequately prepared for disasters. Major structural restoration and modernization programs have lately been carried out in relation to the outcome. The restoration projects, which are typically scheduled every five years while minor structural damages are conducted frequently, were carried out five years ago, according to the historical church's representatives. Restoration efforts for visible cultural heritage places, like historical churches, are typically expensive and take a long time to complete, according to Ravankhah et al. (2017). Finally, the findings on historical churches disaster preparedness showed that all of the respondents believed that historical churches disaster preparedness is highly essential because such places are old and have great value to it. Additionally, historical churches ought to endure so that future generations can enjoy and value them as a part of the neighborhood. Disaster preparedness of cultural heritage places is very significant because this might assist limit the negative effect in case a disaster occurs, as stressed by Florentin et al. (2022). In addition, responding to problems after they have occurred is more expensive than proactively planning and implementing mitigation strategies. Therefore, disaster management and preparedness should be a priority for cultural heritage sites.

The outcome of the flood disaster preparedness is shown in *Table 2*. As a result of each historic sites near proximity to a river, which allows the water to move inland in the event of a natural disaster, the results demonstrate that all historical churches are extremely vulnerable to flooding. The municipalities of Kawit, City of Bacoor, and Imus, particularly Kawit, Cavite, are both susceptible to floods since they are located in low-lying areas, according to The Official Website of the Province of Cavite (2020). This town's low height serves as a catch basin for heavy rainfall; in addition, the river's capacity is exceeded as a result of water flowing from highland towns to lowland towns like Bacoor, Imus, and Kawit. In relation to the result, all of the historical churches have experienced flooding those located in the town of Kawit. Mitigation plan for these includes Precautionary Measures such as monitoring of the possible flooding situation on the historical churches. It demonstrates that flooding, one of the natural disasters has gained significant attention over the past ten years as a result of global warming, which causes various typhoons owing to warm weather. As a result, cultural heritage monuments, particularly those in tropical regions, have been more vulnerable to flooding, endangering their continued existence. Additionally, mitigation measures primarily serve as band-aid fixes and are not particularly long-term in nature (UNDRR, 2019). However the main government program that addresses the issue of flooding in the low lying areas such as the town of Kawit and the Cities of Bacoor is the Imus River Basin Subproject in which it is inaugurated in 2021 (Japan International cooperation Agency, 2021). The Bacoor and Imus flood mitigation projects are part of the Imus River Basin Subproject, which aims to reduce flooding in Cavite's low-lying districts. In the Philippines, the project's retarding basin feature is a first-of-its-kind man-made reservoir project that acts as a temporary storage pond to contain water during heavy rains, preserving lives and property.

**Table 2.** Disaster preparedness on flooding of the historical churches (House of worship).

Kawit church	Bocoor church	Imus cathedral
The Kawit Church is vulnerable to flooding because it is near the Marulas	The Bacoor Church is very prone to flooding because it is near the Bacoor	The Imus Cathedral is very prone to flooding because it is near the Imus River



<p>River and the Bacoor Bay. There are times that the high tide can cause water to overflow on some parts of the historical church grounds. The Government of Cavite has a project right now, the Imus River Basin Subproject. Flooding can be prevented with proper mitigation plans from the government which will benefit the site. Precautionary measures were monitoring the water level especially during high tides, typhoons and strong rain.</p>	<p>Bay There were times that the site was flooded during high tide and strong rains. The Government of Cavite has a project right now, the Imus River Basin Subproject. Floods can be prevented as long as the flood control projects are implemented and completed. Precautionary measures were monitoring the water level especially during high tides, typhoons and strong rain.</p>	<p>and Julian River. There were times that the Imus Cathedral was flooded. The Government of Cavite has a project right now, the Imus River Basin Subproject. Flooding can be prevented as long as there are government plans to mitigate flooding. Precautionary measures were monitoring the water level especially during high tides, typhoons and strong rain.</p>
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According to Dalisay and Landicho (2018) study, government disaster management projects are essential to creating more disaster-resilient and prepared sites because they benefit a wide range of stakeholders, including cultural heritage sites, in addition to a small number of people. The respondents also mentioned that floods may be avoided if there were government initiatives and projects that would also benefit historical churches. The government's efforts are the most important component in preventing floods in these historical museums (Florentin et al., 2022). An important consideration when assessing a cultural heritage site's vulnerability to disasters, disaster preparedness, and disaster management is government initiatives. If properly executed, these government initiatives will help the cultural heritage site in terms of disaster management and preparedness (Jigyasu, 2019). The monitoring of the water level, especially for high and low tides and heavy rains; as well as coordination with the government in case of flooding, are key to having a preventative measure for natural disasters, such as flooding, according to the NHCP respondent interviewed. Flooding can be avoided, as emphasized by Dalisay and Landicho (2018), provided that government programs and infrastructures to alleviate flooding problems are addressed correctly. The monitoring of the aforementioned cultural heritage such as historical churches sites remains the most important factor, nonetheless. Monitoring the circumstances before and after a disaster increases the likelihood that the harm caused by a natural disaster will be lessened sooner.

*Table 3* displays the historical churches' earthquake disaster preparedness. The outcome demonstrates that each NHCP representative is aware of the likelihood of earthquakes in the region where the historical museums are situated. Geographic location is the primary factor in this case. The historical churches in Cavite are susceptible to ground shaking because of the province's position, as noted in The Official Website of the Province of Cavite (2020). These historical churches are particularly vulnerable during earthquakes because of the materials used in their construction and the age of the structure because the location is above the West Valley Fault. The most frequent cause of the destruction of cultural heritage sites, according to Boshier et al. (2020), was ground shaking. Cultural heritage places are extremely fragile as a result of the limited technology that allows for structures that are resistant to ground shaking. As a result, there is considerable coordination between the local governments of the towns of Kawit, Bacoor, and Imus about earthquake drills as part of disaster preparedness strategies. The NHCP's cautious approach of routinely inspecting the historic church structures is crucial in this case, nevertheless. According to Ravankhah et al. (2017), government organizations should develop a program to raise awareness when it comes to disaster prevention and management. Since these locations are especially susceptible to natural calamities like ground tremors, certain government

agencies are required to conduct structural inspections at cultural heritage sites. The impact of ground shaking on historical churches is crucial because historically significant churches that have been damaged or destroyed by ground shaking can be challenging to rebuild (Calipusan-Elnar and Abocejo, 2021). Based on the findings, the local governments of Kawit, the cities of Bacoor and Imus, and the NHCP have carried out preventive actions in the form of earthquake drills and structural checks, respectively. However, the respondents claimed that because earthquakes occur suddenly, it is impossible to prevent natural disasters like these. Therefore, it is the duty of the NHCP to make the ancient churches earthquake-resistant. It is impossible to prevent earthquakes because they are one of the main natural disasters that cause harm to cultural heritage sites. However, the most important thing in this situation is to lessen the effects of the earthquake; as a result, one of the primary mitigating measures is routine structural inspections of cultural heritage sites (Bosher et al., 2020). In relation to the result, the respondents stated that the NHCP has disaster risk programs to mitigate the damage of ground shaking through regular structural checks conducted. As emphasized by Vafadari et al. (2017), it is the duty of the government agencies to guarantee that a cultural heritage site is prepared for and resilient to disasters. The NHCP's responsibility to make sure that cultural heritage places, like historical churches, can manage their catastrophe risks, has been met in the case of the research.

**Table 3.** *Disaster preparedness on ground shaking of the historical churches.*

Kawit church	Bocoor church	Imus cathedral
The Kawit Church is vulnerable to ground shaking because the structure is old.	The Province of Cavite is prone to earthquake because a faultline passed through the province	The Province of Cavite is prone to earthquake and makes the Imus Cathedral susceptible to damage if a strong earthquake occur
Ground Shaking happens during no strong earthquake experience. Regular checking for possible structural cracks. The NHCP has some preventive measures which is Regular structural monitoring.	Ground Shaking happens during no strong earthquake experience. Regular checking for possible structural cracks. There are earthquake drills that the LGU's and other stakeholders participated in. Structural checks are regularly done.	Ground Shaking happens during no strong earthquake experience. Regular checking for possible structural cracks. The local government of Imus City has a disaster preparedness plan when it comes to earthquakes like practicing earthquake drills.
Ground Shaking cannot be prevented, only preventive measures. The NHCP has a Disaster risk program in case an earthquake occurs.	Earthquakes cannot be prevented. Precautionary measures are done using regular structural checks.	Earthquakes cannot be prevented. There is an annual structural check that is done by the NHCP as a precautionary measure.

## Conclusion

The respondents from the representatives of the NHCP are aware that cultural heritage sites are vulnerable to natural disasters based on the outcome of the disaster preparedness survey. The preventative steps to ensure catastrophe readiness are the restoration projects and the soundness test performed by the NHCP. Although the NHCP performs an annual structural checkup, the soundness test was completed a long time ago. When it comes to disaster preparedness, the NHCP has collaborated with the Kawit local government unit as well as the Cities of Bacoor and Imus. The reaction to disasters and the frequency of soundness tests are issues with managing disasters at cultural heritage sites. The geographic characteristics of a place are primarily to blame for the cultural heritage site's vulnerability. Because it is an integral part of their history, culture, identity, and religion, the cultural heritage site is significant from a societal perspective. The respondents claimed that due to ongoing restoration and modernisation

work, historical churches are disaster-ready. Although minor repairs are carried out frequently, the most recent significant restoration and modernization work were carried out on the Kawit Church in 1990 and the Imus Cathedral in 2011. Historic churches need to be prepared for disasters because they are old and have a lot of historical significance. Additionally, as they are a part of the community, they must survive for the future. All of the historical churches are at risk of flooding due to their separate surrounding rivers, according to the disaster preparedness study results for flooding. Flooding has affected all of the historic churches (Bacoor, Kawit, and Imus). There are flood control initiatives that will benefit the entire region, such as the Imus River Basin Project, which will stop flooding in the province's low-lying areas. Flood can be prevented so long as the government plans and implements flood mitigation projects. The constant monitoring of the water level is the final safeguard that is essential in preventing floods. The outcome of the ground shaking (seismic) disaster preparedness test demonstrates that the NHCP officials are aware of the historical churches' susceptibility to ground shaking. However, there were no significant earthquakes that occurred in the ancient churches. Additionally, the NHCP is in charge of structural inspections, and the municipal governments of Kawit, the Cities of Bacoor and Imus coordinate earthquake exercises. According to every respondent, it is impossible to prevent ground trembling, but precautions should be taken anyway. One such precaution is doing routine structural inspections.

The researchers draw the conclusion that NHCP is aware of the ancient churches' vulnerability to disasters based on their findings. As preventative measures, restoration projects and a soundness test were used; nevertheless, the soundness test wasn't repeated for a while. The local government and NHCP work together to coordinate disaster preparedness. Disaster response is a problem since historical churches aren't given priority and because of the geographical characteristics that rendered them vulnerable. Due to their significance to religion, culture, history, and identity, historic churches have social significance. The restoration and modernization initiatives that were completed have made the historic churches disaster-ready. Due to its age, worth to the community, and importance, historic museums must be prepared for disasters. Flooding frequently occurs in the ancient churches. While local governments have developed measures to reduce flooding, floods can be avoided provided that government policies and regular water level monitoring are put into practice. A crucial element of flood control is the regular monitoring of the water level. Earthquakes can cause the antique churches to shake. For disaster readiness in the event of ground shaking, the NHCP and the local government coordinate. Finally, since ground shaking cannot be entirely avoided, precautions like routine structural inspections are made. The study's findings led the researchers to provide the following recommendations for enhancing the ancient churches in Cavite, Philippines, which are prepared for disasters: Every five years, the Historical Churches must undergo a soundness test. The historical church should have a staff member designated for disaster preparedness by the local governments of Kawit, Bacoor, and Imus. It is necessary to increase public awareness of the significance of historical churches. It is necessary to keep track of the Imus River Basin Sub Project's progress.

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## Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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