# Analysis of Physical Archive Storage Strategies in Flood-Prone Areas: Villa Nusa Indah 2 Residental Complex

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**Abstract.** This study aims to analyze the strategies used by residents in flood-prone areas to manage physical archives as part of risk mitigation efforts in household-level public administration. The research was conducted in the Villa Nusa Indah 2 Residential Complex, Bogor Regency, using a qualitative approach through in-depth interviews with three key informants. The findings indicate that the storage of important documents such as ID cards, family cards, diplomas, and property certificates is still largely carried out manually, which remains ineffective in addressing flood risks. Meanwhile, some residents have begun implementing digital archiving as a form of technological adaptation to ensure continued administrative access. The study highlights the importance of a hybrid approach in household document management and underscores the need for local government involvement in providing education, training, and policy support related to community document governance in disaster-prone areas. The implications of this research contribute to the development of public administration practices focused on mitigation and document resilience at the community level.

**Keywords:** Physical archives; Household administration; Archive digitization; Document management; Hybrid approach.

## Introduction

Personal archives and documents are an integral part of the public administration system, as they serve as the legal foundation for various interactions between citizens and the state. According to Susanti & Puspasari, (2020), archives function not only as written evidence but also as tools for memory and decision-making in governance. At the micro level, such as within households, the presence of documents like Family Cards, birth certificates, diplomas, and land ownership certificates is essential for accessing public services, including education, healthcare, and social assistance.

However, the sustainability of physical archives is often threatened by geographic and climatic conditions, especially in disaster-prone areas such as flood zones. Villa Nusa Indah 2, located in Bogor Regency and flanked by two major rivers, is one such area that has experienced an increased frequency of flooding over the past five years. These floods have caused damage to residents' documents, resulting in delays in public service delivery and the fulfillment of citizens' administrative rights. In this context, disaster-resilient archive storage strategies become a vital component of risk management and public service policy.

Disaster mitigation in community archive management can be viewed as part of adaptive public administration. According to Denhardt & Denhardt (2015), such administration requires governments and citizens to be more responsive, participatory, and proactive in addressing environmental challenges. One form of adaptation that is increasingly being adopted is digital archiving. As Wekke (2021) suggests, digital storage

allows people to retain access to and use essential documents even if the physical copies are damaged by disasters.

Unfortunately, the adoption of digital storage technologies remains limited due to gaps in digital literacy and access to technological devices at the household level. Furthermore, physical storage methods used by the community often lack waterproof materials or standardized classification systems. Therefore, it is important to examine how residents in flood-prone areas manage their document storage—both manually and digitally—as a form of administrative mitigation and part of adaptive public governance.

This study aims to analyze physical and digital archive storage strategies in the Villa Nusa Indah 2 Residential Complex, Bogor Regency, an area with a high level of flood vulnerability. Using a qualitative approach, the study explores residents' experiences in managing household archives and evaluates the effectiveness of these methods in addressing disaster risks. The findings are expected to provide input for the formulation of mitigation-based public policies and to strengthen community participation in building administrative resilience at the local level.

## Methods

This study employs a descriptive qualitative approach aimed at gaining an in-depth understanding of the physical and digital archive storage strategies adopted by residents in flood-prone areas, specifically in the Villa Nusa Indah 2 Residential Complex, Bogor Regency. This approach was chosen because it allows the researcher to explore the subjective experiences and actual practices of the community in dealing with the risk of archive damage due to flooding.

### *Research Location and Subjects*

The research was conducted in Villa Nusa Indah 2, located in Gunung Putri District, Bogor Regency, West Java — a residential area geographically vulnerable to flooding due to its position between two major rivers: the Cileungsi River and the Cikeas River. The study focuses on residents who have firsthand experience managing household archives during flood events.

The research subjects consist of three key informants selected through purposive sampling, with the following criteria:

- Have lived in the flood-prone area for at least five years;
- Own or have owned important documents in physical form;
- Have experienced document damage due to flooding;
- Are willing to share information openly and in detail.

The three informants include two local residents and one neighborhood head (RT) in the affected area.

### *Data Collection Techniques*

Data were collected using two main techniques:

- In-depth interviews: Conducted in a semi-structured manner to allow flexibility in exploring the experiences and archive storage strategies of the informants.
- Direct observation: The researcher observed the residential environment, document storage systems, and physical protections used for household archives.

In addition, secondary data were obtained from flood documentation by the Cileungsi–Cikeas River Care Community (KP2C) and scholarly references on disaster mitigation and household archive management.

### *Data Analysis Techniques*

Data were analyzed using thematic analysis, which involves categorizing the information into key themes aligned with the research focus: (1) manual storage strategies, (2) digital storage strategies, and (3) the effectiveness of combining both. The analysis steps included:

- Transcribing interview results;
- Interpreting meanings and contextualizing findings within the framework of public administration and risk mitigation theories.

Data validity was strengthened through **source triangulation**, by comparing interview results,

observations, and documentation to ensure consistency of the information.

*Research Ethics*

This study was conducted with full consideration of ethical standards in social research. Each informant was provided with a clear explanation of the research objectives and was assured of confidentiality regarding their identity if requested. The researcher ensured that informant participation was entirely voluntary and free from any form of coercion.

## Result and Discussion

*Results*

**Overview of Research Objects**

Villa Nusa Indah 2 Housing in Bekasi is a housing complex located in Bojong Kulur, Mt. Putri District, Bogor Regency. This housing is known for its strategic location, close to public facilities such as schools, hospitals, shopping centers, and transportation access. This housing is flanked by two large rivers, namelyCikeas Riverand the Cileungsi River which joins the northern part of the complex asBekasi River. Villa Nusa Indah is the northernmost residential complex inBogor RegencyAndDüsseldorf Squat, therefore people often think that Villa Nusa Indah is located inBekasi City.

The first time this housing was built in 1993 by the developer PT. Kentanix Supra International. In the early years of its development, the facilities at Villa Nusa Indah such as parks, waterways, sports centers (now Funpark) and road infrastructure were well maintained. In 2005, this housing asset was handed over to the Bogor Regency Government, making the residents in this housing repair and build their own public facilities.

In 2007, for the first time, this housing was hit by floods due to the overflow of the Cikeas and Cileungsi rivers. However, the problem of flooding in this housing has never ended until now.

Sub Complex:

- Villa Nusa Indah 1
- Villa Nusa Indah 2
- Villa Nusa Indah 3
- Villa Nusa Indah 5

**Identity Description of the Informant**

This study involved three informants who are members of the general public who live in Villa Nusa Indah 2 Housing, Bogor Regency, an area prone to seasonal flooding. Informants were selected using purposive sampling techniques, which are based on certain criteria set by the researcher to be relevant to the focus of the research. These criteria include:

1. Residents who have lived in flood-prone locations for at least the last 5 years;
2. Possess or have had important records in physical form (such as deeds, diplomas, certificates, and other important documents);
3. Willing and able to provide information openly;
4. Be directly involved in the process of storing, preservation, or saving household archives.

Informants have diverse professional backgrounds and experiences, with the aim of gaining a broad perspective on family archive storage strategies. The following is a list of research informants:

**Table 1** List of Informants

| No. | Informant | Sources | Information |
|---|---|---|---|
| 1. | Residents of Villa Nusa Indah 2 | Mr. Achmad Nurachim | Residents affected by the flood with several documents affected by the flood (Birth Certificate, Certificate, Diploma, and Vehicle BPKB) |

| | | | |
|---|---|---|---|
| 2. | | Luqman | Residents affected by the flood with several documents affected by the flood (Securities, Certificates, and Books) |
| 3. | Chairman of RT Villa Nusa Indah 2 | Bambang Sutopo | The Chairman of RT 05 Villa Nusa Indah 2 who was also affected. |

In-depth interviews were conducted to explore their experiences in dealing with floods and what strategies have been used in storing archives safely, both physically and digitally. The data from these three informants enriched the research findings and provided a comprehensive picture of the challenges and practical solutions of archival storage in disaster-prone environments.

***Analysis of Research Results***

The researcher will describe the results of observations and research interviews in the field based on the title of this study, which is about the Strategy for Storing Physical Archives in Flood-prone Environments, which was carried out on the residents of Villa Nusa Indah 2, Bogor Regency, as an area that routinely experiences seasonal floods.

Climate change and rainy season irregularities have magnified the potential for flooding in various areas, including residential areas. This condition triggers the need for an archive storage strategy that is not only administratively safe, but also resistant to disaster risks, especially floods. Family archives such as birth certificates, diplomas, land certificates, and vehicle ownership documents are important documents that must be saved and maintained so that they are not damaged or lost when a disaster occurs. Therefore, it is important for the public to understand the form of secure archive storage both physically and digitally.

The results of this research were obtained through data collection techniques in the form of interviews and direct observation of several residents affected by the flood in Villa Nusa Indah 2. The interview technique is carried out in depth so that the data collected is natural and contextual, in accordance with the informant's experience. The interview structure that the researcher designed is flexible, not fixated on standard guidelines. This allows the researcher to explore further if there is an unclear answer or requires further elaboration from the informant. Through this approach, researchers can understand the archival storage strategies carried out by residents, both conventionally and through mitigation approaches such as digitization and the use of waterproof storage media.

***Manual Archive Storage Strategy in Flood-prone Environments***

Based on the results of in-depth interviews and direct observation of three key informants, it is known that the manual archive storage strategy is still the most common method used by people in flood-prone environments. Some of the factors that affect the sustainability of this method are limited access to technology, habits that have been built up from generation to generation, and administrative needs that still require the existence of physical documents as legal evidence in official affairs. The three informants—Mr. Achmad Nurachim, Mr. Luqman, and Mr. Bambang Sutopo—revealed that they still keep important family documents, such as birth certificates, diplomas, family cards, land certificates, and vehicle certificates, in physical form.

Mr. Achmad emphasized the importance of physical storage of important documents: "*I still keep some important documents in physical form, such as birth certificates, land or house certificates, education diplomas, and vehicle BPKB.*"

This reflects that despite the potential for digitalization, confidence in the reliability of physical documents in emergency situations remains high. However, according to observations, the storage of such physical documents is more often based on protection against physical damage or disasters, and not based on resilience to the greater threat of natural disasters.

Mr. Luqman added, "*The main obstacle in storing digital documents is the limitation of storage devices such as laptops that sometimes need to be updated or experience errors.*"

This underscores one of the major challenges faced by people living in flood-prone areas. Uncertainty about the feasibility of digital devices, as well as limited access to technology, makes

physical document storage preferable.

In its implementation, the physical document storage strategy still relies on simple methods. The space available in the house, such as cupboards, drawers, or top shelves, is the main place for storage. In fact, there are flood mitigation efforts carried out to keep documents safe. Storage in plastic folders, special waterproof bags, or placement in higher places, such as upstairs or second-floor closets, are the alternatives chosen by some people. Mr. Bambang explained:

"*I kept these documents in an odner which I then put on the top shelf in a special room. The goal is to keep it dry and safe from potential water exposure during flooding.*"

However, despite the mitigation measures that have been taken, this approach still has significant weaknesses, especially in the face of the threat of flooding that can come suddenly with quite extreme heights. Standard plastic cabinets or folders, while they may reduce the risk of damage, are not designed to provide total protection against water. Water can still seep through non-impermeable materials or reach storage areas if flooding comes in extreme conditions. Mr. Achmad also added:

"*Sometimes, even if stored in a safe place, moisture and water can still damage documents.*"

From these findings, it can be concluded that the manual storage strategies currently used are defensive and traditional. While this is the most practical and affordable option in the short term, the resilience of physical documents to natural disasters, particularly floods, remains very limited. This approach that is still widely used has not taken advantage of more advanced technologies, such as waterproof cabinets or airtight filing boxes, which can provide more effective protection against document damage in emergency situations.

In this context, it is important to consider the implementation of further solutions that are more adaptive to disaster threats, such as the integration of more waterproof storage technologies and more optimal maintenance of digital devices. Counseling to the public on the importance of using more durable technology as well as better protection of physical documents, such as waterproof storage boxes and special cabinets, will be helpful in improving the resilience of documents to natural disasters.

***The Effectiveness of Digital Archive Storage in Flood-Prone***

**Environments as Disaster Mitigation**

In response to the limitations of manual archival storage strategies, some informants have begun to turn to digital storage strategies to protect important family documents from the threat of disasters such as floods. Archive digitization is carried out by scanning documents and storing them in the form of digital files in PDF or JPEG format. These digital documents are then stored on personal devices such as laptops, flash drives, external hard drives, or cloud storage services, which provide easy access and protection of data from physical damage.

Mr. Achmad Nurachim and Mr. Luqman are among the informants who have implemented this digitization system, although it is not completely comprehensive. Mr. Achmad said:

"*I have digitized several important documents... especially for Family Cards (KK), ID cards, and house certificates. The goal is to remain accessible if needed at any time and physical documents are unavailable or damaged.*"

This shows that digitalization provides advantages in terms of accessibility and resilience to the risk of physical damage due to natural disasters.

Digital storage has a clear advantage, namely being able to eliminate the risk of physical damage due to water, fire, termites, or moisture. In addition, digital documents can be reprinted if needed, and can be accessed anytime and from anywhere as long as there is an internet connection. This provides convenience and time efficiency in a variety of situations, as well as allows for higher mobility compared to physical document storage. In the context of disaster mitigation, digitization serves as a form of permanent backup that can save valuable archives from disaster damage.

However, although the digitization of archives offers an interesting solution, this strategy is not free from a number of challenges. Several informants mentioned the obstacles faced in its implementation, such as data security risks (lost, deleted, or hacked), limited storage devices, and low technological literacy among the public. Mr. Luqman stated:

"*The main obstacle in storing digital documents is the limitation of storage devices... I also have to*

*regularly move data to other storage media such as external hard drives."*

This statement emphasizes the importance of adequate infrastructure in supporting secure and reliable digital storage.

Mr. Bambang also revealed that he has not done a thorough digitization, because he is not familiar with how it works and has experienced files lost due to technical errors. This shows that although digital storage has great potential, awareness and ability to manage digital data are still the main obstacles in its implementation in society.

Floods, as an annual natural disaster, have become a trigger for people to start realizing the importance of digitizing documents as a form of mitigation against physical damage due to disasters. From the results of the interviews, most of the informants began to digitize important family records, such as ID cards, family cards, house certificates, birth certificates, and other valuable documents. Digitization is done by scanning documents and storing them in the form of digital files such as PDF or JPEG, which facilitates data accessibility and distribution.

Mr. Achmad stated that by storing documents in digital form, he felt more at ease because he had a backup copy that could be accessed at any time:

*"I personally consider digital storage to be safer from the risk of flooding because documents are not in physical form so they cannot be damaged by water. However, digital storage still requires an understanding of technology and account security."*

Nonetheless, Mr. Achmad also emphasized the importance of understanding digital account security and data management, which is a challenge for most people.

Digital storage is considered efficient in terms of mobility, accessibility, and duplication. Digital documents can be shared via email, stored in the cloud, and reprinted if needed. This is a major advantage in emergency situations, where quick access to documents becomes essential. Therefore, digitization not only offers advantages in terms of the physical durability of documents, but also provides high flexibility in emergency conditions.

However, although digital storage provides many advantages, obstacles in its implementation must be considered. One of them is the limited knowledge about digital document management, such as systematic file naming, the use of cloud storage, and data security. Mr. Luqman stated:

*"The main obstacle in storing digital documents is the limitation of storage devices such as laptops that sometimes need to be updated or have errors."*

In addition, Mr. Bambang Sutopo revealed that he has not done a thorough digitization because he is not used to it, and has experienced incidents of important files being lost due to errors or negligence in managing data. This shows that the effectiveness of digital storage is greatly influenced by the level of digital literacy, the quality of the devices used, and the awareness of the importance of regular data backups.

In general, digital storage has great potential as a disaster mitigation strategy, especially in areas with high flood risk. Advantages in terms of resistance to physical damage, ease of access, and duplication of data make digitization an important step in protecting important documents. However, in order for its effectiveness to be achieved to its maximum, there needs to be more intensive digital literacy education and adequate storage infrastructure at the household level. Without this support, digitalization will only be a partial solution that does not fully address the challenges at hand.

***Comparison of Advantages and Disadvantages of Manual and Digital***

**Storage for Storage Strategy Optimization**

From the results of interviews and observations, it can be seen that no storage method is completely perfect. Both manual and digital storage have their own advantages and disadvantages, which complement each other. In this case, the selection of the right method depends on the needs, level of technological literacy, and risks faced by individuals or communities in disaster-prone areas, especially floods. Here is an in-depth comparison based on the key dimensions found in this study:

**Table 2** Comparison of Advantages and Disadvantages of Manual and Digital Storage

| Dimension | Manual/Physical Storage | Digital Storage |
|---|---|---|
| Flood resistance | Susceptible to damage by water and moisture | Not physically affected by flooding |
| Accessibility | Easy access without additional tools | Requires digital devices and internet connection |
| Legality of documents | Legally recognized in most administrative matters | Still needs legalization in some contexts |
| Risk of loss | Can burn, drift, be eaten by termites | Can be deleted, damaged, or lost due to errors or forgot passwords |
| Ease of distribution | Limited, need photocopies for duplication | Easy to share via email/cloud |
| Technology dependency | Device independent | Highly dependent on digital skills and electronic devices |
| Initial costs | Cheap, just need a folder or cabinet | Need scanners, computers, additional storage |
| Long-term security | Weak to physical disasters | Need backup and data security system |

Based on the comparison in the table above, it can be seen that each method has complementary characteristics. The following description will review in a narrative manner how these advantages and disadvantages affect the effectiveness of document storage strategies, especially in the context of flood-prone areas.

1. **Flood Resilience**

   Digital storage has a significant advantage in terms of resilience to natural disasters such as floods, as digital data is not affected by physical damage due to water or moisture. In contrast, manual archives, even if stored at higher altitudes or in waterproof containers, remain vulnerable to physical damage, as Mr. Achmad revealed:

   "*Even if stored in a high place, moisture and water can still damage documents.*"

   Digital storage offers a more secure solution, especially in areas with a high risk of flooding.

2. **Accessibility and Ease of Use**

   Manual archives are easier to access directly without the need for a device or internet connection. This makes it very easy in emergency situations or when access to technology is limited. However, in terms of mobility and speed of data sharing, digital archives excel. Digital documents can be easily accessed, shared, and distributed via email or cloud storage. Mr. Achmad assessed that:

   "*Digital storage is more secure because it's easily accessible at any time, as long as there's a device and an internet connection.*"

   This suggests that although physical archives have the advantage of ease of access without additional tools, digitization offers higher speed and efficiency in situations that require rapid distribution.

3. **Legal Legality and Validity**

   Until now, physical documents are still more recognized in various formal administrative matters and legal processes. Many legal documents still require physical form as legal evidence.

However, with the development of technology, some types of digital documents are now beginning to be accepted with conversion or legalization, although the process is more complicated. For example, Mr. Bambang said:

"*Physical documents are more legally recognized, but I also see the importance of having a digital backup.*"

Although physical documents still play an important role in the context of legality, the recognition of digital documents is increasing along with legal developments related to digitalization.

4. **Easy Distribution and Backup**

One of the advantages of digitalization is the ease of distributing and backing up data. Digital documents can be shared via email or copied to cloud storage, making them easily accessible to many people quickly. On the other hand, physical documents require a time-consuming and costly photocopying process. However, while digitalization offers advantages in terms of data distribution and backup, Mr. Luqman reminds us of the importance of:

"*Digital documents must be backed up regularly, otherwise the risk of data loss is also great.*"

It's important to remember that while digitization offers ease of distribution, protection through backups remains indispensable.

5. **Risk of Loss**

Physical documents are particularly vulnerable to physical damage, such as burning, drifting, or being eaten by termites, especially when disaster strikes. Digital archives, while more secure against physical damage, are still vulnerable to data loss due to user error, device damage, or cyberattacks. One of the proposed solutions is to use a regular backup system and use secure storage devices, such as external hard disks or cloud storage.

6. **Technology Dependency**

Digital storage is highly dependent on digital skills and electronic devices. This is an obstacle for most people who are not familiar with technology or do not have adequate devices. Mr. Bambang stated:

"*I want to digitize the documents, but I'm also worried if there are mistakes or data loss.*"

The success of the implementation of digital storage depends heavily on the understanding and readiness of the community in managing digital data.

Based on the results of the interviews, most informants agreed that a combination of manual and digital storage is the ideal solution. As stated by Mr. Achmad:

"*Ideally, the two are combined – physical documents remain, but equipped with digital backups.*"

This *hybrid* approach offers dual protection for family-important documents, as well as addressing the challenges inherent in each method. By combining these two methods, the public can maintain the integrity of important documents physically and digitally, which will be very useful in dealing with disasters such as floods.

As a step forward, the public needs to be encouraged to implement a more adaptive and integrated storage strategy, namely maintaining physical documents for administrative matters that still require physical evidence, while developing digital backups for disaster risk mitigation. This approach will create a safer, more efficient, and more resilient storage system to the risk of natural disasters.

***Discussion***

As explained in the previous chapter, the strategy of archiving in a disaster-prone environment is very important, especially in ensuring the availability, security, and accessibility of organizational information. Environments that are at high risk of inundation or flooding demand adaptive and effective storage mitigation systems and innovations. Thus, this discussion will review in more depth how the archive storage approach is applied and how effective it is in real conditions.

In the process of collecting data, the researcher determined 3 informants, consisting of 2 informants, namely the general public of Villa Nusa Indah 2, and 1 informant from Mr. RT 05 Villa Nusa Indah 2. The information collected included their experience in managing archives during floods, challenges faced during

floods, and adaptive efforts made to ensure minimizing the impact of damage to document archives from floods.

***Manual Archive Storage Strategy in Flood-prone Environments***

Based on the results of in-depth interviews and observations of the Villa Nusa Indah 2 Housing community, the strategy of manual archival storage is still the main method used in storing important family documents. This is in line with the findings of Suliyati, (2019) who stated that people tend to store documents such as birth certificates, ID cards, certificates, and diplomas in physical form because they are considered more legally valid and easier to access without the need for additional technology.

However, in terms of disaster risk mitigation, this strategy has significant weaknesses. Paper archives are very vulnerable to damage caused by water, moisture, and mold, as happened to informants Pak Achmad and Pak Luqman whose documents were damaged by floods. This weakness confirms what Kuswati & Zulaikha, (2020) revealed, that the storage of physical archives without adequate mitigation approaches is very prone to losing important information after a disaster occurs.

Although some residents have made simple mitigation efforts such as storing documents in high cabinets, in plastic folders, or waterproof bags, these efforts have not been fully effective in dealing with major floods that submerge houses to chest height. In the context of archive management theory, as stated by Khasanah, (2023), storage must consider logical systems, physical security, and ease of access. This is not fully visible in the field, because there are still many residents who keep archives with other items without a classification system and without waterproof facilities that are completely up to standard.

In other words, manual storage strategies still rely on traditional approaches and are not equipped with protective equipment specifically designed to deal with disasters. As stated by Fatmawati et al., (2024), the storage of personal documents requires four main aspects: documentation, structuring, preservation, and assessment. However, in practice, the community has only reached the stage of documentation and simple arrangement, while aspects of preservation and long-term assessment have not been widely implemented.

This condition shows that there is a gap between theory and practice, as well as the need for further education on the importance of special archive storage devices, such as waterproof archive containers and waterproof cabinets. In addition, literacy about the importance of storing documents in strategic locations (such as the second floor, high iron shelves, or airtight containers) has also not become a common habit.

***The Effectiveness of Digital Archive Storage in Flood-Prone Environments as Disaster Mitigation***

Digitization of archives has begun to be implemented by some communities as a form of adaptation to the threat of flooding. From the results of the interview, it is known that some residents such as Mr. Luqman and Mr. Achmad have scanned documents into digital format (PDF or JPEG) and stored them on a flash drive or personal laptop. This strategy is the first step towards information technology-based archive management, as explained by Sutirman (2020), that digital archives are a modern form that offers easy access and long-term protection.

In the context of disaster mitigation, this approach is particularly relevant. According to Government Regulation No. 21 of 2008 concerning Disaster Management and explained by Wekke (2021), mitigation is an important effort made before a disaster occurs to reduce risk. Digital storage is part of technology-based mitigation, which can significantly avoid damage to documents due to flooding because they are not physical. Data stored in the cloud or hard disk can be recovered at any time and accessed from any location.

However, the effectiveness of this digital storage is still constrained by several factors. First, limited access to technology, especially devices such as scanners, laptops, and external storage media. Second, digital literacy is still low, causing many citizens to not understand the importance of data backup, securing files with passwords, or using secure cloud services. Third, the risk of losing digital data, such as deleted files, device damage, or data theft by irresponsible parties, is also a major concern as explained by Darmansah et al., (2024).

Based on the effectiveness indicators according to Gibson (in Murtikasari et al., 2020), digital

storage already has clarity of purpose (reducing the risk of document loss), but it is still not optimal in other indicators such as achievement strategies, facilities, and supervision. Without training support, proper digital infrastructure, and continuous supervision, this digitalization strategy will only be temporary.

However, the existence of community initiatives to scan and store documents is a positive indication of awareness of document protection. According to Pranata, (2024), digitizing household archives will be very effective if accompanied by the use of the right storage media, such as external HDDs or large-capacity cloud storage protected by encryption.

***Comparison of Advantages and Disadvantages of Manual and Digital Storage for Storage Strategy Optimization***

From the field results and comparison of theories, it can be concluded that the best archive storage strategy in flood-prone environments is a combination of manual and digital methods. This strategy is known as the *hybrid* approach, which is also recommended in the archival literature as conveyed by Ghifari Aminudin Fad'li et al., (2023), that archive management should consider the existence of physical and digital documents to strengthen information resilience.

Physical documents remain important because they are still an administrative and legal requirement in many official affairs. However, storing them without digital backups is high-risk in disaster-prone areas. Meanwhile, digital documents, while flexible and waterproof, still need to be maintained through layered backups and training in the use of good storage media.

This strategy is also in line with the principle of archive preservation according to Kuswati & Zulaikha, (2020), namely the protection of documents so that they can still be used in the long term, both through preventive approaches (control of temperature, humidity, and the use of waterproof folders) and curative approaches (restoration or re-scanning of damaged documents). The hybrid approach combines the two in a complementary way.

This research framework has explained the cycle of linkages between public awareness, disaster mitigation, archive management, and preservation. Therefore, a manual-digital integrative strategy will be a system that is able to survive in emergency conditions as well as for long-term needs.

By considering the findings in the field that have been analyzed and discussed in depth, it can be concluded that archival storage in flood-prone environments requires an adaptive and sustainable approach. An integrative strategy between physical and digital storage is the most rational solution to be implemented, especially in the midst of limited infrastructure and digital literacy of the community. The results of this discussion provide a strong foundation for formulating conclusions, practical implications, and policy recommendations that will be elaborated further.

## Conclusion

This study was conducted to analyze the strategies of storing physical and digital archives applied by communities in flood-prone environments, especially in Villa Nusa Indah 2 Housing, Bogor Regency. Based on the results of observations and interviews with three main informants representing the general public and environmental officials, a number of important findings were obtained regarding the practice of storing family documents in the midst of the risk of natural disasters.

First, it is known that the method of storing archives manually or physically is still the main strategy used by many citizens. Important documents such as birth certificates, ID cards, diplomas, and house certificates are generally stored in plastic folders or closed cabinets in high places. However, these efforts have not been fully effective in dealing with high-intensity floods. Many residents have damaged documents due to seeping water, moisture, and even total immersion. This indicates that manual storage has not been supported by a waterproof protective means or a good classification system.

Second, some residents have begun to implement archive digitization as a disaster mitigation measure. This process is done by scanning important documents into digital format and storing them on devices such as laptops, flash drives, or cloud storage. This strategy is considered more efficient and resistant to the risk of physical damage. However, its effectiveness has not been maximized because it is still faced with challenges such as limited technological devices, low digital literacy, and lack of knowledge about backup systems and data security.

Third, the results of the study show that there is no one completely ideal storage method. Both manual and digital storage have advantages and disadvantages. Therefore, the most effective strategy is an integrative or hybrid approach, which combines manual methods for document legality purposes, and digital methods for long-term protection. By storing physical documents securely and supplementing them with digital copies, the public can minimize the risk of data loss due to disasters and still meet legal requirements in official administration.

Overall, an optimal archival storage strategy in flood-prone environments must consider physical security factors, data accessibility, technological readiness, and community literacy. There is a need to increase awareness and education so that people not only store documents traditionally, but also be able to adopt storage technology that is safer, more efficient, and resilient to disasters.

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