



SURVEY REPORT

Project Title: Strengthening the capacity of officials on Integrated Flood Management Plans (IFMP): Integrating IFMP into provincial disaster prevention plans in coastal provinces of Central Vietnam



Hanoi, 2023

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Preface

Vietnam is one of the countries most heavily affected by floods and storms. In recent years, under the impact of climate change, floods have occurred more frequently, with more extreme consequences, causing significant damage to people, livestock, property, environmental pollution, and significant impacts on the country's economy. Although Vietnam has been proactive in flood management, these solutions are mainly localized, fragmented, unsystematic or short-term and may cause more severe flooding to nearby areas. Therefore, there is a need for a different approach and IFMP is effective approach.

In 2016, the Directorate of Water Resources developed a manual of Integrated Flood Management Plans (for provincial level). This was the first manual for developing IFMP in Vietnam. Through its implementation, it was found that the document needs to be updated and revised for various reasons, such as the issuance, amendment, and supplementation of many new legal documents. Moreover, these manuals do not provide detailed methods for building flood hazard maps or flood risk maps. Therefore, the consultant will proceed to develop the IFMP manual and integrating IFMP into provincial disaster prevention plans. To serve this purpose, the Center for Environmental Fluid Dynamics conducted a field survey in three provinces of Quang Nam, Quang Ngai, and Binh Dinh to collect documents, evaluate the current situation of floods, the current status of the Integrated Flood Management Plan developed locally, and the advantages and difficulties in the process of building Integrated Flood Management Plans.

1. Objectives

General objective: Conduct field surveys to collect relevant documents in 3 provinces of Quang Nam, Quang Ngai, Binh Dinh; Viet Nam Disaster and Dyke Management Authority, IFMP documents from both domestic and foreign sources. In addition, conduct surveys and gather information from local departments and agencies regarding the current status of IFMP development at the local level.

Specific objectives:

- Collecting documents on the economy, society, meteorology, hydrology, floods, natural disaster prevention and control... in 3 provinces; collecting documents on IFMPs that have been developed in river basins in Viet Nam Disaster and Dyke Management Authority and manual of developing IFMP which issued by the Directorate of Water Resources.
- Discussing with local departments and agencies to evaluate the current status of developing IFMP in the 3 provinces and identify advantages and challenges in the IFMP development process.

2. Survey location

2.1. Quang Nam Province

Quang Nam is located in the central region of Vietnam, bordering Thua Thien - Hue province and Da Nang city to the north, Quang Ngai and Kon Tum provinces to the south, Laos to the west, and the East Sea to the east. Quang Nam has 18 administrative units at the district level, including 2 cities, 1 town and 15 districts.



Figure 1. Administrative map of Quang Nam province illustration

The total natural land area of the province is 10,438 km². The terrain slopes gradually from west to east and is divided into three regions: the western mountainous region, the central plain, and the coastal plain in the east. Quang Nam is located in the tropical monsoon climate zone with an average annual temperature of over 25°C and an average annual rainfall of 2,000 – 2,500mm, with more than 70% of the rainfall concentrated in the three months of the rainy season (October, November, and December). The province has two main river basins: the Vu Gia - Thu Bon river basin and the Tam Ky river basin.

Quang Nam has two seasons with two different types of climate: the dry season from January to August and the rainy season from September to December, which can extend into January in some areas in the southwestern mountains. Flooding in Quang Nam usually occur from mid-October to mid-December. The amount of rainfall during the flood season is high, and the short, steep rivers and streams can quickly accumulate water, creating strong floods. Quang Nam is the most severely affected province by floods, with large floods occurring in 1964, 1999, 2009, 2016, 2017, 2020, and 2021. In 2020, the province was affected by various natural disasters, including storms, floods, and inundation, causing serious losses in terms of human life and property, with 46 deaths, 17 missing people, 360 injured people, 652 completely destroyed houses, 1,702 hectares of rice fields, and 5,693 hectares of flower fields flooded, 10,000 meters of dykes eroded, and an estimated loss of around 11,000 billion VND [2]. In 2021, natural disasters also caused many losses with 3 deaths, 15 injured people, 4,306 hectares of rice fields, 2,673 hectares of flower fields flooded, 1,400 meters of embankment, and 1,200 meters of bank eroded, and an estimated loss of around 980 billion VND. [3].

2.2. Quang Ngai Province

Quang Ngai is located in the South Central Coast region. Its area stretches about 100km from north to south, with a width of over 60km from east to west. It borders Quang Nam province to the north, Gia Lai and Kon Tum provinces to the west, Binh Dinh province to the south, and the East Sea to the east. Quang Ngai has 13 administrative units, including 1 city, 1 town, and 11 districts.



Figure 2. Administrative map of Quang Ngai province illustration

The topography is divided into two regions: the coastal plain in the east and the vast mountainous area running along the west with peaks over 1,000m high. The mountainous area covers nearly 2/3 of Quang Ngai's territory. Quang Ngai is located in the tropical monsoon climate zone. There are two distinct seasons: the dry season and the rainy season. The average annual temperature is 25.6-26.9°C, the average relative humidity is 84.3%, and the average annual rainfall is 2,504mm. The river network of Quang Ngai is relatively abundant and evenly distributed throughout the province, including 4 main rivers: Tra Bong, Tra Khuc, Ve and Tra Cau.

Most of the rivers originate from the Truong Son range and flow into the East Sea, having common characteristics of being short, steep, with fast water accumulation and strong flow. Floods occur regularly during the rainy season, with the most concentrated storms from September to December. The 1999 flood was the largest ever in Quang Ngai, causing serious and long-lasting consequences for society, economy, and the environment. It resulted in 108 deaths, 215 injuries, over 17,000 collapsed or damaged houses, and total economic losses of over 500 billion VND. In 2009, storm No.9 combined with floods caused a huge loss for the people in the province, with 33 deaths, 2 missing people, and total economic losses of about 4,465 billion VND. Most recently, in 2020, natural disasters caused 1 death, 29 injuries, 381 houses were completely damaged, 186,249 houses were damaged, and the total economic losses were 4,930 billion VND [4]. In 2021, Quang Ngai was directly affected by 04 storms, 09 periods of rain and floods; these natural disasters caused 350 houses to have their roofs blown off or damaged (mainly with less than 50% damage), more than 13,000 houses were flooded, nearly 17,000 hectares of rice fields and over 4,000

hectares of flowers were damaged... The estimated total value of damages is around 1,010 billion VND [5].

2.3. Binh Dinh Province

Binh Dinh is a coastal province located in the South Central region, which is part of the key economic zone in Central Vietnam. It shares a border with Quang Ngai province to the north, Phu Yen province to the south, Gia Lai province to the west, and the East Sea to the east. Its natural area covers 6,025 km² and is divided into 11 administrative units, including 1 city, 2 towns, and 8 districts.



Figure 3. Administrative map of Binh Dinh province illustration

The terrain of the province gradually lower from west to east, with a difference of about 1,000m. Common landforms include mountainous and hilly areas, intermediate plains, and coastal areas. Binh Dinh belongs to the South Central Coast climate zone and the East Truong Son climate region. There are two distinct seasons: the dry season from January to August, and the rainy season from September to December. The climate is divided into three main regions: Region 1 is the northwest mountainous area of the province, including An Lao district, Vinh Thanh district, the western communes of Hoai An district, and the western mountainous communes of Hoai Nhon town. This region has an annual rainfall of over 2,200 mm and an average temperature of less than 26°C. Region 2 is the southern mountainous region of the province, including Tay Son district, Van Canh district, and the western communes of Phu Cat district, with an annual rainfall of 1,800-2,100 mm and an average temperature of less than 26°C. Region 3 is the coastal plain area, with

an annual rainfall of 1,700-2,200 mm and an average temperature of over 26°C. Binh Dinh has many small rivers and streams with high gradients. There are four major rivers: Lai Giang, La Tinh, Kon, and Ha Thanh, with a total length of 352 km and a total basin area of 5,699 km².

On average, Binh Dinh province has 3 to 4 floods per year. According to statistical data, in 1999 the province experienced the most flood episodes with 8 floods, while in 2000 there were only 2 floods. The flood season starts from September to December with heavy rainfall concentrated from October to December. The rivers in the province are all short and steep, so floods often occur quickly with a high flow rate, causing many human and property damages. In 2018, a storm and floods caused 28 deaths and missing people, flooded 10,149 houses, collapsed 7 houses, damaged 9 houses, caused landslides on 47,150 m² of national and provincial roads, caused erosion on 10.75 km of dikes, and 78.8 km of canals, flooded 19,478 ha of newly planted rice fields, and destroyed 391 ha of reclaimed land, resulting in an estimated damage of 520.5 billion VND [6]. In 2021, there were 5 floods due to heavy rain that caused the southern plain of the province to be heavily flooded, with 4 deaths, 30 collapsed houses, 35,564 flooded houses, 8,731 ha of Dong Xuân 2021-2022 winter-spring rice fields, and 324 ha of flower fields along the river [7].

3. Survey method

❖ Method of collecting documents

This method is based on primary and secondary information sources collected from previous research documents to build a logical basis to prove a hypothesis. The collected documents are usually numerous and chaotic, and to get an overview of the entire collection, it must be processed and synthesized to help generalize the characteristics of the whole. The consultant cooperates with localities to collect documents related to economy, society, meteorology, hydrology, floods, IFMP that has been developed, natural disaster prevention and control...

❖ Statistical analysis and synthesis method

The statistical method is a process that includes statistical investigation, summarizing information (also called statistical synthesis), and analysis. From the collected documents, statistical analysis is carried out to make evaluations of the current state of the Comprehensive Flood Management Plan.

❖ Expert consultation method

The expert consultation method is a method that utilizes the knowledge of experts in related field to evaluate the nature of a complex scientific or practical event to find optimal solutions to these events or evaluate a scientific product. This is the most economical method, but the right expert must be chosen with expertise in the issue being researched. These experts must have scientific integrity.

During the implementation of this project, the consultant consults with experts on the impacts of floods on various fields, evaluates the current situation, advantages, and difficulties in the process of building and implementing the Natural Disaster Prevention Plan, IFMP, other strategies, programs, planning, and development plans. The consultant also gathered opinions and suggestions on training documents.

4. Survey plan

Time and location: 04/12/2022 to 10/12/2022 in 3 provinces of Quang Nam, Quang Ngai and Binh Dinh.

Table 1. Survey plan

No.	Time	Content
1	04/12	Travel from Ha Noi to Quang Nam
2	05/12	Work with Steering Committee for Disaster Prevention and Search and Rescue of Quang Nam Province
3	06/12	Work with the Department of Agriculture and Rural Development of Quang Nam Province
4	07/12	- Travel from Quang Nam to Quang Ngai - Work with Steering Committee for Disaster Prevention and Search and Rescue of Quang Ngai Province
5	08/12	Work with the Department of Agriculture and Rural Development of Quang Ngai Province
6	09/12	- Travel from Quang Ngai to Binh Dinh - Work with Steering Committee for Disaster Prevention and Search and Rescue of Binh Dinh Province
7	10/12	- Work with the Department of Agriculture and Rural Development of Binh Dinh Province - Travel from Binh Dinh to Ha Noi

Several survey photos:



Figure 4. Work with Steering Committee for Disaster Prevention and Search and Rescue of Quang Nam Province



Figure 5. Work with Steering Committee for Disaster Prevention and Search and Rescue of Quang Ngai Province



Figure 6. Work with Steering Committee for Disaster Prevention and Search and Rescue of Binh Dinh Province

5. Results

5.1. Collected documents

❖ Viet Nam Disaster and Dyke Management Authority

- Integrated Flood Management Plan for the Huong River Basin in Thua Thien Hue Province until 2020, with a vision towards 2030;
- Integrated Flood Management Plan for the Cai Nha Trang River Basin;
- Integrated Flood Management Plan for the Cai Ninh Hoa River Basin;
- Integrated Flood Management Plan for the Ba River Basin;
- Integrated Flood Management Plan for the Giang and Nhat Le River Basins in Quang Binh Province (2016-2030).

❖ Quang Nam Province

- Resolution No. 68/NQ-HDND dated December 8, 2020 on the 5-year socio-economic development plan for 2021-2025;
- Disaster response plan at different risk levels amid the COVID-19 pandemic in Quang Nam province in 2021;
- Quang Nam province's plan for disaster prevention and control for the period 2021-2025;
- Report on the summary of disaster prevention and control in 2017 and implementation in 2018;
- Report on the summary of disaster prevention and control in 2021 and implementation in 2022;
- Plan for risk management of natural disasters in the Vu Gia Thu Bon river basin;
- Decision No. 2557/QD-UBND dated September 7, 2021 on the establishment of the Quang Nam province Command Committee for Disaster Prevention and Search and Rescue;
- Updated action plan for climate change response for the period 2021-2030 and vision to 2050.

❖ Quang Ngai Province

- Report on the implementation of the socio-economic development plan in 2018, 2019, 2020, 2021, and 2022;
- Disaster response and search and rescue plan in Quang Ngai province in 2022;
- Decision No. 04/QD-PCTTTKCN dated August 3, 2022 on the issuance of the disaster response and search and rescue plan in Quang Ngai province in 2022;
- Report on the summary of disaster prevention and search and rescue work in 2015, 2016, 2017, 2018, 2019, 2020, and 2021;

- Quang Ngai province's plan for disaster prevention and control for the period 2021-2025;
- Report on the results of the community awareness-raising and community-based disaster risk management project for the period 2009-2020 in Quang Ngai province;
- Decision No. 01/QD-PCTTTKCN dated March 22, 2022 on the establishment and specific assignment of tasks to members of the Quang Ngai province Command Committee for Disaster Prevention and Search and Rescue in 2022;
- Decision No. 1301/QD-UBND dated August 27, 2021 on the establishment of the Quang Ngai province Command Committee for Disaster Prevention and Search and Rescue;
- Report on the summary of the national target program for climate change response for the period 2010-2015;
- Report on the implementation of the climate change response action plan in Quang Ngai province in 2016;
- Action plan for climate change response in Quang Ngai province for the period 2011-2020;
- The Active Climate Change Response Action Plan, enhancing resource management and environmental protection in the province until 2020.

❖ **Binh Dinh Province**

- The 5-year socio-economic development plan 2021-2025;
- The natural disaster response plan for Binh Dinh province in 2021;
- Decision No. 2992/QD-UBND on the natural disaster response plan for Binh Dinh province in 2022;
- Reports summarizing the work of disaster prevention and search and rescue in 2017, 2018, 2019, 2020, and 2021;
- The disaster prevention plan for Binh Dinh province from 2021 to 2025;
- Decision No. 1546/QD-UBND of May 11, 2018, approving the outline of the task of the integrated flood management plan for the Kone - Ha Thanh river basin;
- The report on the integrated flood management plan for the Kone - Ha Thanh river basin in Binh Dinh province from 2021 to 2035;
- Decision No. 2620/QD-UBND of August 16, 2022, approving the integrated flood management plan for the Kone - Ha Thanh river basin;
- Decision No. 1643/QD-UBND of May 26, 2022, approving the outline of the task of the project: Integrated flood management plan for the La Tinh river basin;
- Decision No. 562 of February 24, 2020, on the formation of the Provincial Disaster Prevention and Search and Rescue Command;

- Decision on the establishment of the Provincial Disaster Prevention and Search and Rescue Command and Civil Defense in 2021;
- The hydrological report on the Kone - Ha Thanh river basin in 2019;
- The comprehensive irrigation planning report for Binh Dinh province from 2015 to 2020 and the vision towards 2030

In addition to the list of documents collected at the aforementioned locality, the consultant has also collected relevant documents on flood risk management, including the manual of developing IFMP in 2016, published by the General Department of Irrigation as part of the Disaster Risk Management Project in Vietnam phase 2 (DRSV-II). This manual served as a basis for the consultant to develop a new manual with appropriate approaches, enhancing accuracy in assessing potential flood risks and proposing and prioritizing solutions.

5.2. Current situation of IFMP development

❖ Quang Nam Province

In 2019, a Natural Disaster Risk Management Plan was developed for the Vu Gia - Thu Bon River Basin in Quang Nam province through the project "Vietnam Natural Disaster Management - Vu Gia - Thu Bon River Basin Natural Disaster Risk Management Plan 2020-2030". The Disaster Risk Management Plan covers several types of natural disasters such as storms, droughts, saltwater intrusion and flood. It outlined the legal basis, the necessity to develop a Natural Disaster Risk Management Plan, the socio-economic development situation in the river basin, and assessed flood risks through qualitative methods. It also proposed a priority list of construction and non-construction measures. However, the plan had yet to address some steps, including step 1: establishing a working group; step 2: reviewing documents for analysis and evaluation of collected data and had not clearly demonstrated the multi-sectoral approach as well as the participation of various departments and sectors.

Quang Nam province has favorable mechanisms and policies for implementing the Integrated Flood Management Plan (IFMP) as it is one of the tasks to be carried out in natural disaster prevention and control, regulated in Article 13a of the Law amending and supplementing some articles of the Law on Natural Disaster Prevention and Control and Law on Dykes No. 60/2020/QH14 of June 17, 2020, and the National Strategy for Natural Disaster Prevention and Control by 2030, vision to 2050 No. 379/QĐ-TTg of March 17, 2021 of the Prime Minister. This creates favorable conditions for localities to propose projects and allocate funding. The province also had experience in developing Natural Disaster Risk Management Plans. However, the existing plan, which was developed in 2019 for all types of natural disasters, needs to be updated and supplemented to address the current flood situation in the area. Moreover, as the Vu Gia - Thu Bon River Basin is interprovincial, coordination between Quang Nam and Da Nang provinces is necessary to develop an IFMP for the basin, posing a significant challenge. In addition, to develop the IFMP effectively, it is essential to adopt a multi-sector approach that involves clear understanding and cooperation among all relevant departments and agencies. Therefore, training

activities are required to improve their understanding of their roles and responsibilities in IFMP development

❖ **Quang Ngai Province**

Quang Ngai province also has advantages in terms of mechanisms and policies, because IFMP is one of the tasks to be implemented in disaster prevention and control. In addition, the main rivers in the province are all intra-provincial rivers, making it easy to collect and synthesize data. Besides the aforementioned advantages, the province still faces some difficulties. Currently, Quang Ngai province has not yet developed IFMP for its river basins, thus the province lacks experience in building IFMP. Additionally, the province also encounters difficulties in allocating funds for implementation. The concept of IFMP is new to the locality, with new methods and approaches, so it will take more time to research and implement IFMP construction.

❖ **Binh Dinh Province**

Binh Dinh has developed an IFMP for the Kone-Ha Thanh river basin (Decision No. 2620/QD-UBND dated August 16, 2022) and is currently working on IFMPs for the La Tinh and Lai Giang rivers. The IFMP for the Kone-Ha Thanh River Basin included an analysis and assessment of relevant legal documents related to IFMPs for river basins, a review of related disaster risk management plans, an assessment of flood risks using mathematical models, and a list of construction and non-construction measures. However, there were misunderstanding in identifying the members of the IFMP working group in the plan, as the consulting unit was mistakenly identified as the working group, and the specific content of step 3 (on-site investigation) and step 4 (risk assessment) were not clearly presented. These are important steps in identifying risk levels and proposing flood prevention measures for each area.

Binh Dinh also has benefits from favorable mechanisms and policies, as IFMP is one of the tasks to be implemented in disaster prevention and control. The province has the advantage of experience in developing IFMPs for the Kone-Ha Thanh river basin. However, the content of IFMPs is very detailed and requires participants to have in-depth expertise in GIS, flood mapping, risk mapping and assessment, and therefore local officials lack the necessary expertise to independently develop IFMPs for river basins within the province.

5.3. Evaluation of the manual of developing IFMP in 2016

The consultant has reviewed the manual of developing IFMP (for provincial level) in 2016. The handbook includes 4 main parts:

- Part 1: Overview of the document, including the basic contents for building the handbook, its purpose, and the target users.
- Part 2: Introduction to integrated flood management, including the situation of floods and natural disaster risk management in Vietnam, and the management of river basin floods.
- Part 3: Instructions for developing IFMP, including 6 main contents or 6 steps to implement IFMP (Integrated Flood Management Plan): Step 1 - establishing a working group; Step 2

- reviewing documents; Step 3 - conducting field surveys; Step 4 - analyzing flood risks; Step 5 - developing IFMP; Step 6 - implementation, review, and evaluation.

- Part 4: Forms.

After the implementation process, some advantages and disadvantages of the manual were identified as follows:

- Part 1: The manual provided orientation documents for developing IFMP, which were updated to the time of developing the manual, and the purpose and target users of the manual were fully stated. However, currently, many new legal documents have been issued, revised, and supplemented, so the manual needs to be adjusted accordingly.
- Part 2: The manual provided an overview of flood situations and damages caused by floods up to the time of developing the manual, and it stated the situation of natural disaster risk management in Vietnam and the specific objectives of comprehensive flood management. However, the updated damage data caused by floods only extended up to 2010 and not up to the time of issuing the handbook in 2016.
- Part 3: The manual provided 6 steps to develop IFMP. Step 1 identified the parties involved and established the working group, but did not generalize the group's necessary. Step 2 listed all the necessary documents that needed to be reviewed but lacked the content to evaluate the effectiveness of the IFMPs that had been previously developed. Step 3 provided the necessary steps for field investigation and survey, but did not give detailed content that needed to be implemented. Step 4 did not provide methods for analyzing flood risks. The manual only provided one method of flood risk analysis by creating a hazard map and overlaying various layers of information (administrative, economy, infrastructure...). Step 5 provided guidelines for proposing measures for river basins and the main contents of the report framework. However, the guidelines for proposing measures did not address the implementation schedule for the measures, and there was no template for the list of flood prevention and control measures in IFMP. The report framework lacked legal basis, evaluation of the current flood prevention and control work, and assignment of responsibilities. Step 6 provided detailed guidance for implementation, review, and evaluation.

Conclusion

Through the field survey process, the unit has achieved the following contents:

- Investigated and collected documents from Departments, Committees, and Sectors: economy, society, meteorology, hydrology, floods, IFMP, natural disaster prevention and control...
- Evaluated the current situation of IFMP development in 3 provinces and the advantages and disadvantages during the IFMP development process. However, Quang Ngai province has not yet implemented IFMP development. Through the review process, it was found that most IFMPs of the provinces have not been fully implemented according to the 06 steps, and the implementing officials have encountered many difficulties in the IFMP building method. The detailed evaluation of IFMP implementation highlights the need for capacity building among officials to fully comprehend the concept, objectives, and steps of IFMP construction.
- The result of evaluating the manual of developing IFMP for the provincial level in 2016 shows that the manual needs to be updated and revised due to many newly issued, revised, and supplemented legal documents and the manual also lacks detailed methods for developing flood hazard maps, risk maps, causing confusion during implementation at localities.

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