TRAINING 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

Quang Nam, 2023
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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

Project Leader
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Contributors
Dr. Le Minh Nhat, Department of Disaster Response and Remedy
M.S. Dang Dinh Duc, Center for Environmental Fluid Dynamics
Dr. Nguyen Quoc Son, Center for Environmental Fluid Dynamics
Nguyen Hong Thuy, Center for Environmental Fluid Dynamics
M.S. Pham Thi Tuyet May, Center for Environmental Fluid Dynamics

Quang Nam, 2023
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## Abbreviation

<table>
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<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>APN</td>
<td>Asia-Pacific Network for Global Change Research</td>
</tr>
<tr>
<td>MARD</td>
<td>Ministry of Agriculture and Rural Development</td>
</tr>
<tr>
<td>VNU</td>
<td>Viet Nam National University</td>
</tr>
<tr>
<td>CEFD</td>
<td>Center for Environmental Fluid Dynamics</td>
</tr>
<tr>
<td>IFMP</td>
<td>Integrated Flood Management Plans</td>
</tr>
</tbody>
</table>
Preface

In Vietnam, under the effect of climate change, natural disasters, especially storms and floods, cause more and more damage. Although Vietnam has been active in flood management, these solutions are mainly localized, fragmented, unsystematic or in a short-term period and may cause more severe flooding to nearby areas. Therefore, there is a need for a different approach. IFMP is an integrated management with the aims to maximize the benefits of floodplains and minimize flood damage with a watershed and multisector approach. Recognizing the necessary of IFMP, Center for Environmental Fluid Dynamics, VNU University of Science, Vietnam National University organized training for officials with an aim to enhancing efforts in providing support to the officials through tailored research activities; enhancing efforts in providing capacity development to the officials that meet their specific needs by organizing training; and creating holistic and transdisciplinary capacity development activities on IFMP.

The training for local officials of agencies such as: Provincial Steering Committee for Disaster Prevention and Search and Rescue, District Steering Committee for Disaster Prevention and Search and Rescue and other relevant departments and agencies. The presentations received attentions and appreciation as well as the fruitful comments of the experts and representatives from local agencies. Based on the comments raised at the training, Center for Environmental Fluid Dynamics (CEFD) will, in collaboration with the experts, finalize the report and training documentation. The training was successfully organized on April 2023 in Quang Nam, Viet Nam.

Taking this opportunity, Center for Environmental Fluid Dynamics would like to express sincere thanks to APN for their generous support and to all participants for their active and constructive comments to the training.
Organization of the training

Objectives

(i) Share the knowledge-base of IFMP and how to develop IFMP,
(ii) Guidance on integrating IFMP into the provincial disaster management plan

Date of training

14 and 17 April 2023

Venue

Ban Thach hotel,
No.10 Bach Dang, Tan Thanh Ward, Tam Ky City, Quang Nam, Viet Nam.

Organizer

Center for Environmental Fluid Dynamics (CEFD), VNU University of Science, Vietnam National University.

Supported by

Asia-Pacific Network for global Change Research (APN).
PART 1. REPORT OF THE TRAINING

1. Introduction

The training course was organized by CEFD in collaboration with the Provincial Steering Committee for Disaster Prevention and Search and Rescue of Quang Nam with the following main contents:
- Guidance on developing and updating IFMP;
- Guidance on integrating IFMP into the provincial disaster management plan.

A training for local officials of agencies: Provincial Steering Committee for Disaster Prevention and Search and Rescue, District Steering Committee for Disaster Prevention and Search and Rescue and other relevant departments and agencies was held at Ban Thach hotel in Quang Nam on 14 and 17 April 2023.

2. Objectives of the training

The general objective of the training was to strengthen the capacity of provincial authorities/organizations and disaster prevention agencies in developing IFMP and integrating it into provincial disaster prevention and control plan.

The specific objectives of the training were to:
(iii) Share the knowledge-base of IFMP and how to develop IFMP,
(iv) Guidance on integrating IFMP into the provincial disaster management plan

3. Training agenda

Training agenda is detailed below:

<table>
<thead>
<tr>
<th>Time</th>
<th>Contents</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day 1 – Morning (8:00 – 11:00)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 – 8:30</td>
<td>Opening remarks and introduction of delegates</td>
<td>Dr. Le Minh Nhat</td>
</tr>
<tr>
<td>8:30 – 9:00</td>
<td>Introduction to the steps of developing/updating the IFMP</td>
<td>Dr. Le Minh Nhat</td>
</tr>
<tr>
<td>9:00 – 11:00</td>
<td>Guidelines for building flood and hazard maps</td>
<td>Dr. Le Minh Nhat</td>
</tr>
<tr>
<td><strong>Day 1 – Evening (14:00 – 17:00)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:00 – 16:00</td>
<td>Guidelines for assessing flood risks</td>
<td>Dr. Le Minh Nhat</td>
</tr>
<tr>
<td>16:00 – 17:00</td>
<td>Guidelines for proposing solutions</td>
<td>Dr. Le Minh Nhat</td>
</tr>
<tr>
<td><strong>Day 2 – Morning (8:00 – 11:00)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 – 9:00</td>
<td>Guidelines for evaluating the effectiveness and impact of certain construction solutions</td>
<td>Dr. Le Minh Nhat</td>
</tr>
<tr>
<td>9:00 – 10:30</td>
<td>Guidelines for prioritizing solutions</td>
<td>Dr. Le Minh Nhat</td>
</tr>
<tr>
<td>10:30 – 11:00</td>
<td>Guidelines for building an IFMP report</td>
<td>Dr. Le Minh Nhat</td>
</tr>
</tbody>
</table>
4. Training Participants

The training was attended by representatives from the following organizations:

- Dr. Le Minh Nhat, Head of the Representative Office of Viet Nam Disaster and Dyke Management Authority in Central and Central Highlands Regions.
- Representatives of CEFD consultant: Assoc. Prof. Tran Ngoc Anh - Project leader, MSc. Dang Dinh Duc, Dr. Nguyen Quoc Son, MSc. Pham Thi Tuyet May, Ms. Nguyen Hong Thuy.
- Representatives of Steering Committee for Disaster Prevention and Search and Rescue of Quang Nam Province: Mr. Pham Quang Dong, Deputy Chief of the Office.
- Representatives from various departments: Department of Agriculture and Rural Development, Department of Natural Resources and Environment, Department of Planning and Investment, Department of Finance, Department of Transportation.
- Representative of Military Command of Quang Nam Province.
- Representative of Quang Nam Provincial Hydro-Meteorological Station.
- Representatives of Steering Committee for Disaster Prevention and Search and Rescue of districts, towns, and cities: Tam Ky, Hoi An, Dien Ban, Hiep Duc, Nong Son, Duy Xuyen, Dai Loc, Thang Binh, Que Son, Nui Thanh, Phu Ninh.

List of Participants:

<table>
<thead>
<tr>
<th>No</th>
<th>Full name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tran Thi Tu Anh</td>
<td>Division of Agriculture and Rural Development of Nong Son District</td>
</tr>
<tr>
<td>2</td>
<td>Tran Huu Tuy</td>
<td>Provincial Military command</td>
</tr>
<tr>
<td>3</td>
<td>Truong Hiep</td>
<td>Central Region Representative Office</td>
</tr>
<tr>
<td>4</td>
<td>Bui Trinh Minh Duc</td>
<td>Department of Planning and Investment</td>
</tr>
<tr>
<td>5</td>
<td>Phan Dinh Duy Phu</td>
<td>Division of Agriculture and Rural Development of Duy Xuyen District</td>
</tr>
<tr>
<td>6</td>
<td>Mai Thanh Son</td>
<td>Division of Agriculture and Rural Development of Hiep Duc District</td>
</tr>
<tr>
<td>7</td>
<td>Dinh Ngoc Binh</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>8</td>
<td>Nguyen Trong Quy</td>
<td>Department of Finance</td>
</tr>
<tr>
<td>No</td>
<td>Full name</td>
<td>Organization</td>
</tr>
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<td>---------------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>9</td>
<td>Nguyen Dinh Huon</td>
<td>Provincial Hydro-Meteorological Station</td>
</tr>
<tr>
<td>10</td>
<td>Vu Van Tinh</td>
<td>Provincial Hydro-Meteorological Station</td>
</tr>
<tr>
<td>11</td>
<td>Le Dinh Tuong</td>
<td>Economic Division of Hoi An city</td>
</tr>
<tr>
<td>12</td>
<td>Do Thi Phuong</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>13</td>
<td>Nguyen Thanh Cao</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>14</td>
<td>Rich Dai Phon</td>
<td>Department of Natural Resources and Environment</td>
</tr>
<tr>
<td>15</td>
<td>Nguyen Phi Hong</td>
<td>Economic Division of Dien Ban Town</td>
</tr>
<tr>
<td>16</td>
<td>Huynh Thanh Quoc</td>
<td>Division of Agriculture and Rural Development of Que Son District</td>
</tr>
<tr>
<td>17</td>
<td>Pham Tan</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>18</td>
<td>Le Thi Anh Dao</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>19</td>
<td>Nguyen Tan Nam</td>
<td>Division of Agriculture and Rural Development of Thang Binh District</td>
</tr>
<tr>
<td>20</td>
<td>Truong Thi Thuy Trang</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>21</td>
<td>Vo Thi Ly</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>22</td>
<td>Huynh Tan Hoang</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>23</td>
<td>Nguyen Thi Van Lan</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>24</td>
<td>Pham Van Thanh</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>25</td>
<td>Le Van Hiep</td>
<td>Division of Agriculture and Rural Development of Nui Thanh District</td>
</tr>
<tr>
<td>26</td>
<td>Nguyen Hong Nhuong</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>27</td>
<td>Trinh Ngoc An</td>
<td>Division of Agriculture and Rural Development of Phu Ninh District</td>
</tr>
<tr>
<td>28</td>
<td>Le Cong Duan</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>29</td>
<td>Pham Quang Dong</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>30</td>
<td>Nguyen Huu Thanh</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>31</td>
<td>Ha Thuy Linh</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
<tr>
<td>32</td>
<td>Truong Xuan Ty</td>
<td>Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province</td>
</tr>
</tbody>
</table>
5. Conduct of the training

The training was inaugurated by Dr. Le Minh Nhat, Head of the Representative Office of Viet Nam Disaster and Dyke Management Authority in Central and Central Highlands Regions, MARD. He warmly welcomed all participants to the training and provided some background information on the project and emphasized the objectives of the training. The consultant also pointed out that the important of developing IFMP in context of climate change and he hopes that through this training course, the participants will have a better understanding of the significance, objectives, and process of developing IFMP.

Figure 1. Dr. Le Minh Nhat, Representative Office of Viet Nam Disaster and Dyke Management Authority in Central and Central Highlands Regions, MARD, makes the welcome speech

In the first presentation, Dr. Le Minh Nhat gave brief introduction on the definitions of IFMP and the steps of developing/updating the IFMP. Subsequently, he presented in detail the specific steps of implementation, each of which was accompanied by illustrative examples to enable the participants to grasp the precise purpose, input, and output of each step. Specific key contents addressed in this presentation include:

- Definition, objectives of IFMP;
- Difference between traditional flood management and IFMP;
- Comparison between old version and new version of IFMP manuals;
- The steps of developing/updating the IFMP and detailed contents in each step;

Figure 2. Dr. Le Minh Nhat, MARD, presents Developing/updating IFMP
In the second presentation, MSc. Dang Dinh Duc presented the importance of integrating the IFMP into the disaster prevention plans, the steps involved, and provided illustrative examples for each step. Specific key contents addressed in this presentation include:

- Responsibilities and tasks of integration implementation;
- Content that needs to be integrated;
- The steps of integrating the IFMP into the disaster prevention plans.

Figure 3. MSc. Dang Dinh Duc, CEFD, presents Integrating IFMP into the provincial disaster management plan

In the discussion: At the end of the training course, the trainers raised several questions related to the training topics to see if the trainees were understood the lectures. In this section, we also want to know how the issues mentioned in the lecture were applied in local specific contexts. This section also allows participants to ask any questions they have, and the trainers answer or respond those questions. Through the training and discussion, the consultant has clarified the concerns of the participants, providing information on the methods and scope of application for each method.

Mr. Tran Huu Tuy, Military Command of Quang Nam Province

Vietnam is currently requiring localities to develop IFMP, which is a new concept. Through the training course, trainees have gained a better understanding of the meaning, objectives, and steps to develop IFMP. It is recognized that IFMP is a very effective approach, and based on this, localities can be more proactive in responding to natural disasters in general and floods in particular.
Through the training session, it was realized that officials involved in implementing the construction of IFMP require in-depth expertise in flood mapping and risk assessment... The consultant provided detailed guidance on these topics, but the amount of knowledge required is substantial, and further specialized training courses are needed to enable localities to proactively develop IFMP.

Trainees realized that prioritizing solutions in order is very necessary. This creates favorable conditions for localities to allocate budgets in short-term, medium-term, and long-term investment plans. However, currently the prioritization of solutions depends on the urgency and resources of the localities, without considering other aspects. Therefore, the method of prioritizing solutions which is addressed in the training session is very useful to ensure a balanced development between socioeconomic sectors and reducing the risk of floods.

After the training session, it was understood that Integrated Flood Management is managed according to the river basin, not according to provincial or district boundaries, or specific areas.

Finally, Dr. Le Minh Nhat briefly summarized what had been discussed during the training, and thanked all participants for their participation, especially those who contributed to the presentations and discussions.

6. Conclusion

After finishing the discussion, representatives of Viet Nam Disaster and Dyke Management Authority, representatives of the Steering Committee for Disaster Prevention and Control, Search and Rescue of Quang Nam province, the Consultant and delegates come to an agreement on the following:
- Flood is one of the greatest natural risks to sustainable development. At any scale, flood management is very important. To balance the development needs and risks, the best approach is the integrated management of floods. IFM is a process that promotes the coordinated management and development of water, land, and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. IFMP requires the coordination of multiple departments and sectors.

- Integrating IFMP into provincial disaster prevention plans is essential to avoid overlap in proposing solutions. During the integration process, it is necessary to consider the level of impact of floods on socio-economic development activities compared to the impact of other natural disasters, because each locality is characterized by different types of natural disasters.
PART 2. PRESENTATIONS AT THE TRAINING

1. Developing integrated flood management plans

MAIN CONTENTS

I
INTRODUCTION TO IFMP AND MANUAL

II
GUIDANCE ON THE STEPS FOR DEVELOPING IFMP

III
CONCLUSION AND DISCUSS
I. INTRODUCTION TO IFMP AND MANUAL

Concept (according to WMO and GWP)

Integrated flood management is a process that combines land and water resources management to maximize the benefits of flood-prone areas and minimize the damage caused by floods. Integrated flood management will apply a basin and multi-sector approach, involving communities and supported by mechanisms and policies in flood management.

Objective

- Maximizing benefits in areas at risk of flooding while minimizing the damage to people and property caused by floods, aiming for sustainable development in river basins, ensuring livelihood security and addressing the vulnerability of communities living in the basin.
- Minimizing damage to people and property.
- Protecting the environment and promoting sustainable development of the ecosystem.

I. INTRODUCTION TO IFMP AND MANUAL

The differences between traditional flood management and integrated flood management.

<table>
<thead>
<tr>
<th>Traditional flood management</th>
<th>Integrated Flood management</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Flood prevention plan is usually oriented towards extremes (design floods, historical floods)</td>
<td>- Applying risk management principles and may not completely controlled due to unpredictable changes in climate and socio-economic factors, as well as prioritizing multi-criteria measures.</td>
</tr>
<tr>
<td>- Measures (either construction or non-construction) focus on the goal of reducing floods and minimizing the local damage caused by floods. Usually, the measures implement in the three phases before, during, and after the flood have not been clearly distinguished. This leads to conflicts and mutual impacts that reduce effectiveness.</td>
<td>- The measures (either construction or non-construction) are considered to be integrated across river basins to harmonize benefits between different areas. Proposed measures for each phase before, during, and after floods are evaluated carefully to prioritize implementation in practice.</td>
</tr>
<tr>
<td>- Lack of participation from relevant parties.</td>
<td>- Participation from many stakeholders involved.</td>
</tr>
</tbody>
</table>
I. INTRODUCTION TO IFMP AND MANUAL

Legal basis:

- The Law on Natural Disaster Prevention and Control No. 33/2013/QH13 (amending and supplementing some articles of the Law on Natural Disaster Prevention and Control and the Law on Dykes No. 60/2020/QH14 dated June 17, 2020) which includes provisions on the development of a comprehensive flood management plan for river basins within provinces.

- "The National Strategy for Natural Disaster Prevention and Control until 2030, with a vision to 2050, Decision No. 379/QD-TTg dated March 17, 2021 by the Prime Minister of the Government, in which Task and Solution No. 6 is Develop and implement a Comprehensive Flood Management Plan for river basins, plans for strong storm and super typhoon, flash floods, landslides, saltwater intrusion, riverbank and coastal erosion control, droughts".

Practical basis:

- In some localities (such as Hue, Quang Binh, Phu Yen, Khanh Hoa...), the implementation of integrated flood management approach has shown to be appropriate.

- Although there are manual available (2016), the application in practice is still difficult, because this is a new approach.

Objective of the manual: To provide guidance for localities on the process of developing IFMP for river basins in their respective areas.

Target users of the guide: People's Committees of provinces/cities, Provincial Steering Committee for Disaster Prevention and Search and Rescue, Department of Natural Resources and Environment, Department of Agriculture and Rural Development, relevant ministries and agencies of the central government, international organizations, and NGOs providing resources to implement the IFMP.

The manual is structured as follows:

- Introduction
- Part 1: General information of manual
- Part 2: Introduction to Integrated Flood Management
- Part 3: Main contents for developing IFMP
- Part 4: Responsibilities of parties involved in building IFMP
- Conclusion
- References
- Appendix
## I. INTRODUCTION TO IFMP AND MANUAL

### Part 1: General information of manual

<table>
<thead>
<tr>
<th>Content</th>
<th>Old manual (2016)</th>
<th>New manual</th>
</tr>
</thead>
</table>

### Part 2: Introduction to Integrated Flood Management

<table>
<thead>
<tr>
<th>Content</th>
<th>Old manual (2016)</th>
<th>New manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Flood situation and damage</td>
<td>- Overview of flood situation and flood damages up to the time of manual development (2010)</td>
<td>- Updating the damage data until 2020.</td>
</tr>
<tr>
<td>- Integrated flood management of river basins</td>
<td>- Provide the definition and specific objectives of Integrated Flood Management</td>
<td>- Evaluation of the manual in 2016 and the current status of integrated flood management plans in the central provinces</td>
</tr>
</tbody>
</table>

## I. INTRODUCTION TO IFMP AND MANUAL

### Part 3: Main contents for developing IFMP

<table>
<thead>
<tr>
<th>Step</th>
<th>Outdated document (2016)</th>
<th>New material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: Establishing the working group</td>
<td>- Tasks for the team to carry out have not been summarized yet</td>
<td>- Identifying the tasks that the working group needs to carry out</td>
</tr>
<tr>
<td>Step 2: Reviewing documents</td>
<td>- Not collect and evaluate documents on natural characteristics, socioeconomic conditions, infrastructure, flood situation, and documents related to flood prevention and control in the river basin.</td>
<td>- Supplementing the collection and evaluation of documents on natural characteristics, socio-economic conditions, infrastructure, flood situation, and documents on flood prevention and control in the river basin.</td>
</tr>
<tr>
<td>Step 3: Field investigation and survey</td>
<td>- Not evaluate the previous IFMPs</td>
<td>- Supplement the evaluation of previous IFMPs</td>
</tr>
<tr>
<td>Step 4: Flood risk analysis</td>
<td>- The detailed guidance for the required tasks is not provided</td>
<td>- Detailed guidance on the tasks to be carried out</td>
</tr>
<tr>
<td>Step 5: Propose solutions and Develop Comprehensive Flood Management Plan report (CFMP)</td>
<td>- Not providing many risk analysis methods and still using simple risk assessment methods</td>
<td>- Provide advanced risk analysis methods (qualitative, quantitative) and risk assessment approaches</td>
</tr>
<tr>
<td>Step 6: Implementation and Review/Evaluation of IFMP</td>
<td>- Providing a phased implementation plan for measures and a template for a list of measures.</td>
<td>- Providing a phased implementation plan for measures and a template for a list of measures.</td>
</tr>
<tr>
<td></td>
<td>- The main content of the report lacks legal basis, evaluation of the current state of flood prevention and control in the river basin, and a section on assigning responsibilities</td>
<td>- The main content of the report is supplemented by legal basis, assessment of the current situation of flood prevention and control in the river basin, and assignment of responsibilities.</td>
</tr>
<tr>
<td></td>
<td>- A detailed guidance on implementing, reviewing, and evaluating the work is needed.</td>
<td>- Unchanged</td>
</tr>
</tbody>
</table>
1. **Identify the involved parties:**
   - Provincial People's Committee and centrally-governed cities;
   - Other relevant departments and agencies.

2. **Send official letters to the departments and agencies:**
   - The Provincial Steering Committee for Disaster Prevention and Search and Rescue sends official letters to the relevant departments and agencies.

3. **Decide to establish a task force:**
   - The provincial People's Committee makes a decision to establish IFMP working group.

*Note: The list of IFMP working group members must include at least one official from the Department of Agriculture and Rural Development, the Department of Natural Resources and Environment, the Department of Planning and Investment, the Department of Finance, the Department of Industry and Trade, and the provincial Hydro-Meteorological Station.*
IL. GUIDANCE ON THE STEPS FOR DEVELOPING IFMP

1. Collect and analyze related documents, programs/projects
   - Legal documents and policy mechanisms related to the project;
   - Related plans, programs/projects;
   - Natural and socio-economic characteristic documents, infrastructure documents, and flood situation documents (if there is an IFMP, update and supplement the documents);
   - Documents related to flood prevention and control activities in the river basin.

2. Collect documents
   - Collect documents from relevant departments and units.

3. Processing the collected documents
   - Analyze and evaluate the current situation of flood prevention and control activities:
     + Evaluate the IFMP
     + Evaluate the results of implementing the overall disaster prevention and control tasks and specifically for floods
     + Evaluate the current organizational structure and coordination of implementation
   - Evaluate and update the natural, socio-economic, and infrastructure characteristics in the province (a river basin map showing administrative layers, rivers and streams, transportation routes, etc.).

After completing step 2, it is necessary to convene IFMP working group meeting to discuss the implementation of the next steps. Depending on the resources, budget, and capacity of the locality, a decision may be made to invite additional consultant.

II. GUIDANCE ON THE STEPS FOR DEVELOPING IFMP

Some important contents that need to be surveyed and updated information.

- Meteorological and hydrological data, flood marks.
- Topographic data on river channels, canals, and detailed terrain in flood-prone areas.
- Data on infrastructure that alter the flow in the basin, flood control and drainage constructions, flood protection constructions, and constructions with potential to obstruct flood flow.
- Data on infrastructure and population in areas at risk of flooding.
- Assessment of the effectiveness of flood prevention and control measures, as well as risk reduction measures implemented in the basin.
- Assessment of the feasibility of flood prevention and control measures, proposed measures to reduce flood risk.
**II. GUIDANCE ON THE STEPS FOR DEVELOPING IFMP**

1. **Assessing flood resilience capability:**
   - Assessment of legal compliance, mechanisms, and policies;
   - Assessment of human resources and capacity of flood control forces;
   - Assessment of the current situation of flood forecasting and warning at the local level;
   - Assessment of equipment, materials, and facilities for flood control;
   - Assessment of the capacity of core response forces in flood control;
   - Assessment of the current situation of information systems and communication at the local level;
   - Assessment of the community’s awareness and skills in responding to natural disasters and training for flood control at the local level;
   - Assessment of flood control infrastructure;
   - Assessment of the current situation of support for post-flood damage control;
   - Assessment of financial resources for implementing flood control activities at the local level, either through direct or indirect investment.

2. **Building flood hazard maps.**

3. **Building flood risk maps.**
   - Developing flood maps using qualitative methods;
   - Constructing maps using quantitative methods.

4. **Flood risk analysis and assessment based on risk maps.**

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**Step 1:** Establish an IFMP working group.

**Step 2:** Collecting and processing of documents.

**Step 3:** Investigation and field survey.

**Step 4:** Flood risk assessment.

**Step 5:** Propose solutions and develop an IFMP report.

**Step 6:** Implementation, monitoring and evaluation.

> Some investigation and field survey images.

- Measure flood depth.
- Measuring flood levels using DGPS equipment.
- Additional surveying of topographic, river cross-sections data using depth sounder equipment combined with DGPS.
- Surveying infrastructure in flood-prone areas.
1. Building flood hazard maps:

- Flood hazard map shows the levels of flood (based on 3 factors: inundation depth, velocity, and inundation duration).

- The map displays:
  
  + Specialized layer: the maximum inundation depth and scale, distribution of peak flood velocity, and duration of inundation across space.
  
  + Background layer: geographic factors and hydraulic system such as reservoirs, pumping stations, dams, dykes, etc.

Flood Hazard Map of Vnub Long Province,
Source: Project "Investigation, Survey, and Issuance of Water Levels Corresponding to Flood Alert Levels in Vnub Long Province"
II. GUIDANCE ON THE STEPS FOR DEVELOPING IFMP

Modelling method

- Data collection: topography, hydro-meteorological data, infrastructure, etc.
- Model selection
- Model setup
- Calibration and validation
- Flood simulation under different scenarios
- Processing input data for the model: topography, hydrological data, infrastructure, etc.
- The scenario of major historical floods, climate change, super typhoon, reservoir discharge from upstream...

Modeling

The steps to setup model

Gathering input data
- Hydro-meteorological data;
- Topographical data;
- Existing flood control infrastructure and infrastructure in plans;
- Infrastructure that may affect flood flow;
- Land use maps;
- Urban development plans and land use plans;
- Historical flood documents.

Select modeling software
- 1D modeling software: MIKE 11, MIKE URBAN (urban), SWMM (urban), HEC-RAS.
- The 2D simulation models include MIKE 21, FLO-2D, and DelR3D.
- The combination of 1D and 2D modeling: MIKE Flood, HEC-RAS, IFAS...

Setup model
- Building computational grid
- Boundary conditions: Top boundary, inflow boundary, bottom boundary.
- Modeling flood control structures, water management structures and drainage systems.
- "Setting up connections between models (if any)."

Model calibration and validation
- The comparison of calculated results with measurements.
- Stepwise or optimization methods can be used.
- Validation with independent data set
- Selecting historical flood events (if data is available).
- In case of insufficient data, the method of similar catchment and/or field survey can be used.
Developing computational scenarios

- Historical flood events in the locality;
- Natural disaster risk level for floods and inundation in the locality (as regulated in Article 45, Decision No. 18/2021/QĐ-TTg);
- Climate change scenarios issued by the Ministry of Natural Resources and Environment;
- Super typhoon and flood scenarios caused by upstream reservoir discharge;
- Land use plans, urban development plans,... (related to scenarios of water exploitation, changes in urban infrastructure, etc.);
- Proposed measures to minimize flood damage (single measures or a combination of multiple measures).

Note: For coastal provinces in Central Vietnam, attention should be paid to the scenario of climate change and sea level rise.

2. Building flood risk maps

- Building GIS database
- Developing hazard maps

- Disaster hazard refers to the level (intensity) of a natural phenomenon that can cause adverse impacts to affected objects.
- Risk is the damage that a natural disaster can cause to people, property, environment, living conditions, and socio-economic activities.

DATABASE

- Geographic data: administrative boundaries, transportation networks, hydrological systems, land use/land cover, topography, socioeconomic and demographic data.
- Specialized data: exposed data, vulnerable data, hazardous data...
- The simulated results of flood hazards corresponding to different scenarios.
- Development plans/strategies
II. GUIDANCE ON THE STEPS FOR DEVELOPING IFMP

2. Developing flood risk maps

- A risk map is a tool used to identify natural risks in general and flood risks in particular.
- It shows:
  - Base layer: spatial zoning of risk levels.
  - Base layer: basic information on major roads, river systems, terrain elevations, key infrastructure, community living areas, administrative boundaries, etc.

Building a map using qualitative risk assessment method

\[ R = (H \times V \times E) \]

- Risk (R): This is the damage that natural disasters can cause to people, property, the environment, living conditions, and socio-economic activities.
- Threats/Hazard (H): The intensity of a natural disaster that can have adverse impacts on affected objects.
- Vulnerability (V): Vulnerabilities are characteristics and states of a community, environment, or assets that are easily affected and unable to withstand adverse impacts from natural disasters.
- Exposures (E): This refers to degree to which a person, infrastructure, housing, production capacity, and other tangible assets can be damaged (opposite of resilience) due to being located in an area prone to natural disasters.

The qualitative risk assessment matrix
II. GUIDANCE ON THE STEPS FOR DEVELOPING IFMP

2. Developing flood risk maps

➤ Perform risk mapping

Constructing flood risk maps using quantitative risk assessment method.

Quantitative risk assessment.

- It is a function of Probability and Damage. In other words, flood risk is determined by the expected annual damage value and the sum of all flood frequencies.

- The advantage is that it can better estimate the economic value at risk and compare the risk levels of different areas.

4. Analysis and assessment of flood risk based on flood risk maps

- Based on the flood risk map that has been developed, identify the risk zones and then analyze and evaluate the risk according to 5 levels (Decision No. 18/2021/QD-TTg dated April 22, 2021 on regulations on forecasting, warning, information dissemination on natural disasters and levels of natural disaster risk):
  + Low risk,
  + Moderate risk,
  + High risk,
  + Very high risk,
  + Catastrophic risk.

- For river basins that have already developed flood hazard maps or flood inundation maps, the development of flood hazard maps can be omitted.

- For river basins that have already developed flood risk maps, the development of flood hazard maps can be omitted.
II. GUIDANCE ON THE STEPS FOR DEVELOPING IFMP

1. Proposing list of measures 1
   List of measures 1 is a list of construction and non-construction measures compiled from the documents collected in Step 2.

2. Proposing list of measures 2
   List of measures 2 is the list of measures 1 combined with additional proposed measures based on the flood hazard map at Step 4.

3. Proposing list of measures 3
   List of measures 3 is the final list of measures sorted in priority order.
II. GUIDANCE ON THE STEPS FOR DEVELOPING IFMP

Prioritize solutions based on:
- Cost-benefit analysis
- Evaluation based on criteria set
- Consultation with experts and local stakeholders.

Multi-criteria analysis (MCA)
The MCA criteria set is applied to prioritize measures in the project "Enhancing Resilience to Climate Change-Induced Natural Hazards in Vietnam's Coastal Cities - Phase 2".

The template table of flood prevention and control measures

<table>
<thead>
<tr>
<th>No.</th>
<th>Program/Project</th>
<th>Objectives</th>
<th>Lead Agency</th>
<th>Coordinating Agency</th>
<th>Implementation divergence (Year)</th>
<th>Expense</th>
<th>Budget resource</th>
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<tr>
<td>A.I</td>
<td>Prevention and mitigation phase</td>
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<tr>
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<tr>
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<td>Remedial and reconstruction phase</td>
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<td>B</td>
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</tbody>
</table>
II. GUIDANCE ON THE STEPS FOR DEVELOPING IFMP

Step 1: Establish an IFMP working group.

Step 2: Collecting and processing of documents.

Step 3: Investigation and field survey.

Step 4: Flood risk assessment.

Step 5: Propose solutions and develop an IFMP report.

Step 6: Implementation, monitoring and evaluation.

Decision approving the IFMP:

- After the IFMP Working Group completes the IFMP Development Report, the Department of Agriculture and Rural Development will draft a Plan and submit a letter to the provincial People's Committee.

- The Department of Agriculture and Rural Development will direct the IFMP Working Group to complete the Plan and Report based on the feedback received.

- The Department of Agriculture and Rural Development will coordinate with the Provincial People's Committee Office to submit the draft Plan.

Implementation:

Department of Agriculture and Rural Development:

- Guiding, checking, and urging the implementation of IFMP
- Acts as a contact point with national and international organizations
- Organizing review, monitoring, and evaluation of the implementation.

Department of Planning and Investment:

- Balancing consideration, advising on investment capital by stage and annually.
- Advising the provincial People's Committee to issue policies on financial support for agencies implementing the Plan.

Other local departments and agencies:

- To lead or coordinate the implementation as agreed in the detailed deployment plan.
ILGUIDANCE ON THE STEPS FOR DEVELOPING IFMP

Step 1: Establish an IFMP working group.
Step 2: Collecting and processing of documents.
Step 3: Investigation and field survey.
Step 4: Flood risk assessment.
Step 5: Propose solutions and develop an IFMP report.
Step 6: Implementation, monitoring and evaluation.

Review

Propose to the Provincial People's Committee to adjust the content, measures, and plans to be suitable for the actual conditions.

Organize review and report recommendations to the People's Committee for updating the Comprehensive Flood Management Plan for the river basin under necessary conditions.

Leading the annual and 5-year periodic evaluation and drawing lessons learned.

Provincial Steering Committee for Disaster Prevention and Search and Rescue, Department of Agriculture and Rural Development.

Monitoring and evaluation
Perform at three levels:

Level 1: Output monitoring
- Regular and continuous monitoring of the implementation of plans, processes, and resulting outputs.

Level 2: The results assessment
- Monitoring and evaluation of changes in behavior or system which are changes resulting from activities in the IFMP.

Level 3: Impact assessment
- Referring to the evaluation of changes towards the objectives, which are the results of changing behaviors or systems due to the implementation of activities in the IFMP.
III. CONCLUSION AND DISCUSS

- The manual is developed based on the 2016 manual document and practical implementation experiences of localities that have developed IFMPs. The document provides detailed steps to develop Integrated flood management plans for the locality.
- The manual is designed to support provincial People's Committees in developing IFMP for river basins within their jurisdiction. Depending on the actual situation, localities can flexibly implement the steps and methods introduced in this manual.
- The objective of the training course is to enhance the knowledge of local officials, help them understand the process of building IFMPs, the data, methods, and tools used at each step, thereby developing practical-oriented proposals and controlling the quality of the product during the development process.
- Localities should consider proposing necessary training courses in the near future.

Thank you!

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2. Integrating IFMP into the provincial disaster prevention plans

Report contents

1. General information;

2. Overview of Natural Disaster Prevention and Control Integrated Flood Management Plans;

**General information**

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

**Grant:** Asia-Pacific Network for Global Change Research (APN)

**Areas:** Quang Nam, Quang Ngai, Binh Dinh

**Time:** 1/10/2022 – 30/9/2023

**Objectives of the Project:** The main objective of the project is to improve the quality and effectiveness of disaster prevention at the provincial level, in order to reduce the damages caused by floods. It can be done through strengthening the capacity and knowledge of officials in the relevant departments and agencies in developing integrated flood management plans, guiding the integration of the IFMP into the provincial disaster prevention and control plan.

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**Typical natural disaster zoning in Vietnam**

(Source: Circular 35, 02/2021/TT-BNNĐT guiding the development of disaster prevention and control plans at all levels in localities)
The Provincial Disaster Prevention Plans Framework

1. Legal basis for planning;
2. Purpose, requirements;
3. Characteristics of natural, social, economic, and infrastructure conditions;
4. Evaluation of the current state of disaster prevention and control work;
5. Identifying and assessing natural disaster risks;
6. Measures for disaster prevention and control;
7. Integrating disaster prevention and control content into plans, programs, and projects;
8. Determining resources and annual and 5-year progress;
9. Determining the responsibilities of organizations and individuals.
**Integrated Flood Management Plan (IFMP) Framework.**

1. Legal basis for developing Integrated Flood Management Plan according to river basin;
2. Natural, socio-economic and infrastructure characteristics in the province;
3. Review and evaluate the current situation of flood prevention and control in the river basin;
4. Identify and evaluate the level of flood risk, the impact of floods on people and socio-economic activities;
5. Propose flood prevention and control measures;
6. Determine the responsibilities of organizations and individuals.

**Instructions for integration:** 3 questions to be answered.

**Question 1:** What are our responsibilities and duties?

**Question 2:** What content needs to be integrated?

**Question 3:** How should the integration be carried out (process, content)?
Responsibility, duty.

The objective of integrating manual.

- Clarify the purpose, significance, content, and implementation methods of integrating IFMP;
- Provide technical basis for provincial officials to integrating IFMP into the provincial disaster prevention plans;
- Serve as a reference document for relevant parties on integrating IFMP into disaster prevention activities and local development.
Embedding content

**Plans**

**Integrated Flood Management**
- Flood development;
- Flood risk assessment;
- Flood control measures:
  - Prevention, mitigation:
    - Structural measures;
    - Non-structural measures;
  - Response;
  - Disaster recovery;

**Provincial Disaster Prevention**
- Natural disaster situations;
- Identify and assess natural disaster risks;
- Natural disaster risk management measures:
  - Prevention, mitigation:
    - Structural measures;
    - Non-structural measures;
  - Response;
  - Recovery from natural disaster consequences;

Responsibilities of involved parties.

**Content Integration Process**

**Answering question 2**

1. Establishing viewpoints, orientations, and bases,
2. Collection and statistics
   - Collecting the Disaster Risk Reduction Plan;
   - Collecting the integrated flood management plan;
   - Collecting other related documents;
3. Review and categorize measures
   - Measures in the provincial disaster prevention plan;
   - Measures in IFMP;
4. Selection, integration
   4.1. When there are sufficient resources
   - Human life safety;
   - Housing, property, livelihoods;
   - Economic efficiency (cost-benefit);
   - Overall socioeconomic-environmental effectiveness;
   - Resources;
   - Vulnerable and marginalized groups;
   4.2. When resources are limited
   - Flexible resource allocation;
   - Overall priority order;
   - Opinions of locals and experts;
5. Proposed list of integrated measures
   - Based on the viewpoint and direction;
6. Monitoring and evaluation
   - Evaluation criteria (indicators, effectiveness, ...);
   - Evaluation time frame (1 year, 5 years).
### Step 1: Establish viewpoint, direction, principles

- In accordance with the spirit of re-measures, decisions, legal documents, development plans, etc.;
- Clear objectives and content;
- Balancing benefits, risks, and being suitable for the natural characteristics of each region and locality to ensure sustainable development (human, economic, environmental...);
- Suitable for the characteristics of each sector, local resources, focus, ensuring feasibility and effectiveness;
- Harmonizing measures in all 3 phases: prevention, mitigation (both structural and non-structural), response and recovery from natural disasters, ensuring system, coherence, and comprehensiveness;
- Considering the impact of other types of natural disasters;
- Reviewing the 5-year plan, annual plan of the previous period if the new plan has not been approved;
- Conducting review and survey if necessary;
- ...

### Step 2: Collection and statistics

1. Collect approved the provincial disaster prevention plans:
   - Record-keeping agency (Department, Committee,...);
   - Final report on the provincial disaster prevention plans;
   - Approved the provincial disaster prevention plans;
   - Other reports, meeting minutes, workshop records;
   ...

2. Collect approved Integrated Flood Management Plan (IFMP):
   - Record-keeping agency (Department, Committee,...);
   - Final report on Comprehensive Flood Management of the province;
   - Approved Comprehensive Flood Management Plan of the province;
   - Other reports, meeting minutes, workshop records;

3. Other documents:
   - Other relevant documents;
   - Opinions of citizens, management levels, experts;
   - ...
**Step 3: Review and categorize the measures.**

<table>
<thead>
<tr>
<th>FORM 1</th>
<th>FORM 2</th>
<th>FORM 3</th>
</tr>
</thead>
</table>
| ✓ Prevention, mitigation;  
  • Structural measures;  
  • Non-structural measures;  
 ✓ Response;  
  • Structural measures;  
  • Non-structural measures;  
 ✓ Natural disaster recovery;  
  • Structural measures;  
  • Non-structural measures; | ✓ Structural measures;  
  • Prevention and mitigation  
  • Response  
  • Recovery from natural disasters  
 ✓ Non-structural measures;  
  • Prevention and mitigation  
  • Response  
  • Recovery from natural disasters. | ✓ Structural measures;  
  • Improving the legal framework and policy mechanisms:  
  o Prevention and response measures  
  • Strengthening organizational structure and disaster management capacity;  
  • ...  
 ✓ Non-structural measures;  
  • Investment, upgrading of disaster prevention and water conservancy works;  
  o Prevention, response, etc.  
  • Investment, upgrading of construction works taking into account disaster prevention... |
Step 3: Review and categorize the measures.

- **Structural measures:**
  - Complete the legal document system and policy mechanisms.
    - Prevention, response, ...;
  - Strengthening the organization, machinery, and capacity for natural disaster management;
  - Develop, review, and implement plans, strategies, and options;
  - Improving forecasting and warning capabilities at the provincial level;
  - Raising awareness and knowledge of disaster prevention and mitigation for the community;
  - The program for forest planting and protection;
  - The application of science and technology in agricultural production;
  - ...

- **Non-structural measures:**
  - Investing and upgrading natural disaster prevention and hydraulic works:
    - Prevention, response, ...;
  - Considering natural disaster prevention in investment and upgrading of construction works.
  - Investment and upgrading of transportation infrastructure combined with natural disaster prevention and mitigation.
  - Infrastructure for water supply and drainage:
  - Sheltering decks for ships and boats during storms.
  - Hydropower reservoir.
  - Measurement, monitoring and early warning works;
  - ...

Step 4: Selection, integration

- **measures of IFMP**
  - Structural measures;
  - Non-structural measures.

- **Provincial disaster risk reduction measures**
  - Structural measures;
  - Non-structural measures.

Integrating IFMP measures into the provincial disaster prevention plans.

- **Criterion for selection:**
  - One side has, one side doesn’t;
  - There are many similar contents:
    - Standardize one comprehensive measure.
  - There are some similar contents:
    - Compare time, purpose, perspective, etc.
    - ...
    - Cost-benefit analysis
Step 4: Selection, integration (ensured resource)

The IFMP measures
- Structural measures:
  - Prevention, mitigation;
  - Response;
  - Recovery from natural disasters...
- Non-structural measures:
  - Prevention, reduction;
  - Response;
  - Overcoming natural disaster consequences

The Provincial Disaster Prevention Plans measures.
- Structural measures:
  - Prevention, mitigation;
  - Response;
  - Disaster recovery..
- Non-structural measures:
  - Prevention, mitigation;
  - Response;
  - Disaster recovery.

IFMP Plans + Provincial Disaster Prevention Plans
(Example: 15 IFMP measures + 20 Provincial Disaster Prevention measures = 35 measures)

Step 4: Selection, integration (limited resources)

measures of IFMP
- Structural measures;
- Non-structural measures.

Provincial disaster risk reduction measures
- Structural measures;
- Non-structural measures.

Integrating IFMP measures into the Provincial Disaster Prevention Plans.

Selection criteria:
- One side has it, one side doesn’t.
- There are many similar contents:
  - Agree on a comprehensive measure
- There are some similar contents:
  - Compare the time, purpose, viewpoint, ...
  - ...
Step 4: Selection, integration (limited resources)

Criterion for selection and integration (limited resources)
- Human life safety (B2);
- Housing (B2);
- Property, livelihood (B2);
- Economic efficiency (Cost-benefit) (B3);
- Overall economic, social and environmental effectiveness;
- Resources;
- Vulnerable groups and gender…
- …

Tables:
- B2
- B3
- ...

Step 5: Proposed list of integrated measures

Criteria for consideration:
- Perspective and direction;
- Overall priority order;
- Total resources available;
- Opinions of citizens and experts;
- …
## Step 6: Monitoring and evaluation

**Evaluation criteria**
- Pros, cons, causes, and measures;
- Realistic resource investment;
- Through indicators of reducing damage to property, people, and the environment…

**Evaluation time**
- Evaluation cycle for the results of implementing the provincial disaster prevention plans is 01 year;
- Evaluation cycle for the results of implementing the provincial disaster prevention plans is 5 years.

**Supervision responsibilities**
- The Department of Agriculture and Rural Development is responsible for implementing and supervising…;
- The Steering Committee for Natural Disaster Prevention and Search and Rescue…
- …

## Responsibility of parties

**Provincial People's Committee (PPC)**
- Direct the Department of Agriculture and Rural Development to lead and coordinate related departments and agencies to implement integration;
- Direct the Department of Planning and Investment and the Department of Finance to coordinate to determine costs and benefits, mobilize resources to implement measures…
- Issue a Decision on the integrated IFMP in to the provincial disaster prevention plans;

**District People's Committee (DPC)**
- Leading and coordinating with organizations to collect and analyze data, providing support as needed……
- …
Target audience of the guide

- Provincial and central cities’ People’s Committees;
- Provincial Steering Committee for Disaster Prevention and Search and Rescue;
- Department of Agriculture and Rural Development, and related departments;
- Central Ministries/Agencies;
- International organizations, NGOs supporting resources to implement IFMP and PCTT plans, and stakeholders involved in planning.
Practical section.

1. Establishing viewpoints, orientations, and bases.

2. Collection and statistics
   - Collecting the.Diane Risk Reduction Plan;
   - Collecting the Integrated Flood Management Plan;
   - Collecting other related documents.

3. Review and categorize measures:
   - Measures in the provincial disaster prevention plan;
   - Measures in IFMP.

4. Selection, integration
   4.1. When there are sufficient resources
   1. When resources are limited
      - Human life safety;
      - Housing, property, livelihoods;
      - Economic efficiency (cost-benefit);
      - Overall socioeconomic-environmental effectiveness;
      - Resources;
      - Vulnerable and marginalized groups.

5. Proposal list of integrated measures
   - Based on the agreement and decision;
   - Overall priorities;
   - Overall priority, order;
   - Opinions of localities and experts.

6. Monitoring and evaluation
   - Evaluation criteria (effectiveness, efficiency, costs);
   - Evaluation time frame (1 year, 5 years).

Measures in Quang Nam province's disaster risk reduction plan.

- Reference materials for stakeholders on integrating IFMP into the Provincial Disaster Prevention activities and local development.
Measures in the IFMP of Quang Nam province for flood management.

- Reference materials for stakeholders on integrating IFMP into the Provincial Disaster Prevention activities and local development.