THE MEKONG RIVER COMMISSION SECRETARIAT

Best Practice Guidelines for Integrated Flood Risk Management Planning and Impact Evaluation

The Flood Management and Mitigation Programme, Component 2: Structural Measures & Flood Proofing in the Lower Mekong Basin

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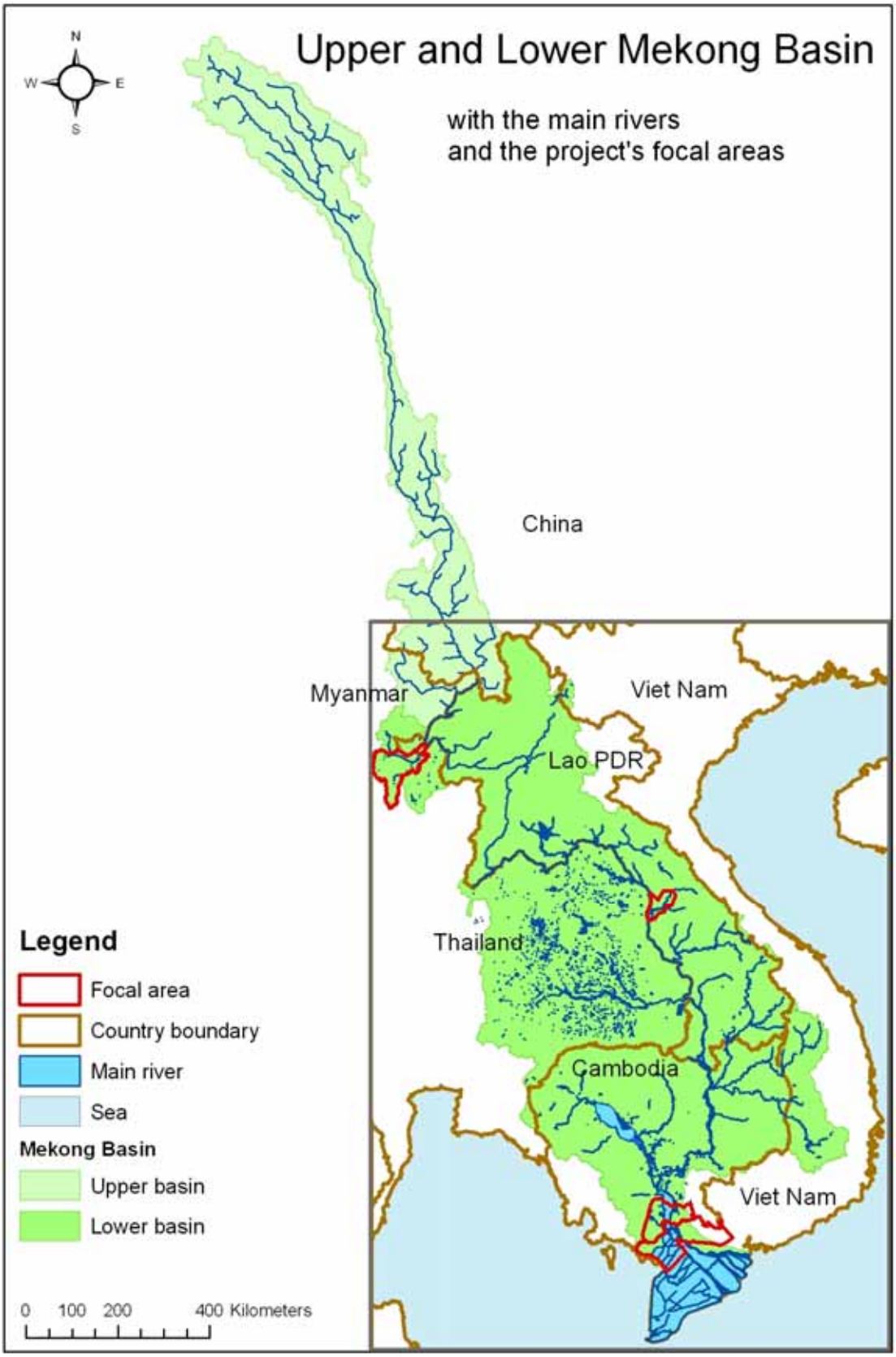


GLOSSARY

See Appendix 1.

ABBREVIATIONS

N.B. Abbreviations that occur only once and that are explained in the text are not included in the table below.

ADCP	Acoustic Doppler Current Profiler (Acoustic Doppler Profiler); instrument to measure how fast water is moving across an entire water column
ARF	Area Reduction Factor (hydrology)
BCM	Billion Cubic Meters
BDP	Basin Development Planning
BPG	Best Practise Guidelines
CBA	Cost Benefit Analysis
d/s	downstream
DACA	Damage and Casualties Assessment project for the Lower Mekong Basin based on HIS-SSM
DEM	Digital Elevation Model (see also DTM)
DSF	Decision Support Framework
DTM	Digital Terrain Model (see also DEM)
EC	European Commission
EU	European Union
EV1	Extreme Value type 1 distribution (hydrology)
EXCIMAP	European Exchange Circle on Flood Mapping
FEMA	Federal Emergency Management Agency
FHA	Flood Hazard Assessment
FMM	Flood Management and Mitigation
FMMP-C2	Flood Management and Mitigation Programme, Component 2
FN curve	Curves relating the probability per year of causing N or more fatalities (F) to N
FRA	Flood Risk Assessment
FV	Future Value (economic analysis)
GEV	Generalised Extreme Value distribution (hydrology)
GIS	Geographic Information System
HAZUS	Software for risk assessment analysis of potential losses from floods, hurricane winds and earthquakes (by FEMA)
HH	Household(s)
HIS-SSM	Hydrological Information System - damages and casualties assessment module
HYMOS	Information system for water resources management
IFRM	Integrated Flood Risk Management
ISIS	Hydrodynamic simulator for modelling flows and levels in open channels and estuaries
IUH	Instantaneous Unit Hydrograph (hydrology)
JICA	Japan International Cooperation Agency
LMB	Lower Mekong Basin
LMD	Lower Mekong Delta
LXQ	Long Xuyen Quadrangle (Vietnam)
MCM	Million Cubic Meters
MRC(S)	Mekong River Commission (Secretariat)
MSL	Mean sea level, the average (mean) height of the sea, with reference to a suitable reference surface
NPV	Net Present Value (economic analysis)
PDR (Lao)	(Lao) People's Democratic Republic
PoR	Plain of Reeds (Vietnam)

PV	Present Value (economic analysis)
RFMMP	Regional Flood Management and Mitigation Programme
RID	Royal Department of Irrigation
RR	Rainfall Ratio (hydrology)
SBF	Se Bang Fai (Lao PDR)
SCS-CN	Soil Conservation Service (USA) Curve Number method (hydrology)
SWAT	River basin scale model quantifying the impact of land management practices in large, complex watersheds
TCEV	Two Component Extreme Value (hydrology)
u/s	upstream
UH	Unit Hydrograph (hydrology)
UK	United Kingdom
UNESCO-IHE	Institute for Water Education (IHE) of the United Nations Educational, Scientific and Cultural Organization
USA	United States of America
WUP	Water Utilisation Programme

USED SYMBOLS

The FMMP-C2 guidelines contain in the left margins symbols for quick reference. The symbols indicate:

A. Type of text/ content;
B. A project stage.

A) The report texts have been categorised into four groups. These groups are as follows:

I) Project background / Report info

Text on the FMMP-project and its background,
or explanation on the report structure or content.

II) Theory

Theory behind the proposed/ applied methods and guidelines.

III) Example

Example of the proposed/ applied methods and guidelines.

The fourth group comprises the remainder of texts and concern methodology and theory adapted/ applied to the Lower Mekong Basin, i.e. the guidelines. These guidelines are to be applied in one of the five project stages described below (B).

B) A project consists in general of five phases. Project FMMP-C2 encompasses only Phase 2: Planning/ Development/ Design. This phase can be subdivided in the following five stages:

a) Preliminary/ prefeasibility study

b) Feasibility study & overall planning

c) Preliminary design

d) Detailed design & detailed planning

e) Construction/ bid documents

Any part of a guideline falling outside the
scope of the five phases above will be marked with:

Sometimes more than one symbol may apply to a section.

CHAPTER 1

INTRODUCTION

1 INTRODUCTION

1.1 Guide to the reporting structure of the Flood Management and Mitigation Programme - Component 2, Structural Measures and Flood Proofing

Component 2 on Structural Measures and Flood Proofing of the Mekong River Commission's Flood Management and Mitigation Programme was implemented from September 2007 till January 2010 under a consultancy services contract between MRCS and Royal Haskoning in association with Deltares and Unesco-IHE. The Implementation was in three stages, an Inception Phase, and two Implementation Stages. During each stage a series of outputs was delivered and discussed with the MRC, the National Mekong Committees and line agencies of the four MRC member countries. A part of Component 2 - on 'Roads and Floods' - was implemented by the Delft Cluster under a separate contract with MRC. Component 2 prepared five Demonstration Projects which have been reported separate from the main products.

The consultancy services contract for Component 2 specifies in general terms that, in addition to a Final Report, four main products are to be delivered. Hence, the reports produced at the end of Component 2 are structured as follows:

Volume 1 **Final Report**

Volume 2 **Characteristics of Flooding in the Lower Mekong Basin**
Volume 2A *Hydrological and Flood Hazards in the Lower Mekong Basin;*
Volume 2B *Hydrological and Flood Hazards in Focal Areas;*
Volume 2C *Flood Damages, Benefits and Flood Risk in Focal Areas;*
Volume 2D *Strategic Directions for Integrated Flood Risk Management in Focal Areas.*

Volume 3 **Best Practice Guidelines for Integrated Flood Risk Management**
Volume 3A *Best Practice Guidelines for Flood Risk Assessment;*
Volume 3B *Best Practice Guidelines for Integrated Flood Risk Management Planning and Impact Evaluation;*
Volume 3C *Best Practice Guidelines for Structural Measures and Flood Proofing;*
Volume 3D *Best Practice Guidelines for Integrated Flood Risk Management in Basin Development Planning;*
Volume 3E *Best Practice Guidelines for the Integrated Planning and Design of Economically Sound and Environmentally Friendly Roads in the Mekong Floodplains of Cambodia and Vietnam*[1]*.*

Volume 4 **Project development and Implementation Plan**

Volume 5 **Capacity Building and Training Plan**

Demonstration Projects
Volume 6A *Flood Risk Assessment in the Nam Mae Kok Basin, Thailand;*
Volume 6B *Integrated Flood Risk Management Plan for the Lower Xe Bangfai Basin, Lao PDR;*
Volume 6C *Integrated Flood Risk Management Plan for the West Bassac Area, Cambodia;*
Volume 6D *Flood Protection Criteria for the Mekong Delta, Vietnam;*
Volume 6E *Flood Risk Management in the Border Zone between Cambodia and Vietnam.*

The underlying report is **Volume 3B** of the above series.

[1] Developed by the Delft Cluster

1.2 Best Practice Guidelines for Integrated Flood Risk Management Planning and Impact Evaluation

These BPG are meant to provide guidance in the process of the preparation of IFRM strategic directions and plans.

Strategic directions refer to the type of measures that are most attractive to manage the risks and reduce the damages in a certain area, whereas IFRM plans present the most attractive set of specific measures for flood risk management in a certain area.

The start of any IFRM planning exercise should be an adequate risk assessment. After this risk assessment the following steps are distinguished:

- the identification of possible measures for risk reduction,
- the consultation and participation of stakeholders,
- the evaluation of environmental impacts,
- the evaluation of social impacts,
- the evaluation of the economic impacts.

In this guideline the practices referring to each of these steps are described. It proposes an approach to the identification of IFRM measures and the assessment of social, economic and environmental impacts of structural flood mitigation measures in the LMB. It also summarizes the various ways to involve the general public and other stakeholders in the planning, design and implementation of these measures

1.3 How to use the Best Practice Guidelines

The intended users are project planners, and executing agencies within and outside of government. The tools can also be used in project preparation by managers in the MRC, and the NMCs, as well as any agencies or firms that they engage for project preparation and execution.

The guideline is primarily for use in the stage of project preparation, evaluation and design.

The different countries in the LMB and institutions financing projects have varied policies, regulations and guidelines for project evaluation and preparation which include methods for social, economic and environmental impact assessment. The Guideline presents those assessment practices that are most useful and appropriate for flood management projects in the LMB. The proposed methodology endeavours to identify and as far as possible also quantify the socio- and environmental impacts of envisaged measures by comparing the situation without the project with the situation as it would be with the project.

In order to manage an engineering project properly, it is normally divided in project phases. Common is a division in the following five phases:

1. Initiation
2. Planning/ Development/ Design
3. Production/ Execution
4. Monitoring/ Control
5. Closure

The Best Practise Guidelines are almost exclusively applicable to Phase 2: Planning/ Development/ Design. This phase, its stages and the associated symbols used in the guidelines are elaborated in Appendix 8.

1.4 Background on the development of the Best Practise Guidelines

This Guideline is based on a review of social, economic and environmental impact assessments methods from the MRC (Basin Development Plan Programme), and on standards for impact assessments required by MRC-member states and major donor agencies.

Also the lessons learned in the process of the formulation of strategic directions for the focal areas in the Stage 1 Implementation Phase of the FMMP-C2 are used in the preparation of this outline.

Practices as presented in this Guideline will be tested and further elaborated in the FMMP-C2 demonstration projects during the Stage 2 Implementation Phase.

1.5 Purpose and scope

This BPG has been developed to summarize the essential information that must be gathered to assess the social, economic and environmental impacts of structural flood mitigation measures in the Lower Mekong Basin, and how to involve the public and other stakeholders in both analyzing and addressing these impacts.

The objectives of the BPG are to:

1. Provide an overview of available flood risk management measures and their relative impacts on flood risk reduction;
2. Provide an overview of the social, economic environmental impact assessment process;
3. Identify the key elements that must be included in an impact assessment of structural flood mitigation measures;
4. Recommend strategies for involving stakeholders, including the public in different stages of planning and implementing the flood mitigation measure;
5. Provide sample tools and checklists that can be adapted and applied to each country and project context.

The Guidelines will be relevant for planners and project managers in MRC, the National Mekong Commissions and line agencies when doing:

1. Formulation of strategic directions for flood risk management;
2. Planning and prioritisation of potential structural flood mitigation measures;
3. Screening and preparation of structural flood mitigation projects;
4. Designing projects and monitoring their implementation.

The Guidelines will be applicable to the assessment of social-economic and environmental impacts of structural measures for flood risk reduction only. The socio-economic and environmental impacts of non-structural flood risk management measures are not dealt with.

CHAPTER 2

PRACTISES FOR IDENTIFICATION OF INTEGRATED FLOOD RISK MANAGEMENT MEASURES

2 PRACTICES FOR IDENTIFICATION OF INTEGRATED FLOOD RISK MANAGEMENT MEASURES

2.1 Introduction

This part of the BPG for IFRM planning and impact evaluation is meant to give guidance in the process of identifying promising measures for flood risk reduction. Once promising measures have been identified and formulated then the evaluation of the socio-economic and environmental impacts is to be carried out, as presented in the following parts of this outline BPG. An essential element in the impact evaluation is the assessment of the flood benefits that are at stake when managing the flood risks.

This initial identification of promising measures will provide the "strategic direction" for the flood risk management in a certain area.

For being promising, flood risk management measures are to be attuned to:
1. the type of flooding, e.g. flash floods, Delta floods;
2. the risk category, e.g. loss of life, agriculture, housing and business, public and industrial infrastructure

The types of floods and the corresponding hazard assessment are dealt with in the BPG for risk assessment. The same BPG deals also with the different categories of damages.

2.2 Integrated Flood Risk Management concept

The concept of IFRM as used in the guidelines is illustrated as follows:

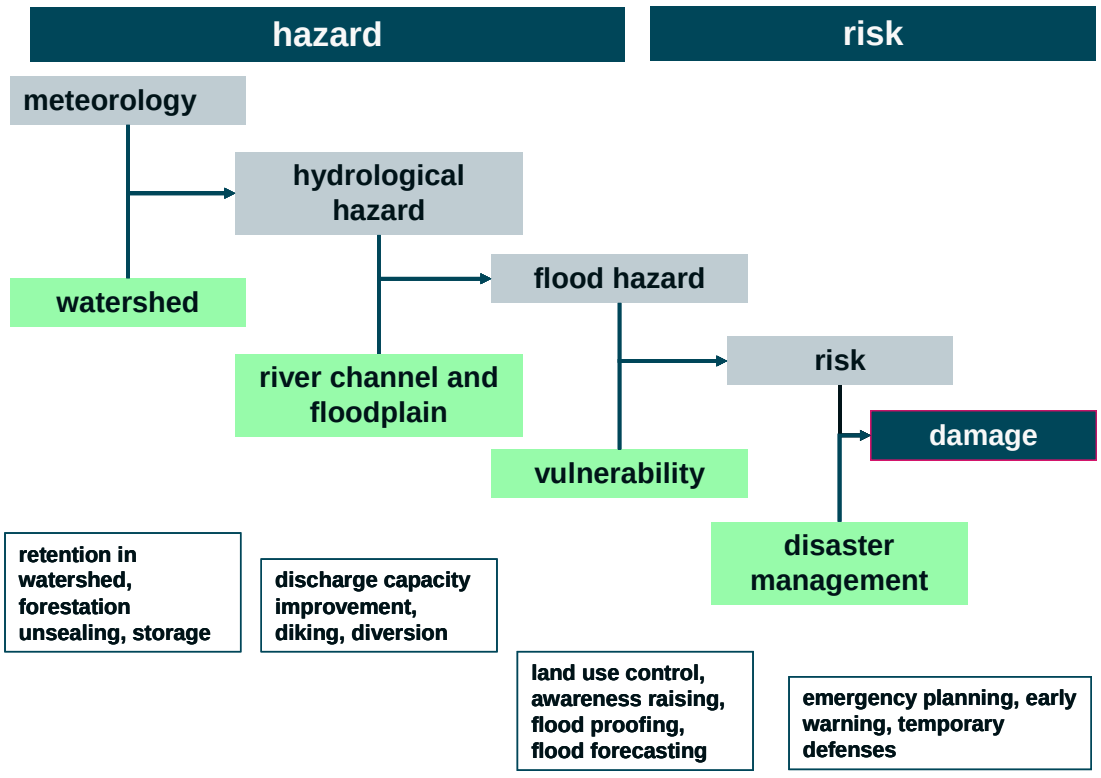


Figure 2.1 Scheme for flood risk assessment use din the FMMP-C2.

It refers to the management of flood risk and the reduction of the damage in the full chain of events and circumstances that starts from a meteorological hazard all the way down to the occurrence of the eventual damage.

Flood risk management aims at the reduction of flood risks, whereas the reduction of the eventual damage when flooding is imminent is referred to as "disaster management".

This IFRM concept is used to find the most cost-effective measure (or combination of measures) to bring flood risks down to an acceptable level. The assessment of the "acceptability" of the residual risk, however, is not part of the approach.

The IFRM concept can also be used to find the most cost-effective measure (or combination of measures) to keep the flood risk acceptable in case the flood risks increase as a consequence of changed land use (for instance the number of crops per year or the construction of public or industrial assets in flood prone areas) or of changed flood hazards (for instance sea level rise).

The IFRM approach provides the decision maker with the information about the most cost-effective way to reduce the flood risk to a certain level. It is up to the decision maker to make an assessment which level of risk is tolerated by society. From a purely economic point of view risks are tolerated as long as the costs for reducing these risks are higher then the actual risk reduction. It becomes more complicated, though, when intangible damages are at stake, especially loss of life. In such cases it is more appropriate to set targets rather then defining criteria. (For instance a target could be set to reduce flood risk to the extent that within a certain period of time, say 10 years, the number of fatalities is reduced by, say, 50%)

The application of IFRM concepts is only meaningful when there is sufficient understanding of the actual or future flood risks. The assessment of the risks is dealt with in the respective BPG.

2.3 Types of flood risk management measures

The BPG provide guidance in the assessment of the suitability of the different types of measures for certain types of flooding and certain damage categories. The following types are considered:

1. Structural measures aiming at the reduction of the flood hazard, i.e.
   a. creation of storage and/or retention capacity, including small scale retention at field level, reservoirs and river floodplain restoration;
   b. improvement discharge capacity by river and/or diversion works;
   c. diking and/or polder schemes.

2. Structural measures aiming at the reduction of the flood vulnerability, i.e.
   a. flood proofing of buildings and infrastructure.

3. Non structural measures aiming at the reduction of flood hazards, i.e.
   a. watershed management;
   b. forestation;
   c. unsealing.

4. Non-structural measures aiming at the reduction of the flood vulnerability, i.e.
   a. land use control;
   b. awareness raising;
   c. flood forecasting.

5. Disaster management measures aiming at the reduction of the damages once flooding is imminent, i.e.
   a. early warning;
   b. emergency planning;
   c. temporary defences.

Typically structural flood risk management measures create changes in flood regime and land use, and require space for the proposed structures. Direct impacts, both positive and negative, are to be expected in settlement, on cropping patterns and production levels, on fisheries, and on transport. Indirect impacts could be felt inside and outside the project area, both upstream and downstream. These impacts could cover a wide array of parameters of which the most important ones are covered in the following parts of this outline BPG.

2.4 Types of flooding

The type of flooding is an important factor in the assessment of the appropriateness of different types of measures. The BPG will provide the considerations regarding the effectiveness of measures for the following types of floods:

1. Tributary floods,
2. Mainstream floods,
3. Combined floods,
4. Floods in the Cambodian Flood Plain, and
5. Flood in the Mekong Delta.

Tributary floods
Tributary floods, which occur in the steep sloped upper reaches of the basins are flash floods due to intense rainfall after a long rainy period forcing the catchment to respond quickly to the rainfall. Flash floods are short lived (few hours), rise and fall rapidly and the flow velocities are very high. Further downstream flashiness reduces due to damping and differences in the timing of the contributions of tributaries. Out of the backwater reach of the Mekong the tributary flood hazard is determined by extreme river discharge and the downstream river conveyance capacity.

Mainstream floods
Mainstream floods are caused by high water levels on the Mekong as a result of extreme river flows in combination with limitations in the downstream conveyance capacity of the Mekong river and flood plain.

Combined floods
Combined floods are floods that occur in the downstream sections of the tributaries, where the flood level is determined by the combination of tributary flow and the water levels in the Mekong, backing up the tributary levels and impeding the drainage. Also, when the levels in the Mekong are high, backwater flowing into the tributaries may occur. The character of these floods is not flashy; they may stay for weeks. In view of the shallow areas along the Mekong downstream of Vientiane a large number of tributaries in their lower reaches face this type of flooding.

Floods in the Cambodian Flood Plain
The flood in the Cambodian flood plain describes the conveyance and storage of the flood in the Mekong and its flood plain downstream of Kratie to Phnom Penh, inclusive of the flooding around Tonle Sap Lake and the inflow to and outflow from the lake via the Tonle Sap River. Important aspects here are the spill levels of the rivers, the flood plain conveyance in relation with the road infrastructure and existence and dimensions of embankments.

Floods in the Mekong Delta
The flood in the Mekong Delta deals with the conveyance of floodwater via the Mekong and Bassac Rivers and their flood plains, including the use of colmatage canals to divert and control the flow from and to the rivers. In the delta the levels rise slowly due to the storage in Tonle Sap

Lake and in the Mekong flood plains. Flooding here is recognized as essential for soil fertility, biodiversity and aquaculture. At the same time, it hampers use of agricultural land for maximum output. The flood levels in the Mekong Delta in its downstream part are essentially the result of upstream and lateral inflow, net rainfall in the delta and downstream water levels at sea.

2.5 Damage categories

Another important factor in the assessment of the suitability of certain measures is the category of damage that is at stake.

For risk assessment purposes four main damage categories have been distinguished:

1. **Loss of life and injuries**
   includes number of people killed, missing and injured by the flood; treatment costs for the injured persons;
2. **Infrastructure & relief**
   includes educational facilities and materials, medical facilities, materials and equipment, irrigation infrastructure, bank erosion, fisheries infrastructure and equipment, transport infrastructure and equipment, communication infrastructure and equipment, industrial infrastructure and equipment, construction materials and equipment, drinking water and sanitation infrastructure and equipment, rescue operations, support and relief;
3. **Housing**
   includes collapsed and swept away houses, partly damaged or submerged houses, damaged roofs and other private property damage, cultural & historical structures, offices, small industrial units, markets & commercial centres and warehouses;
4. **Agriculture**
   includes rice areas, flower & vegetable areas, other annual crops, perennial crops, large and small livestock and poultry, damaged agro-chemicals and erosion of farm land and housing land.

2.6 Outline guideline

Gert Sluimer: to elaborate/ review

The “BPG for IFRM planning and impact evaluation” will be composed in the following format:

Table 2.1 Title ??

Type of flooding: delta flooding				
IFRM measure type	Damage category			
	Loss of Life	Housing	Infrastructure	Agriculture
Structural measures				
Flood proofing				
Non-structural measures				
Disaster management				

For each of the cells in this matrix, where relevant, observations and recommendations are formulated regarding the effectiveness of a measure type and/or specific measures.

For example:

- Type of Flooding: Delta flooding
- Damage Category: Agriculture
- Type of Measure: Structural measure
  - creation storage capacity

- Observation:
  The management of flood discharges that enter the Delta by upstream retention would not only require enormous storage capacities in the basin but also an operation of these storages aiming at flood control. Effects of hydropower developments on floods have been investigated by Beecham and Cross (2005) and Adamson (2007). Results of these studies show that the Chinese dams have a high potential to reduce flood peaks in the upper part of the LMB. The effect, however, rapidly reduces further downstream. Though the effect is small on the flood levels and inundated area a significant effect was found on the duration of flooding, which reduced substantially for some 40% of the flooded area. It is noted, however, that these effects required an active storage capacity equal to roughly the annual amount of Mekong flood volume stored temporarily in the Tonle Sap.

  Effective use of the storage capacity of the Tonle Sap Great Lake can also reduce the flood duration by delaying the early flood. This will have a direct risk reducing effect as far as the risk is related to the harvesting of the second rice crop.

CHAPTER 3

PRACTISES FOR STAKEHOLDER PARTICIPATION

3 PRACTICES FOR STAKEHOLDER PARTICIPATION

3.1 Introduction

MRC has made the involvement of public and the public opinion in the work of MRC a prerequisite for the sustainable development of the Mekong River Basin. The MRC is aware that stakeholder involvement in decision making is fundamental to achieving feasible, equitable and lasting solutions in water management and that the quality of decisions can be improved by the inclusion of a broad range of stakeholders who can bring important local knowledge and relevant perspectives to the process[2].

> 'Water is a subject in which everyone is a stakeholder. Real participation only takes place when stakeholders are part of the decision-making process. This can occur directly when local communities come together to make water supply, management and use choices.
>
> (Global Water Partnership)

Public participation is the second of the so-called Dublin Principles, which form the basis for IWRM, as promoted by Global Water Partnership: 'Water development and management should be based on a participatory approach, involving users, planners and Policy makers at all levels'[3]

3.2 Purpose of these Best Practice Guidelines regarding stakeholder participation

This guideline has been prepared on the basis of:

a. review of other guidelines or best practice documents in the field of flood risk assessment and water management;
b. Review of existing practices in public participation at MRC;
c. experience gained during the preliminary stakeholder consultation in West Bassac, Cambodia and Lower Sae Bang Fai in Laos PDR FMMP-C2 project area.

The guideline is intended for anyone who will be engaged in facilitating or conducting stakeholder participation exercise with the aim of influencing structural design and planning or any other development activities within the IWRM framework.

Flood protection measures, apart from reducing the risk of damage to houses, property, and creating better living conditions for the people, will also bring economic benefits to the people mainly through better land use and agriculture. A concrete public participation plan is crucial to ensure that the needs of community and stakeholders supporting the community are incorporated in the design of the demonstration project and support systems are put in place to adapt to these changes.

3.3 Why public participation ?

Public participation improves the effectiveness of flood management measures by assessing and integrating the needs and concerns of those vulnerable to flood damage into project design and outcomes. As flooding brings benefits and potential damage, the advantage of structural flood protection measures can only be assessed in interaction with communities living in flood affected areas.

[2] MRC – Public Participation Plan in Lower Mekong Basin
[3] MRC - Public Participation in Basin Development plan

For flood prevention, protection and mitigation, a good combination of structural measures, preventive measures and operative measures during flood events are necessary: appropriate land use, adequately designed floodplains and flood-control structures planning, mitigation, early-warning systems, correct risk communication and preparedness of the populations on how to act during floods. In some cases even relocation of extremely endangered activities and buildings may be advisable. All these can be achieved only through a meaningful participation of all concerned.

Public participation has a number of benefits in improving the quality and sustainability of projects:

- Participation engenders a sense of ownership over project investments, which will motivate people to take care of facilities constructed in their area.
- Transparency in providing information about project plans builds trust and reduces opposition to changes that the project will bring.
- Structural measures must be used cost-effectively and cannot protect all areas. Engaging people in identifying the most vulnerable areas for investment, and assessing the trade-offs in resource allocations contributes to a sense of fairness in public decision-making.
- People have knowledge about the local area that can only be assessed through direct interactions at the community level. Without this information the analysis of a project cost and benefits is incomplete.
- Understanding people's perspective on their vulnerability, their coping mechanisms and their livelihood development plans is essential to assessing the best mix of options between structural and non-structural measures within an Integrated Flood Risk Management approach.
- Participatory monitoring of project implementation contributes to quality assurance and increases accountability in the use of public funds.

3.4 What is public participation ?

Public participation in the context of the MRC is defined as follows: Public Participation is a process through which *key stakeholders* gain influence and take part in decision making in the planning, implementation, monitoring and evaluation of MRC programs and projects.

This definition is adapted from those used by multilateral agencies such as the World Bank and Asian Development Bank. Most definitions of participation by such agencies and by governments around the world that have policies or legislation in place on participation include the concept of stakeholders sharing in decision making.

The term public can be taken to mean any individual or group in society, including the government and business sector. Who or what is included in the "public" depends very much on the activities under consideration. The term "stakeholder" helps clarify the meaning of "public" in the context of development activities:

A Stakeholder is any person, group of institution that has an interest in an activity, project or program. This includes intended beneficiaries and intermediaries, those who will be positively affected, and those involved and/or those who are generally excluded from the decision-making process.

Participation is more than consultation. Participation requires that stakeholders at all levels have an impact on decisions at different levels of water management. The quality of participation will determine the success of the public participation process in incorporating the needs of all the stakeholders, particularly the intended beneficiaries.

A consultative process such as questionnaires, stakeholder meetings does not necessarily allow real participation if they are only employed to legitimize decisions already made. Hence, a clear purpose of public participation becomes very crucial.

A participatory approach is the only way of achieving long-lasting consensus and common agreement. However, for this to occur, stakeholders and officials from water resources and management agencies have to recognize that the sustainability of the resource is a common problem and that all parties are going to have to sacrifice some desires for the common good.

Participation is about taking responsibility, recognizing the effect of sectoral actions on other water users or vulnerable groups to water related disasters and aquatic ecosystems and accepting the need for change to lessen water related disasters, improve the efficiency of water use, and allow the sustainable development of the resource.

Principles of Public Participation

1. All the stakeholders should be able to influence the decision making process equally.
2. The participation process communicates the interests and meets the process needs of all participants.
3. The public participation process should facilitate the involvement of all those potentially affected.
4. The public participation process involves participants in defining how they participate.
5. The public participation process communicates to participants how their input was, or was not, utilized.
6. The public participation process provides participants with the information they need to participate in a meaningful way.
7. Maintain honesty and integrity throughout the process.
8. Recognize community knowledge.
9. Use cross-cultural methods of communication.
10. Institutionalize meaningful public participation by acknowledging and formalizing the process.
11. Create mechanisms and measurements to ensure the effectiveness of public participation.

Participation will not always achieve consensus, arbitration processes or other conflict resolution mechanisms might also need to be put in place.

Public participation also adds costs to project planning. Community consultations and information dissemination require time and financial resources as well as professionals that are trained in facilitation of community meetings. Having discussions on resource allocations and land-use changes in public forums can also raise conflicts and create concerns about potential changes prior to final decisions being made. For this reason, a public participation strategy must be developed early in the project planning to clarify what communities will be consulted about, when and how. The public is necessarily involved at some stage when an infrastructure is constructed in their area. Preparing a strategy for their engagement as opposed to dealing with lobbying, opposition or public concerns as they arise, results in more effective project planning.

3.5 Existing public participation practices in the Lower Mekong countries

MRC has determined the necessity to integrate public participation into all of the Commission programs through adoption of its 1999 Public Participation Policy. This policy recommends the integration of public participation in all MRC programs.

Public participation is also reflected in the national policies and strategies of the riparian countries.

- The Lao PDR Constitution states that state organisations and government officials ‘must disseminate and create awareness of all policies, regulations and laws among the people and, together with the people, organise their implementation in order to guarantee the legitimate rights and interests of the people.

- Vietnam has issued a number of decrees and national program strategies to foster greater community consultation and participation in socio-economic development and poverty reduction programs. Most notably the Grassroots Democracy Decree requires commune authorities to publish and publicly discuss commune plans, budgets, and expenditure.
- Cambodia has engaged in a process of decentralization where Commune Councils consult with community members on preparing a Commune Development Plan that will receive state financing.
- Thailand has an active civil society that directly engages with elected representatives and governments in social, economic and infrastructure programs that affect their communities.

Based on the institutional framework of each country, different programs for public participation in local development planning are underway. Preparation of structural flood management measures includes assessing the existing participatory processes in place and the local development plans that have been made as a result. Public participation for project preparation should build on the existing mechanisms of public consultation and, where possible, reinforce the role of local government or local elected councils as the convenor of public forums in their jurisdiction. Public participation processes also involves consulting with community-based organizations and other civil society groups that represent members or more vulnerable groups.

3.6 Public participation methods

In the past, participatory approaches have suffered from a certain naivety among managers and development workers, who thought that the goals of participation could easily be achieved through simple methods of consultation and communication.

Experience has shown that without rigorous methods and tools, participatory processes will become ineffective, and the results could in fact be detrimental to the needs of people and of the natural resources on which they depend.

While stakeholder approaches are necessary parts of the participatory process, they do not necessarily ensure that a given process is participatory. In order to respect the principles of participation, planning and management initiatives require a wide range of methods and approaches, not only stakeholder identification and analysis. Within the broader participatory process, stakeholder approaches have their particular function, and they should not be expected to deliver more than what they are intended for.

In the application of tools and methods, it must always be accepted that participatory approaches, including stakeholder identification and analysis, do take time and resources, and that they require flexibility. A participatory process is a phased process that must be responsive to the needs, expectations and capacities of the participants.

Stakeholder approaches must be sensitive to the cultural context in which they are developed and applied. While the principles of participation are universal, the practice of participatory planning and management must take into account the principles, communication style, knowledge and skills of all stakeholders.

The use of stakeholder approaches inevitably results in a broadening of the planning agenda. When needs and interests of stakeholders are placed on the planning table, and when the marginal and powerless are given an opportunity to participate, planning initiatives become more aware of the cultural, social, economic and environmental context, and they become more responsive to a diversity of needs and priorities. This is why managers and facilitators need to embark on such processes with open minds: the form and outcome of the process is likely to be very different from what they had imagined in the first place.

3.7 Public participation methods shortlist






These are the list of available public participation methods that can be adapted depending on the purpose, stage of project (concept, planning or implementation) and the participation framework at respective Government and NMCs.

The public participation methods can be broadly classified into three groups: Awareness & Education, Inputs and Decision making method. Awareness methods are used to encourage public attendance and Education methods are employed to help the public better understand the flooding patterns and trends and impact on land use and livelihoods. The public can then provide Input to identify those issues related to agriculture, fisheries and livelihoods development in their area that are most important to them.

- Awareness and education methods:

  These methods are designed to increase the awareness of public on planning and participation activities and build their capacity to become further involved. They could be used at all the stages of the project.

  Displays and exhibits: maps, pictures and text arranged in a poster style and posted in public places in the affected area or during meetings to share information with the general public.

  Direct mail: a method to build awareness by mass mailing written materials. Direct mailings work best when the message is simple and an audience is easily identifiable.

  Community Calendar: a typical calendar filled with important meeting dates, information about the planning process at community organizations like people's committee or local NGOs, resource users groups etc.

  Newsletter: provides the public with a regular source of information that can be reviewed at their leisure. Newsletters may be distributed at various planning stages to keep the public informed and educated throughout the planning project.

  Public Education Meeting: incorporate educational programs, such as seminars and presentations or simulations and informal discussions to improve understanding of the public on planning issue or task. Public educational meetings build capacity of public to participate more effectively.

  Websites: The Internet is a tool to share information with the general public and stakeholders. Maps, reports, meeting agendas and minutes, contact information, and many other types of information can be served on the Web. The Internet also supports interactive participation, such as on-line voting, planning chat-rooms, and Internet map serving that can be used to create planning maps at home.

  Media Liaisons: Members from the media are invited to participate as non-voting members on area planning committees. This way planning would be consistently and accurately covered in the local newspapers and radio stations.

- Input methods:

  Methods designed to gather public opinions and expertise.

  Public Notice: the minimum legal requirement necessary to advertise opportunities for public participation. Notice is usually posted in public places and newspapers.

  Open house: an informal setting using displays, handouts and other materials designed to expose stakeholders to planning information and ideas. It provides stakeholders a chance to react and express feedback about planning information in oral or written form.

  Public hearing: the minimum legal requirement for public participation is an official meeting used to present technical information and obtain formal review and approval of proposals. The hearing consists of 1) a summary of why the project is being done, 2) the alternative solutions identified,
  3) an assessment of the consequences and impacts of each solution, and 4) reactions to the proposed course of action. An official, permanent record of the public hearing is established.

  Visual preference survey: asks stakeholders to identify 3-D rendering or actual photographs of design alternatives or landscapes they prefer or find appropriate. This method is used to identify visual preferences common to the community.

  Opinion surveys: questionnaire used to systematically collect data or viewpoints from many people. Data is relatively easy to obtain, but difficult to analyze and interpret Sample must be chosen carefully to represent appropriate population. Questions should be simple, jargon-free and brief.

  Focus groups: a small group of people (usually 6-12) responsible for identifying issues, concerns, values, beliefs or information related to a particular issue. Participants often are selected based on their knowledge of a particular subject. Focus groups require a skilled facilitator and vocal participants.

  Visioning: Stakeholders are asked to develop a vision that reflects community values and depicts what they want the future to look like using text, speech, images, or a combination.

  Cognitive Mapping: Cognitive mapping measures participants' spatial perceptions or preferences. Using a GIS, individual results are compiled into a single composite map that helps decision-makers interpret shared public preferences. For example, stakeholders may draw on a base map (digital or hardcopy) to identify areas that will be positively or negatively impacted by floods and flood control structures for the people, agriculture, fisheries and the ecosystem.

- Decision-making methods:

  Methods meant to involve the public to share decision-making responsibilities.

  Advisory Committee: Committees are more often used to gather information on a specific area of planning, such as natural resources. Committees can expand the technical capacity and expertise of the commission. The advisory committee can also sponsor a plan process.
  However, the plan commission still has the legal responsibility to review and recommend any plan brought by the committee.

Plan Commission: Appointed or elected members are authorized to prepare a comprehensive plan and recommend the plan's adoption to the governing body. Commissions do not have authority to adopt plans, but they often sponsor a plan process, put public participation efforts in motion, and ensure proper representation of local stakeholder groups.

Referenda: Binding referenda involve stakeholders to make policy decisions by majority vote. Non-binding or advisory referenda use stakeholders' votes to advise local government leaders on a policy decision.

Interactive GIS: A GIS equipped with land information, such as fields, land cover, roads, surface water, and flooding scenarios among others can address many questions concerning planning. The GIS, plus land use and flooding data, can find areas suitable for agriculture development, areas impacted by loss or increase in fishing opportunities, any impact on nature reserves or damage to conservation sites such as Parks and natural sanctuaries in 'real-time' to enhance decision-making at public meetings.

- A combination of methods

  A single method alone cannot achieve a planning task or engage all stakeholders equally. A combination of methods is usually implemented together depending on the situation. A Website is a powerful tool to disseminate information, but not all stakeholders or members of the public have access. Other methods, used in addition to the Website, such as a newsletter, may reach a larger number of stakeholders. Community calendars and public education meetings are required to reach the public in the field. Awareness & Education, Input, and Decision-making methods used together, may more effectively accomplish participation objectives.

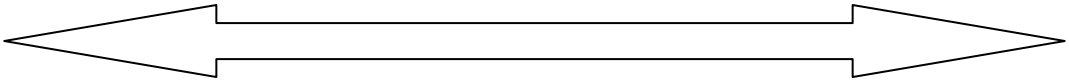
Complete the participation tools matrix (Appendix 2) that you want to use and decide which tools or methods will be best suited, based on cost and time and suitability for the purpose.

3.8 Level of participation

The level of participation will depend on the purpose of public participation and the context in which it is done. It can range from a top-down process of information sharing with no role for stakeholder to influence any decision to complete empowerment of the stakeholders, wherein they also become part of the decision making process and project implementation.

Each level of the Public Participation Continuum shown below describes a "Level" of participation. The appropriateness of the level of participation to choose from will very much depend on the type of decision to be taken and the impact it will have on people, nature and environment. If the decision is not controversial and will not create winners and losers, then informing the public and stakeholder groups of the proposed decision and its rationale through a press release or advertising campaign may be all that is required. If, however, the decision will likely create controversy or affect a large segment of stakeholder groups, then the decision-making organization should consider using a more sophisticated approach to participation. As a general rule: the more significant the impact, the greater the need for public participation.

Table 3.1 Participation level by type



Information Sharing	Consultation	Collaborative Decision Making	Empowerment
Top-down decision making – most powerful stakeholders informs some of the other stakeholders of some decisions	Most powerful stakeholders present tentative decision for discussion	Joint analysis but final decision still with most powerful stakeholders	Inputs, analysis and decisions made with equitable involvement of all stakeholders

The structural measures for flood protection will impact a variety of stake holders in the river basin. The potential impact will be different for people depending on different livelihoods options adopted like agriculture and fishing. It will be, similarly, also different for Government departments such as Dept, of water resources and irrigation and Dept. of Fisheries or Agriculture. Since the structural flood protection measures will have greater impact on a variety of stakeholders group a higher level of public participation will be desired.

One of the reasons some are sceptical of participatory development is that this type of development has come to be thought of as a fully democratic process. Thus, all stakeholders (e.g., farmers) should influence and to some degree control development and management. However, participatory development does not imply full and direct democracy. At one extreme, participatory development would not mean, for example, consulting all 200,000 farmers in the area around the ADB financed Song Chu Irrigation System (south of Hanoi, Viet Nam) about design. This clearly would not be useful, possible, or affordable. At the other extreme, a process that only involved village leaders would not necessarily protect the rights of the poor or disadvantaged.

Between the two extremes lie a range of options that offer the potential for appropriate levels of participation for different purposes. For example, elected water users organization boards should be able to reflect the views of their irrigator members. Each sector and project needs to define the optimal participatory structures that will allow adequate stakeholder representation (including the poor and disadvantaged), without becoming too unwieldy or expensive.

(Source: OED. Participatory Approaches in Forest and Water Resource Operations in Selected Developing Member Countries (2003))

3.9 Steps in public participation process

3.9.1 Stakeholder participation action plan

The first step in public participation process in to prepare an action plan for stakeholder consultation and participation. The starting point for any action plan is to define the purpose followed by stakeholder analysis which describes all the potential participants. The greater the stake of participants, and the less influence they have on the outcome through normal channels, the greater the need to engage them in a participation process.

A stakeholder participation action plan can be structured in any preferred form of work plan but will include the following elements:

Table 3.2 Elements of a stakeholder participation action plan

Question	Action Plan
What decisions or outcomes are expected from public participation?	Define the purpose and scope of public participation based on the levels of participation identified.
Who must be involved to arrive at the decision or outcomes?	Identify and prioritise the target groups for public participation forums using the stakeholder analysis.
What is the most effective means to interact with these groups? Are there existing forums or events through which the target groups can be reached?	Organize the groups by their locality (eg. Village meetings), or mandates (public officials, NGOs) and the most feasible means to reach each group within the time frame and budget.
What is the level of education, understanding of the issues, language and cultural background of the target participants?	Define the specific activities (meeting, workshop, brochure, media broadcast or advertising supplement) required to reach the target participants. Identify the most appropriate tools and methods for communicating and facilitating feedback from the target group. Reference should be made to other programs – of NGOs, local government, mass organizations or community-based organizations – that have conducted public participation forums in the locality. Community development professionals experienced in communication and facilitation may be required for adapting participatory tools to the locality.
What are the timelines, budget and human resources available to conduct the public participation activities?	Evaluate the costs of the defined activities, tools and methods. Finalize the activities and number of participants based on the costs and the resources available for the process.
What are the skills in facilitating participation among those responsible for the process?	Determine who will facilitate the participatory process. In some cases, experienced facilitators can be hired. In other cases, line agencies, local officials or community representatives will lead the activities directly. A training needs assessment and Training of Trainer process may be required to prepare those who will undertake the participatory exercises.

On this basis, a typical public participation plan is presented in Appendix 5. This plan needs to be updated during implementation of different stages of a project.

The following section describes in detail the steps in public participation process.

3.9.2 Define the purpose

Define clearly what you want to achieve at the end of the public participation process. This should be based on the public participation principles adopted at MRC.

A clear sense of purpose will help you decide on the appropriate methods for public participation, who are the stakeholders to engage and whether the process was successful (achievements can sometimes surpass initial objectives).

Write down the objectives and keep as a record. Do not be over-ambitious. Focus on what is needed for the particular task (and what may provide some useful footholds for future activities), but recognise that formal engagement exercises are usually constrained by time, resources and the willingness of stakeholders to respond.

Key Questions for defining the purpose

- A better understanding of the real issues among all stakeholders with flood management?
- Help and advice from stakeholders, resulting in a better policy/decision?
- A better strategy for dealing with floods?
- Prevention of potential problems with structural measures for flood protection later?
- Compliance with a statutory requirement?
- Involvement of stakeholders who may be negatively affected by the structural measure and the need for alternative development for these stakeholders?
- Beginning a long-term relationship with stakeholders?
- A large amount of relatively superficial feedback?
- Detailed, carefully considered comments from experts?
- Greater acceptance of the ultimate solution?
- A decision?

Finally, if you are instigating an engagement process, ask yourself some searching 'What if?' questions, such as 'What if the process suggests that my plans are completely misguided?' What will you do? What will be the implications for others?

Public participation has various stages depending on the type of project and level of engagement that is feasible at each stage of the project cycle. The essential stages are:

1. Stakeholder Analysis
2. Information Dissemination
3. Information Gathering
4. Consultation
5. Participation in decision-making
6. Public awareness on disaster risks and disaster preparedness
7. Community mobilization for operation and maintenance.

For the planning stage for IFRM the first five elements are of importance. Number 6 refers essentially to a soft flood risk management measure aiming at vulnerability reduction. The last element is of importance for the operation and maintenance stage. An overview of the first five stages is presented below.

3.9.3 Stakeholder analysis

Stakeholder analysis is the identification of a project's key stakeholders, an assessment of their interests, and the ways in which these interests affect project riskiness and viability. It is linked to both institutional appraisal and social analysis: drawing on the information deriving from these approaches, but also contributing to the combining of such data in a single framework. Stakeholder analysis contributes to project design through the logical framework, and by helping to identify appropriate forms of stakeholder participation.

As a first step in the social assessment process, it is important to conduct a stakeholder analysis in order to:

- identify the principal and secondary groups that "have a stake" in the project and the implementation of the FRM measures, and
- analyse the nature of their interest in the project, how they define the problems to be addressed and the resources they can bring to achieving the objectives of the FRM project.

As mentioned, the stakeholder analysis is among the first steps in addressing the social issues of the FRM project. It should be prepared at the beginning of work on the formulation and design of the project. Moreover, throughout the process of planning and implementing the project, the stakeholder analysis should be continually reviewed and updated in order to confirm the involvement of stakeholders and keep track of changes in their circumstances and interests. This will facilitate the planning for the involvement of stakeholders in different aspects of the project.

Critical elements for conducting stakeholder consultation

Preparation

- Decide on the type of meetings with stakeholders
- Decide on venue
- Prepare briefing material on the project
- Educate Stakeholders for equal participation by all
- Provide a facilitator who is sensitive and trained in social aspects and facilitation

Participants

- Identify key stakeholders
- List from the stakeholders analysis

Logistics

- Venue Should be accessible to all
- Should have adequate facility
- Should provide facilities for effective

communication

- When: Time of day and week should be suitable to the key stakeholders
- How: Create atmosphere of equal participation

Methods

- Choose appropriate method based on the type of stakeholderS

The project proponent (and/or its consultants) is normally responsible for preparing the stakeholder analysis. In some instances, it is possible for the project proponent to identify the interests, problem definition, resources and mandate of different stakeholder groups. Nonetheless, it is preferable to conduct the stakeholder analysis using a participatory process that involves the different stakeholders. For example, during a public consultation workshop to introduce and discuss the FRM project, the proponent can organize focus groups during which different types of stakeholders work together to identify, themselves, their interests, how they define the problems to be addressed by the project, their resources (to support the project or not) and, where relevant, their mandate. In a plenary session, the different focus groups can share the results of their work and a comprehensive stakeholder analysis can be prepared and agreed. Through this process, the proponent will also establish a basis for periodic updating of the analysis in consultation with the different stakeholder groups. The size of the group will have an impact on the participation and should be carefully considered depending on the outcome you want to achieve.

Key questions for stakeholders' analysis:

1. How will the structural flood protection measure impact positively or negatively the people in the demonstration project focal area?
2. What are the capacities of the people to adapt to the changes in land use pattern and
3. What support systems would be necessary to help people adapt by equipping them with the necessary skills?

Questions to ask

1. Who is likely to benefit from the project?
2. Who is likely to be affected by the negative impacts of the project?
3. Who will be responsible for implementing measures to mitigate the negative impacts?
4. Whose cooperation, expertise or influence would be helpful to the success of the project?
5. Who are the most vulnerable and least visible for whom special consultation efforts have to be made?
6. Who supports or opposes the changes the project will bring?
7. Whose opposition could be detrimental to the success of the project?
8. Who might have resources to contribute?
9. Who is able to make decisions (land-use, access, construction designs) that could affect the project?

The concept of stakeholders is often simplified in believing that interests, experiences, needs and expectations are homogenous among a given group of people. In reality, stakeholders are very diverse, and methods used in stakeholder identification and analysis must accept and reveal this complexity, by describing and interpreting the many differences which exist among social groups and sectors. Stakeholders must also be defined broadly, in order to capture a wide range of groups and individuals. The interests or stakes of the various actors or stakeholders differ as a result of factors such as tenure, ownership, history of use, social organisation, values and perceptions, and pattern or type of use.

A good stakeholder analysis will identify the people and groups that are directly or indirectly involved in or affected by the project, including groups that are supportive of and other groups that may oppose the project. Understanding these social issues is important to define strategies to gain support for and encourage participation in the project.

The stakeholder analysis matrix (Appendix 3) should be completed with people knowledgeable about the project area.

How the size of meetings impacts participation

3–6 people:	Everyone speaks
7–10 people:	Almost everyone speaks. Quieter people speak less. One or two may not speak at all.
11–18 people:	Five or six people speak a lot, 3 or four join in occasionally.
19–30:	Three or four people dominate. Use breakout groups of 4 to 8 to discuss issues in depth.
30+ people:	Little participation in a discussion is possible unless breakout groups are used.

Mixing men and women and people of different status or backgrounds may be useful in meetings designed to listen to and incorporate a variety of perspectives and experiences. However, this may not be possible or appropriate everywhere, and you should be sensitive to power relationships and cultural norms. In other meetings designed to seek in-depth perspectives from each group, it may be better to separate groups into homogeneous subgroups.

Source: Rogers, J. 1989. Adults Learning. Open University Press. Milton Keynes. UK.

The stakeholder analysis must be adapted to the context in which the project is taking place. Essentially, it involves gathering the information related to the questions below:

Who are the principal and secondary stakeholders?

In general, the principal or primary stakeholders will be the people, communities and social groups that are (i) the intended beneficiaries from the reduced flood risk; or, alternatively, (ii) the people or groups that are most at risk of being adversely affected by the FRM measures. The secondary stakeholders are the public, private and community organizations that are directly responsible for and/or instrumental to the planning, construction or operation and maintenance of the FRM measures. Some groups may be both primary and secondary stakeholders – they may be beneficiaries who have a mandate or other resources to contribute to the planning and implementation of the project.

What are the stakeholders' interests?
The interests of different stakeholders describe how and why they are involved in the project. For people and communities in the project area, for example, the interest is to reduce the damages to their land, property and other assets. For rice farmers, the interest may be more specific to protect their wet-season rice crop. For national disaster management agency, their interests may be how the project contributes to the objectives of a regional flood risk management plan. The provincial department of agriculture, on the other hand, is focused on increasing crop production and/or diversity. Environmental NGOs are interested in issues such as protection of environmental flows, biodiversity, etc.

How do stakeholders define the problem(s) that need to be addressed by the FRM measures?
The problem definition by different stakeholders should be stated as clearly as possible; it should be a negative statement, not a statement that already implies a solution. For farmers, for example, wet season rice paddy is at risk of inundation if floods occur early or are deeper than normal (rather than, "there is no flood protection system"). The problem for farmers may also be that deep floods increase the risk of injury or death for their livestock. For some government agencies, however, the problem may relate to the lack of adequate technical capacity or other resources.

What are the resources they can bring to achieving the project objectives?
Different stakeholders will have different resources that they can mobilize either to support or, in some cases, to oppose the project. Resources are financial and non-financial. Many government agencies and formal organizations have both types of resources; in addition to money, they have knowledge/technical expertise, political influence and other types of non-financial resources. The people living and working in the project and most civil society organizations, however, have predominantly non-financial resources, for example, volunteer labour, time, local knowledge, votes, strikes and public pressure.

What is the mandate of the stakeholder?
The stake holder's mandate is the formal authority to carry out a particular function. For example, local government is mandated to provide certain types of services for people living in the project area and to build and/or maintain local infrastructure. Other government agencies at all levels have formal mandates, as do many civil society, NGO, international and other formal organizations. The people and socio-economic groups in the project area such as women, farmers, fishers, low-income people, etc., generally do not have specified mandates.

3.9.4 Information dissemination

Information dissemination can take a variety of forms throughout the project cycle and should aim to provide information that is understood and useful to the stakeholders. Thus, the knowledge gained in the stakeholder analysis should be used to design the information dissemination methods and the types of materials to be used.

Open, transparent dissemination of information about planned initiatives or projects should be provided in parallel with the social assessment. This two-way flow promotes an active relationship between those who seek and those who provide project-related information.

During the planning phase it is important that people understand clearly the stage of project processing and the chance that the project may or may not go forward. A key consideration in preparing the strategy for information dissemination is to ensure transparency and full disclosure of information to the full public at the time that a project will start. Prior to the start, confidentiality is as important as transparency so that small groups of people with information are not in a position to speculate and acquire benefits at the expense of others.

In the IFRM planning stage the following information is essential:

Table 3.3 Information requirements in the IFRM planning stage

Information to be disseminated	Methods
What project or initiative is being planned, and what is the financing source?	Posters at local government centres, community meeting halls, near proposed project site.
Why is information being gathered, who will use it and how?	Fact sheet and explanation during focus groups and interviews.
What are the results of the assessment?	Community meetings.
Is the project proceeding or not and what are the reasons in either case?	Media articles/broadcasts and advertisements.
Outline of the next steps.	

3.9.5 Information gathering

The next stage of public involvement is to examine how stakeholders are affected by a particular project or programme by developing a better understanding of their social, economic, cultural and political conditions. This stage is also referred to as the social impact assessment. The process for social impact assessment gathers information from the community using participatory techniques. The purpose and methods are described in detail in Chapter 5: Practices for social evaluation.

3.9.6 Consultation and participation in decision-making

Consultation goes beyond gathering and disseminating information and creates an opportunity for stakeholders to discuss and negotiate their needs and preferences. It is here that ideas and priorities from stakeholders can start to affect project design. This step is crucial in the sense that it creates the opportunities by which stakeholders can influence a final decision (the final stage). In consultation processes the inputs from participants are documented by project planners who then assess whether the expressed needs and preferences can be included in design and if so in what ways.

Participation in decision-making occurs where stakeholders are able to take part in decision making. It is during this stage that projects, policies and everyday resource decisions are reviewed by the affected public and activities, costs and benefits are allocated as a result. Participation in decision-making is often practiced in the case of small-scale mitigation works or non-structural measures where prioritisation of various options is done by villages or community-based organizations. In this case, the final measures to be selected are chosen from the top priorities within the available budget.

The forums and methods to undertake consultation and participatory decision-making are similar. The difference between consultation and participation in decision-making will depend on the outcomes that are desired from the interaction with stakeholders. The difference in terms of whether stakeholders are being asked to give inputs or to make decisions needs to be clearly stated in order to manage expectations. In both cases, participants need to be provided with simplified information on flood risks and scenarios for flood protection in order to provide quality input or make informed decisions.

In the IFRM planning stage the following inputs are required:

Table 3.4 Input requirements in the IFRM planning stage

Inputs from stakeholders	Methods
Perspective / consensus on the main problems to be addressed by flood risk mitigation measures.	Participatory Vulnerability Assessment Participatory rural appraisal.
Prioritisation of potential solutions to reducing flood risks.	Open municipal / village / commune meetings
Validate: - the choice of flood protection measures considered as options. - the locations/settlement areas/land that will benefit from flood protection investments.	Focus group discussions with representative groups.
Identify issues, opportunities and constraints to be identified in the assessments.	Key informant interviews with leaders of villages, community-based organizations or other representatives

Appendix 4 gives the questions to be asked to all the stakeholders during the consultations. The answers to these questions will help in validating the choice of flood protection measures, their location or help in searching for alternative solutions when problems are identified.

3.10 Using the findings of the stakeholders' analysis

Findings from a stakeholder analysis are already recorded in the tables and matrix diagrams, and the risks and assumptions arising from the analysis should be included in the log frame. In addition, the analysis should have contributed to a participation matrix that is used to explain project design. These records of the analysis are the basis for revision later on in the life of the project.

In more concrete terms, the findings of a stakeholder analysis need to be included (with different amounts of detail) into (a) the project concept note and (b) the project document. It will also be appropriate to include analysis in annual monitoring reports and reviews.

Findings should be shared with community members, with an emphasis on being sensitive and respectful to race, ethnicity, gender, language, and culture.

3.11 Public participation checklist for government agencies

1. Understand the public participation policies at MRC and respective NMCs and also of the line agencies, if they exist.

2. Obtain the support of senior management to ensure that the Agency's policies and activities are modified to ensure early, effective and meaningful public participation, especially with regard to FMMP stakeholders. Identify internal stakeholders and establish partnering relationships.

3. Use the following Guiding Principles in setting up all public meetings:
   - Maintain honesty and integrity throughout the process
   - Recognize community and local knowledge
   - Encourage active community participation
   - Utilize cross-cultural formats and exchanges

4. Identify external Environmental FMMP stakeholders and provide opportunities to offer input into decisions that may impact their life. Consider at a minimum individuals from the following organizations as appropriate:
   - Affected Communities
   - Line Agencies serving the affected communities
   - Civic/public interest groups
   - Grassroots/community-based organizations

5. Identify key individuals who can represent various stakeholder interests. Learn as much as possible about stakeholders and their concerns through personal consultation, phone or written contacts. Ensure that information-gathering techniques include modifications for minority and vulnerable communities (for example, consider language and cultural barriers, technical background, literacy, access to respondents, and preferred types of communications).

6. Solicit stakeholder involvement early in the policy-making process, beginning in the planning and development stages and continuing through implementation and oversight.

7. Develop co-sponsoring/co-planning relationships with community organizations, providing resources for their needs.

8. Establish a central point of contact within the NMC to assist in information dissemination, resolve problems and to serve as a visible and accessible advocate of the public's right to know about issues that affect their life or environment.

9. Regionalize materials to ensure cultural sensitivity and relevance. Make information readily accessible and understandable. Executive summaries/fact sheets should be prepared in layman's language. Translate targeted documents for limited English-speaking population.

10. Make information available in a timely manner. FMMP stakeholders should be viewed as full partners and Agency customers.

11. Ensure that personnel at all levels in the Agency clearly understand policies for transmitting information to FMMP stakeholders in a timely, accessible and understandable fashion.

12. Schedule meetings and/or public hearings to make them accessible and user-friendly for FMMP stakeholders. Consider time frames that do not conflict with work schedules, rush hours, dinner hours and other community commitments that may decrease attendance. Consider locations and facilities that are local, convenient and represent neutral turf.

13. Consider other vehicles to increase participation of stakeholders including:
   - Posters and Exhibits
   - Participation in Civic and Community Activities
   - Public Database and Bulletin Boards
   - Surveys
   - Training and Education Programs, Workshops and Materials

14. Be sure that trainers have a good understanding of the subject matter both technical and administrative. The trainers are the Ambassadors of this program. If they don't understand - no one will.

15. Educate stakeholders about all aspects of flood mitigation.

16. Ensure that research projects identify flood mitigation issues and needs in communities, and how to meet those needs through the responsible agencies.

17. Establish interagency working groups (at all levels) to address and coordinate issues of FMMP.

18. Hold workshops, seminars and other meetings to develop partnerships between agencies, workers and community groups.

CHAPTER 4

PRACTISES FOR ENVIRONMENTAL EVALUATION

4 PRACTICES FOR ENVIRONMENTAL EVALUATION

4.1 General environmental impact assessment approach

Seasonal flooding is an annually recurring phenomenon in the Lower Mekong Basin (LMB), a phenomenon which is of vital importance to maintain the inland fishery and agricultural production in the basin, as well as a variety of flood related ecosystem services. On the other hand, the yearly floods inflict damages on households, agriculture and infrastructure and result in loss of live and property. With growing population and economic development, the need for protection of people and their socio-economic activities against flooding has increased and flood management and mitigation projects are widely implemented.

Structural flood management measures, such as construction of dams and reservoirs, embankments, bypass channels, etc. can have serious environmental and socio-economic impacts: they alter the natural environment of the river, resulting in loss of habitats, biological diversity and ecosystem productivity. These impacts may affect people both upstream and downstream, and at the local as well as on the regional (transboundary) level.

Environmental Impact Assessment (EIA) is a tool that helps environmental managers to identify, predict and mitigate potential environmental impacts of proposed plans or projects and supports decision making on whether or not a project should be implemented, and if so, in what form. For effective environmental assessment, it is important to start at the strategic level (Strategic Environmental Assessment, SEA) and facilitate a dialogue between environmental and development authorities, as well as with informed public representatives. Information exchange and utilization facilitates communication among various stakeholders and experts, plays a vital role in ensuring close collaboration between the various stakeholders and helps in keeping the decision-making process transparent. Stakeholder involvement (see Chapter 3) is crucial in identifying, assessing, monitoring and evaluating environmental impacts.

MRC (Environment Training Kit, 2005) summarized the purposes, objectives and benefits of EIA as follows:

Purpose:
- Ensure the wise use of natural resources;
- Assist in pursuing wise development by evaluating alternatives, improving proposal design and enhancing social aspects of the project;
- Evaluate the rationale behind the proposed development;
- Identify measures for eliminating or reducing potential impacts; and
- Enable informed decision making.

Objectives:
- Ensure that potential environmental effects are considered before decisions are made;
- Promote sustainable development;
- Contain adverse environmental effects within known, specific boundaries; and
- Provide opportunity for public involvement in the decision-making process.

Benefits:
- Promotes better planning and leads to more responsible decision-making;
- Increases likelihood of public acceptance of controversial projects; and
- Saves time and money in the long run: reduces approval time and the need for corrective action.

4.2 Existing practices

Cambodia

Cambodia introduced environmental impact assessments legislation in 1995. However, 14 years on, actual experience is still limited. Government is facing a number of challenges in the process of developing, screening and reviewing EIA reports.

EIA requirements are laid down in Sub-decree on the Environmental Impact Assessment Process No 72 ANRK.BK dated August 11, 1999. It took till 2004 before the sub degree became enforced. In an annex a list of projects requiring an IEIA or EIA is given. The defined projects are categorized as a) industrial sector; b) agricultural sector; c) tourism sector; and d) infrastructure projects. Retention reservoirs, river improvement works, diking and diversions are not mentioned specifically, but fall in either the industry, agricultural or infrastructure category, depending on the nature of the project.

In 2000 general guidelines for conducting Environmental Impact Assessment have been drafted with ADB assistance. A number of sectoral guidelines is available in draft only and require further refinement before being endorsed. Specific guidelines for flood protection projects are not available. Of the available guidelines those for irrigation project and riverbank protection projects have some relevance for flood protection project EIA's.

Lao PDR

EIA regulation in LAO PDR dates back to 2000 (Regulation on Environment Assessment of the Lao PDR Decree No. 1770). It provides guidelines and standards for environmental assessments and a framework within which other ministries can develop their own set of standards and guidelines for EIA procedures. The EIA Decree stipulates that 'no construction or other physical activities shall be undertaken at a project site until an environmental compliance certificate for the project is issued '. Types or sizes of projects which do or do not require EIA are presently not specified. In the current practice the Development Project Responsible Authority reviews projects (based on their description) on a case by case basis and determines whether EIA is required.

Development of sectoral guidelines is the responsibility of the sector ministries themselves. Until now specific guidelines have only been made for hydropower projects, road development projects and mining projects. Recently the Water Resources and Environment Authority (WREA) has become responsible for the drafting of guidelines. Drafting of a specific guideline for flood protection works is not foreseen at the moment.

Vietnam

EIA was first mentioned in the Law on Environmental Protection (Article 18) of 1994. Thereafter, a number of circulars, decrees, ordinances and decisions have been issued by the Ministry of Science, Technology and Environment (MoSTE). These provide further substantiation and guidance for the implementation of EIA. SEA has been formally legalized in Viet Nam in 2006. Laws and regulations do not specifically mention Flood protection projects as requiring EIA. However, a number of related types of projects as specifically mentioned as requiring EIA, amongst others: projects of national importance of all sizes; projects of all sizes that are potentially having direct negative impacts on water sources of river basins, coastal seas, or areas with protected ecology; hydro-electricity projects including the construction of reservoirs with a capacity ≥1,000,000 m^3; exploitation or dredging of ≥ 50,000 m^3 sand or gravel per annum in river-beds; exploitation of surface water (≥ 10,000 m^3 per 24 hours); construction of irrigation schemes covering an area ≥ 500 ha; and construction of sea dykes of all sizes.

General guidelines on Strategic Environmental Assessment, Environmental Impact Assessment and Environmental Protection are available, sectoral guidelines are not.

Thailand

The first mandatory provisions for EIA in Thailand data back to 1981. Officially the EIA System in Thailand was issued under the Enhancement and Conservation of National Environmental Quality Act of 1992. The Ministry of Natural Resources and Environment has the power to specify by notification the type and size of projects or activities requiring EIA. The Environmental Impact Evaluation Bureau of Office of Natural Resources and Environmental Policy and Planning (ONEP) prepared guidance on EIA: 'Environmental Impact Assessment in Thailand', the latest version of which dates from July 2007.

The guidance provides background information on EIA and general guidelines for preparation of EIA reports. Types of projects or activities listed in the general guidance as requiring an EIA are amongst others: dam or reservoir construction with a storage volume ≥100,000,000 m^3 or a surface area ≥ 15 km^2 and irrigation projects with an irrigated area ≥ 12,800 Ha. Flood protection projects are not specifically mentioned in the guidance.

Specific guidelines are available for a number of projects types, e.g. Dam/Reservoir construction, and for Socio-economic Impact Assessment, Public participation in EIA and Health impact Assessment. The socio-economic and public participation guidelines are in line with the WB guidelines, but some 'adaptations' to the Thai situation have been made.

Transboundary impacts are not addressed in the general EIA guidance. The Thai point of view is that transboundary guidelines can only be applied voluntary (in the spirit of cooperation) and not obligatory. Furthermore, transboundary issues are not considered important, there exist very strict mitigation obligations in Thailand and the Security Law states that projects can not be located at less than 1 to 2 km from the border.

Transboundary impacts

In the NMRC's of the four LMB countries it is realized that environmental effects do not respect political boundaries, certainly not in river basins. Sustainable development is high on the agenda and transboundary impacts of developments in the basin should be prevented.

This is also reflected in the Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin of 5 April 1995. Article 3 of the Agreement,

'Protection of the Environment and Ecological Balance', states that the parties of the agreement agree 'To protect the environment, natural resources, aquatic life and conditions, and ecological balance of the Mekong River Basin from pollution or other harmful effects resulting from any development plans and uses of water and related resources in the Basin'. Article 7, 'Prevention and Cessation of Harmful Effects', states that the parties agree to 'To make every effort to avoid, minimize and mitigate harmful effects that might occur to the environment, especially the water quantity and quality, the aquatic (eco-system) conditions, and ecological balance of the river system, from the development and use of the Mekong River Basin water resources or discharge of wastes and return flows. Where one or more States is notified with proper and valid evidence that it is causing substantial damage to one or more riparians from the use of and/or discharge to water of the Mekong River, that State or States shall cease immediately the alleged cause of harm until such cause of harm is determined in accordance with Article 8'.

National environmental assessment legislation and procedures do not yet provide a framework for evaluation of transboundary impacts; therefore development of a common procedure could enhance cooperation and prevent disputes. MRC is committed to develop such an approach.

The draft version of the Framework for Transboundary Environmental Impact Assessment (TbEIA, March 2006), developed by MRC for the Lower Mekong Basin, mentions ports and river works as projects having potential transboundary impacts. This implies that flood protection dikes and dams are considered as potentially having transboundary impacts. Flood management and industrial water supply projects were originally on the list as well, but have been removed, since flood issues and industrial water supply are considered national issues.

4.3 Environmental impact assessment

4.3.1 Overall procedure

Environmental Impact Assessment (EIA) is a process in which a range of environmental, social, and economic issues are taken into account to determine whether environmental constraints should be put on a project, or whether a project should not be allowed to proceed at all.

The EIA process comprises a number of steps, from screening of the proposed project or activity to determine whether it should be subject to a complete assessment, to post evaluation of the completeness of the evaluation process and the effectiveness of mitigation measures required.

EIA aims to improve projects. To judge policies, plans or programmes on their broad socio-economic and environmental impacts another approach has to be followed: Strategic Environmental Assessment (SEA) is applicable (see Section 4.3.16).

Project screening is the process undertaken to determine whether a project requires an EIA and, if so, what level of environmental review is needed. Not all proposed developments require a full EIA, as some projects may not pose an environmental threat. Screening answers the initial question of whether an EIA needs to be performed.

Once it is decided that an actual impact assessment is required, the EIA starts with the collection and analysis of basic data on the project (including possible project alternatives) and on the environment as far as it is likely to be affected. The collection and analysis of the environmental data serves to provide a description of the so-called baseline

In defining the baseline conditions also the environmental effects of autonomous developments (trends) are taken into account.

Potential impacts are identified based on the information on baseline conditions and sources of impact. This identification involves an estimate of the order of magnitude of the impacts. Usually not all potential impacts are studied in detail. For the selection of the impacts to be studied in detail, criteria are used such as:

- Magnitude (the quantum of change);
- Extent (the affected area); and
- Significance (with respect to effects).

The process of selecting relevant alternatives and identification of the important (significant) impacts is commonly known as scoping. Scoping is a very important step in the environmental impact assessment procedure and should enable all interested parties (stakeholders) to express their concerns. As a result, all alternatives and impacts relevant for any of the interested parties will be taken into consideration, which increases the comprehensiveness of the assessment.

The scoping concludes the pre-study phase, after which the actual study period with the preparation of the Environmental Impact Statement (EIS) starts. In this phase an assessment is made of the selected alternatives and impacts. Furthermore measures to mitigate undesired, adverse impacts are proposed. In the post-study period the EIS is reviewed, the actual decision is made and the impacts are monitored.

The general outline of an environmental impact assessment is illustrated in Figure 4.1, which shows the conceptual framework for EIA studies. From this figure it becomes clear that an EIA consists mainly of the following components:

- A description of the proposed project and its objectives. Both (component) activities and sources of impact are described and analyzed, for the construction phase as well as the operational phase of the project;

- A description in ecological and socio-economic terms of the existing situation in the area directly affected by the project and of the natural resource use. The description of the existing environment should focus on those elements which have to be known for the description of the environmental impacts;

- A description of the autonomous developments in the area, in as far as these developments may be of importance for the contents and the conclusions of the environmental impact study. An example of autonomous developments to be taken into account is the change in population density and the related changes in water quality;

- Identification of the potential impacts and definition of the scope of the assessment, including agreement on geographical boundaries, selection of methods for evaluation and presentation etc. Identification of relationships between the project and existing plans and policies is also an important point. Furthermore a check should be carried out whether existing legislation is sufficient to provide regulations for the proper execution of the project activities and for the control of developments which will occur as a result of the project. If deficiencies are identified, recommendations have to be made for amendments;

- A description of the relevant project alternatives. This may include alternative solutions for the problem, but also alternative methods for achieving the project objectives;

- Design of the study program. This includes selection of impacts to be studied, selection of the prediction methods that will be applied and agreement on the level of detail of the study;

- Prediction of the impacts. Not only impacts as a direct result of the project are considered, but also the impacts resulting from developments which are induced by the project. The irreversible and irretrievable use of the natural resources is usually estimated as well. Generally a distinction is made between positive and negative impacts, reversible and irreversible impacts and short-term and long-term impacts. A distinction is also made between impacts occurring during the construction phase of the project and those occurring after completion (during the operational phase);

- If adverse impacts are identified, possible mitigating measures have to be formulated, also for impacts that may result outside the direct project area. The effectiveness of such measures to reduce negative impacts should be described, as well as their feasibility and the costs and benefits involved;

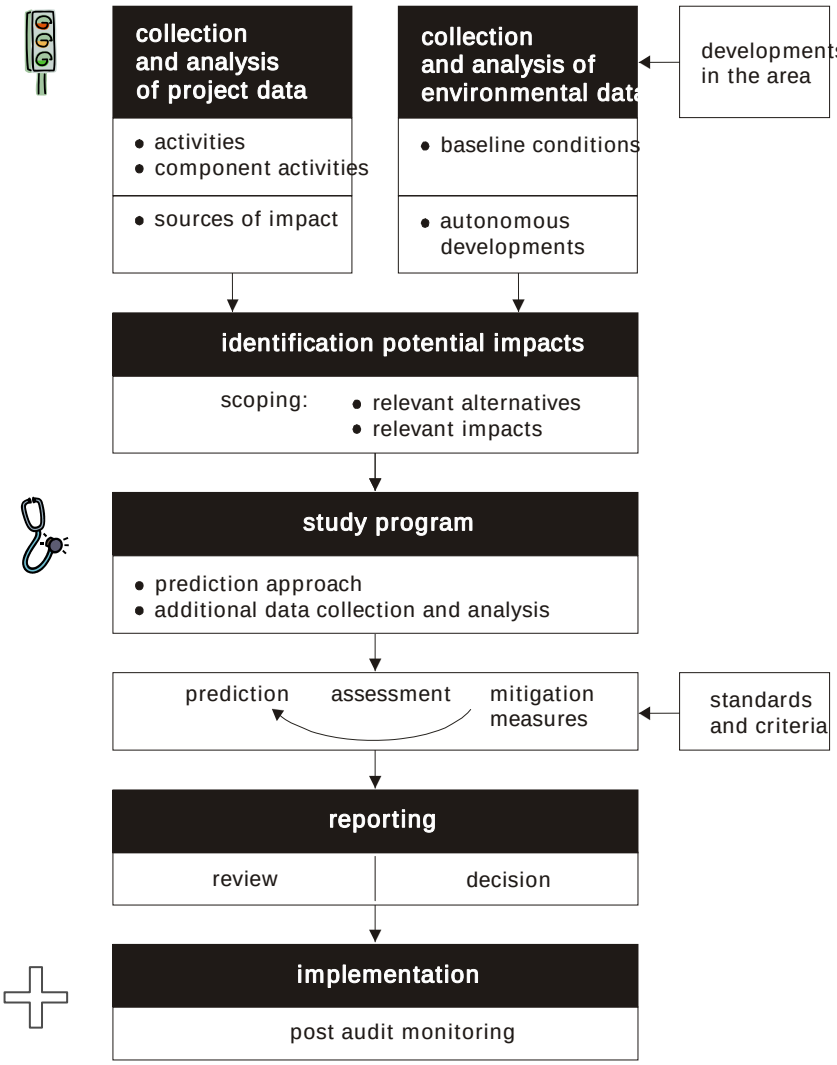


Figure 4.1 Conceptual framework for EIA studies.

- Assessment of the impacts, which includes a comparison of the various project alternatives and the mitigating measures with the situation without the project but including the autonomous developments. The impacts are evaluated by comparing the predictions with existing national and international environmental standards and criteria. From this comparison it should become clear which alternative and which mitigation measures are preferable from an environmental point of view; and

- Recommendations for a monitoring program to check the impacts in reality and to be able to take remedial measures if negative impacts are worse than anticipated. The program should include an indication of the procedure to be followed if impacts in reality prove to be more severe than anticipated. Questions like: "who is responsible for the monitoring?" and "on what time scale should monitoring be carried out?" have to be answered. Furthermore it is common practice in EIA studies to give an overview of identified gaps in knowledge and information and to show how these gaps influence the decision-making process. Gaps in knowledge may be addressed in the monitoring program, or, if they are essential for the decision-making, additional measurements or studies have to be considered as part of the environmental impact assessment.

The above described procedure for a complete environmental assessment is time consuming and costly. It will be clear that such a complete procedure can not always necessary. During a first screening of the proposed project, it has to be assessed whether or not serious adverse impacts of project activities on the environment are expected, and whether or not a full scale EIA has to be executed.

4.3.2 Screening

Screening is a procedure used to determine the environmental assessment requirements of a proposed project. Screening is generally straightforward, as most EIA legislation includes a detailed list of project types and the appropriate level of environmental review. In the absence of such a list general criteria can be used, e.g. ADB (2002) gives criteria for projects requiring a full-scale EIA.

Based on past knowledge and experience the Asian Development Bank developed Rapid Environmental Assessment (REA) checklists. These checklists consist of questions relating to:

- The sensitivity and vulnerability of environmental resources in the project area; and
- The potential for the project to cause significant adverse environmental impacts, taking into account the type, size, and location of the proposed project.

Based on the checklists projects are categorized as either:

- Having a potential for significant adverse environmental impacts;
- Having some adverse environmental impacts, but of lesser degree and/or significance than projects under the first bullet; or
- Projects unlikely to have adverse environmental impacts.

Projects in the first category are deemed to require an environmental impact assessment (EIA) to address significant impacts. For projects in the second category an initial environmental examination (IEE) is required to determine whether or not significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment. For projects in the third category no EIA or IEE is required, although environmental implications are still reviewed.

Categorization is to be based on the most environmentally sensitive component. This means that if one part of the project has potential for significant adverse environmental impacts, then the project is to be classified in the first category, regardless of the potential environmental impact of other aspects of the project.

A proposed project is classified in the first category if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented, and affect an area broader than the sites or facilities subject to physical works. The following locations for proposed projects suggest such a classification:

- In or near sensitive and valuable ecosystems (e.g., protected areas, wetlands, wild lands, coral reefs, and habitats of endangered species);
- In or near areas with cultural heritage sites (e.g. archaeological, historical sites or existing cultural sites);
- Densely populated areas where resettlement may be required or pollution impacts and other disturbances may be significant;
- Regions subject to heavy development activities or where there are conflicts in natural resource allocation;

- Watercourses, aquifer recharge areas, or reservoir catchments used for potable water supply; and
- Lands or waters containing valuable resources (e.g. fisheries, minerals, medicinal plants, prime agricultural soils).

A full scale EIA is also recommended if the project is likely to lead to one of the following impacts:

- Permanent conversion of potentially productive or valuable resources (e.g. fisheries, natural forests, wild lands);
- Destruction of natural habitat and loss of biodiversity or environmental services provided by a natural system;
- Risk to human health and safety (e.g. from generation, storage, or disposal of hazardous wastes, inappropriate occupational health and safety measures, violation of ambient water or air quality standards);
- Encroachment on lands or rights of indigenous peoples or other vulnerable minorities;
- Displacement of large numbers of people or businesses; and
- Absence of effective mitigation or compensation measures.

A project is classified in the second category if its potential adverse environmental impacts on human populations or environmentally important areas, (e.g., wetlands, forests, grasslands, and other natural habitats) are less adverse than those of projects in the first category. The impacts are more site-specific, and few are irreversible. In most cases, mitigation measures can be designed more readily than for projects in the first category.

A project is classified in the third category if it is likely to have minimal or no adverse environmental impacts. Appendix 6 gives a screening table summarizing the criteria that can be used for project categorization.

4.3.3 Description of the project

The description of the project should pay attention to the basic activities related to the project, the project location and the project layout and implementation schedule (in terms of the project cycle). Information, in sufficient detail, has to be provided on:

- The type of project;
- The need for the project;
- The project location (maps showing general location, specific location, project boundary and project site layout);
- The size or magnitude of the operation including any associated activities required by or for the project; and
- A description of the project including drawings showing project layout, components of the project, etc.

This information should give a clear picture of the project and its operations. The proposed schedule for approval and implementation should be described as well.

4.3.4 Description of the environment

The description of the environment has to provide a clear picture of the existing environmental, economic, social and cultural resources and values within the project area. Data sources have to be described briefly and the use of maps, figures, and tables to illustrate the baseline conditions is recommended. The baseline information of the project area has to include a description of:

1. The physical resources, e.g.:
   a. atmosphere (e.g. air quality and climate);
   b. topography and soils;
   c. surface water, including the flood characteristics;
   d. groundwater; and
   e. geology/seismology.

2. The ecological resources, e.g.:
   a. fisheries;
   b. aquatic biology;
   c. wildlife;
   d. forests;
   e. wetlands;
   f. rare or endangered species; and
   g. protected areas.

3. The economic development, e.g.:
   a. industrial activities (e.g., micro-enterprise and home-based industry, small and medium enterprises and larger industrial activities);
   b. infrastructure facilities (e.g. water supply, sanitation, drainage, irrigation, flood control);
   c. transportation (e.g., roads and bridges, airports, ports, inland waterways and other navigation channels);
   d. land uses (e.g., residential, agricultural, commercial; etc.) and tenure (e.g., registered title or other legal rights, lease, customary rights, etc.)
   e. power sources and transmission (e.g., hydropower, thermal);
   f. agricultural and fishery activities (e.g., rice cultivation, subsistence agriculture, commercial/cash cropping, tree plantation, raising/grazing livestock, etc.);
   g. mining activities; and
   h. tourism facilities and potential.

4. The social and cultural resources, e.g.:
   a. population and communities (e.g. numbers, locations, composition);
   b. health facilities;
   c. education facilities;
   d. socio-economic conditions (e.g. community structure, family structure, health and educational status, employment, social well being);
   e. current use of lands and resources for traditional purposes by indigenous peoples; and
   f. cultural heritage and structures or sites that are of historical, archaeological, paleontological, or architectural significance;
   g. Traditional flood coping mechanisms.

4.3.5 Identification of potential impacts

Potential impacts are identified based on the information on baseline conditions (the environment) and sources of impact (the project). This identification involves an estimate of the order of magnitude of the impacts. Criteria are used such as:

- Magnitude (the quantum of change);
- Extent (the affected area); and
- Significance (with respect to effects).

Usually not all potential impacts are studied in detail. The process of narrowing-down of the identified potential environmental impacts to ensure that the assessment focuses on the key issues for decision-making is commonly known as scoping.

In the development of flood risk management plans, programs or measures, four phases can be distinguished, that each may lead to specific environmental and socio-economic impacts. They are:

1. Project site selection;
2. Project concept, planning and design;
3. Project implementation, including construction; and
4. Project management, operation and maintenance.

In the following section an overview of potential (first order) environmental and socio-economic impacts or concerns is given for to each of these 4 project phases. They are summarised in the Checklist of Environmental, Economic and Social Impact given in Appendix 6. In the Checklist also information on potential higher order impacts related to these first order impacts is given.

Site selection can have adverse environmental impacts due to change in the environmental characteristics of the site or area, impacts on livelihood, and the possible need to resettle people away from their current dwelling places. Inappropriate project concept, planning or design may result in undesirable environmental impacts due to changes in the hydraulic characteristics, including the flooding regime, of the site or area; environmental impacts on land, water, and air quality; and changes in the socio-economic viability of the project site or area.

Project implementation, including construction, can have undesirable environmental impacts due to temporary and permanent changes in the land, water, and air quality, and charges in the socio-economic characteristics both during and after construction. In the final phase, project management, operation and maintenance, undesirable environmental impacts due to changes in land, water and air quality; and due to changes in socioeconomic conditions in the medium and long term may occur.

Impacts related to project concept, planning and design commonly have an overlap with impacts related to either project implementation or construction activities or with project management, operation or maintenance. Therefore in the following only a distinction between impacts related to site selection, related to implementation/construction activities and related to project design, management, operation and maintenance will be made.

Potential impacts related to site selection:

1. Land acquisition. Land required by the project may cause the permanent or temporary loss of agricultural and other types of land; loss of or damage to crops, trees, structures and other assets on affected land; or, loss of or restricted access to common property resources (forests, grazing land, etc.). Land acquisition may also result in the displacement of households, businesses or other economic or institutional activities;
2. Encroachment on historical monuments and cultural values such as pagodas, temples, sacred sites (e.g., sacred forests) and graves. Special attention should be given to the effect of the project on indigenous people;
3. Encroachment into forests, swamps, loss of precious ecology. The selected site may contain rare/endangered or useful species/habitats of fauna and flora;
4. Loss of agricultural, aquaculture or grazing land;
5. Impediment to movement of wildlife, cattle and people, including obstruction to navigation and obstruction of fish migration paths; and
6. Loss of the aesthetic, visual or recreational amenity or value of the area.

Potential impacts related to project implementation and construction activities:

1. Soil erosion. Unprotected soil during construction may erode and affect water quality downstream;
2. Increased turbidity in rivers and water courses due to construction activities or dredging in flowing water may lead to loss of flora and fauna;
3. Sedimentation of rivers and water courses as a result of increased sediment loads;
4. Loss of habitats/productive land by disposal of dredge spoil or solid waste/soil disposal;
5. Loss of soil fertility, e.g. when inappropriate landfill materials are used and productive top-soil is not re-used;
6. Worker accidents;
7. Accidents from increased traffic (construction equipment);
8. Disruption of access to villages, damage of local roads with heavy machinery;
9. Temporary obstruction to navigation;
10. Disruption of utility services;
11. Noise/vibration/air pollution (including dust) from construction activities;
12. soil/water contamination as a result of leakage and inappropriate storage of fuels and other chemicals, dumping of construction wastes or improper sanitation (worker camps);
13. Pollution of groundwater as a result of dumping of construction waste, inadequate storage and handling of fuels and other hazardous materials or improper sanitation (worker camps);
14. Social/community disruption. Inflow of non-local workers in local communities/ establishment of work camps and differences in customs between local population and work force may lead to tensions;
15. Health impacts. Disease hazards to workers and local people from lack of sanitation, poor water supply, improper waste management and import of carriers of e.g. HIV, malaria and dengue fever;
16. Increased pressure on water supply and sanitation facilities. Inflow of workers may put pressure on available resources;
17. Undesirable population migration to the project areas; and
18. Employment opportunities for local people, including local businesses.

Potential negative impacts related to project design, management, operation and maintenance are mainly related to project induced changes in the hydrology/hydraulics: the timing, extent, depth and duration of flooding, which may result in a loss of flooding related benefits, such as:

1. Loss of agricultural productivity. Reduced flooding will lead to reduced soil fertility (and consequent impacts on agricultural productivity) in areas previously inundated, reduced water availability, reduced leaching of acids and other pollutants and an increase in pests;
2. Loss of capture fisheries production. Changes in timing, extent, depth and duration of flooding lead to a reduction in fish stocks due to loss of spawning, breeding, nursing or feeding grounds. Fish migration may be hampered;
3. Loss of wetland areas/productivity. Reduced flooding will lead to a reduction in wetland areas and related wetland productivity, biodiversity, natural water purification capacity and natural flow regulation capacity;
4. Reduced possibilities for navigation/transportation by boat;
5. Change in water availability in the dry season. Less replenishment of groundwater in the flood season may result in water shortages in the dry season;
6. Changes in river morphology, either sedimentation or scouring of certain river stretches may occur;
7. Changes in salt water intrusion; and
8. Changes in delta growth.

The positive impacts related to project design, management and operation & maintenance are:

1. Increased safety for population living in the flood prone areas;
2. Reduced sanitation and public health problems in the flood season;
3. Decrease in flood damages to crops, infrastructure and ecosystem;
4. Opportunities to increase agricultural production;
5. Improvement mobility/better road transportation network; and
6. Poverty reduction and improved food security.

4.3.6 Scoping

Scoping is a crucial part of any impact assessment process and involves the narrowing-down of the identified potential environmental impacts to ensure that the assessment focuses on the key issues for decision-making. The overall objective of the scoping exercise is to identify which of the identified potential impacts are significant and should be studied in detail in the EIA. The output of scoping is the Terms of Reference (TOR) for the actual EIA study, which clearly defines both the spatial and temporal boundaries for the EIA.

Scoping also provides a key opportunity for public participation and engagement with different stakeholders to ensure their early involvement in the EIA process, and to make sure that different stakeholder needs and interests are addressed throughout the rest of the process. As such, scoping ensures that the environmental assessment is focused on relevant issues that have been agreed upon following input of all parties concerned.

Following issue identification, data requirements for making a sound assessment can be assessed. Furthermore it can be determined which issues are well understood and have adequate information already available and do not need to be subject to further studies.

The following activities should be part of the scoping process:

- A review all available information on the purpose and the need for the proposed project, as well as identification of the potential impacts;
- A visit to the proposed project location and any alternative sites; and
- A scoping meeting with representatives of all stakeholders of the project.

In preparation of he scoping meeting a Public Consultation and Disclosure Plan has to be developed. This is in essence the identification of stakeholders and the drafting of a program of consultation, disclosure of information, and methods of handling of comments and concerns.

Representatives of the following groups should participate in the scoping meeting:

- Local governmental authorities;
- National governmental ministries with authority over the Project's area of operations;
- Relevant environmental regulatory authorities;
- Specific commercial entities that would be involved in the operation;
- Representatives of academic or scientific bodies with particular interests;
- Representatives of the potentially affected local population, including employees, local community organizations and groups who may be affected by the project (e.g., residents, local enterprises, social organizations); and
- Representatives of non-governmental organizations (NGOs).

An information package on the project (e.g., a 5-10 page document with a cover letter and accompanying drawings, maps, etc.) should be prepared in the local language. The main document should contain a *brief* description of the following items:

- The proposed project and why it is being undertaken, and who the project sponsor is;
- Alternatives to the proposed project;
- The existing environment (based on environmental investigations carried out to date), identifying where there are gaps in information and where further studies are needed;
- The identified potential environmental impacts that may arise during both the construction and operation phase of the proposed project;
- Information on how proposed monitoring of impacts might take place;
- Annotated Table of Contents of the proposed environmental impact assessment; and
- Proposed public consultation and disclosure plan.

The cover letter should explain to the invited participants the purpose of the scoping meeting, which is to gain input for, and agreement upon, the type and amount of information to be included in the EIA. The information package should be distributed to scoping participants at least two to three week prior to the scoping meeting(s).

Scoping meetings should be scheduled for a few hours to a half-day, depending on the number of issues and potential concerns. Sometimes, it is helpful to separate meetings with technical experts from the general public meetings, which may be non-technical in nature. Local groups should advise on convenient local venues and timing.

At the end of the meeting a formal summary record should be drawn up and agreed upon. This summary should include the final Terms of Reference for the EIA and an overview of changes to be made to the Public Consultation and Disclosure Plan.

4.3.7 Development of alternatives

The development and proper examination of alternatives is another key element in any EIA. If a proposed project is expected to cause serious losses or degradation of the environment, the EIA should study alternative ways to meet the objective of the project, with fewer or less serious impacts. A first approach in looking for alternatives is to investigate whether or not the objectives of the project can be met in a fundamentally different way, e.g. by implementing non-structural flood protection measures instead of structural measures. It will be clear that looking for this kind of alternative options is only possible in an early phase of the project.

Once the choice for a certain project has been made, project alternatives can be generated, taking into consideration:

- Alterative locations;
- Alternatives related to the nature and extent of the project activities;
- Alternatives related to design, material use and process; and
- Alternatives in implementation schedule.

A 'no-project' (autonomous developments only) alternative and a ‘most environmentally sound’ project alternative have to be developed. The no-project alternative serves as a standard to compare the different project activities with. The most environmentally sound alternative gives an indication of the minimum impacts that could be attained.

4.3.8 Prediction

Predicting the extent and magnitude of the impacts is probably the most difficult part of an impact assessment. Prediction attempts to determine the relationships between causes and effects, but these relationships are often not well-understood. Furthermore, prediction relies on data and analysis from a variety of sources, physical, biological and socio-economic. The quality and availability of data often imposes an important constraint to the accuracy and reliability of predictions. In many cases, good quality data are simply not available. In such cases, other more qualitative techniques will need to be used.

In selecting a prediction method, the following criteria have to be applied:

- Which impacts have to be predicted;
- Which methods are available to predict a specific impact;
- Which level of accuracy/detail is needed:
- How much time is available for the study;
- What is the budget available for the study;
- Availability of data;
- Availability of expertise and facilities; and
- Acceptability of the applied method by the decision maker and the scientific community.

Normally, the scoping of the project provides information on the impacts to be studied and on the desired accuracy of the prediction results.

Several types of predictive methods can be distinguished:

- Experimental methods;
  - illustrative models;
  - physical (scale) models;
  - laboratory experiments; and
  - field experiments.
- Mathematical models
  - empirical models; and
  - process-descriptive models.

In mathematical models the relationship between cause and effect is explicitly formulated, while these relationships may be unknown in experimental methods. Illustrative models are meant to give an impression of certain elements of a future situation (e.g. the visual appearance, noise levels) while physical models represent physical processes to scale. Laboratory experiments are set up for simulating biological and biochemical processes, often by isolating a specific process (bio-assays) or by isolation of a total ecosystem (meso-cosmos). Field experiments aim to study changes in reality.

Surface water
Impacts on the hydraulic and hydrological conditions comprise changes in flow, in current velocity and direction, in water level and volume, residence time, stratification and overall changes in the water balance of an area. Predictions can be made by mathematical modelling.

Changes in hydraulic conditions may have an influence on sediment transport and morphology, resulting in increased sedimentation or scouring. Mathematical process-descriptive models can to be applied for the prediction.

Changes in water quality may be caused by discharges of pollutants from point or non-point sources, influenced by transport and physical, chemical and biological processes. Mathematical process-descriptive models are available for prediction of changes.

Atmosphere
The emission of substances into the atmosphere, e.g. by construction activities, can be derived from design data on the activity. Changes in concentrations of atmospheric pollutants can be predicted with mathematical dispersion models.

Groundwater
Changes in the groundwater regime may also be predicted using mathematical models. These changes include changes in direction and velocities of flow, depth of the water table, and hydraulic gradient. Changes in groundwater quality by conservative contaminants can be predicted by mathematical models of the groundwater regime.

Biota
Physical disturbance, e.g. the removal of plants, animals and habitats by occupation of land and building activities, can simply be predicted by surveying the existing populations or habitats in the affected area. Predicting the effects of disturbance is much more difficult. For most purposes specialist advice needs to be sought. Prediction of the effects of environmental contamination on plants and animals requires data on the relationship between the dose or concentration of the pollutant and the effect on the receptor. For certain pollutants and receptors these dose-effect relationships are available. For the prediction of changes in productivity and composition of plant and animal communities and habitats, often longer term effects, only a few very specific mathematical models have been developed. The alternative is to seek specialist advice on the effects that are likely to be expected.

Noise
Empirical models are available to predict noise emissions. Sound (noise) contours around or alongside sources of emission (e.g. construction sites) can be drawn with mathematical models.

Human health and welfare
Risks for human heath and welfare arise in the first place from accidents. For certain hazardous activities data on accidents and risk assessment and hazard identification methods are available. The results of risk analysis calculations are often presented as individual risk contours and group-risk curves on a map of the surroundings of the activity.

Changes in air, water, soil and food quality, changes in sound levels, changes in micro-organisms and vectors causing or carrying disease, and changes in human welfare may eventually also have effects on human health. Although the literature on human health effects is very extensive and some dose-effect information is available from toxicological and epidemiological studies, no formal methods to predict these effects have yet been developed.

4.3.9 Assessment of impacts

Predicted impacts are normally presented in a quantitative (numbers) of qualitative (large, small etc.) format. For the decision maker these prediction results are not yet what enables him to use the information for the decision-making process. What is needed is:

- A systematic overview of all relevant predicted impacts for all the alternatives;
- Information on the absolute or relative importance of the magnitude of an impact for the different alternatives (scaling); and
- Information on the relative importance of impacts for a specific environmental aspect, compared with other environmental aspects (weighting).

The systematic overview of all relevant impacts can be given by using a matrix, which shows environmental aspects on one axis and the alternatives, including the no-action alternative, on the other axis.

The overview can be improved by aggregating the matrix. Aggregation can comprise:

- The exclusion of alternatives with unacceptable consequences (e.g. violation of environmental standards or policies);
- Exclusion of environmental impacts which do not show relevant differences between alternatives; and
- Aggregating impacts within one impact category (e.g. surface water, human heath and welfare) by using weighting factors together with scaling values.

However, this type of presentation does not yet give information on the relative importance (significance) of an impact for the various alternatives. General criteria that can be applied to assess the significance of an impact are:

- Spatial scale of the impact. Is it confined to the site only, or beyond to the local, regional, national or transboundary environment;
- Time horizon and duration of the impacts. Will the impact be felt in the short, medium, or long-term? Will the impact be temporary (e.g. during construction only) or lasting;
- Magnitude of the change brought about (i.e., small, moderate, or large); and
- Reversibility of the impact. Can the impact be reversed by specific measures or are remedial measures nor available.

The significance of a predicted impact can be assessed by:

- Comparing with existing (environmental) standards and legislation and policies (are e.g. water quality standards or air quality standards violated as a result of the project);
- Comparing with priorities and preferences, including the level of public concern; and
- The scientific and professional evidence for:
    - the loss/disruption of valued resource stocks, ecological functions or designated areas;
    - negative impacts on social values, quality of live and livelihood; and
    - foreclosure of land and resource use opportunities.

Environmental standards and legislation of importance for flood risk management projects are:

- National and international occupational health and safety standards, both during construction and during operation of the project. Most countries have national standards, international standards are available at e.g. the International Labour Organisation (ILO) and the World Bank (WB);
- Water Quality Standards. Again, most countries have national standards, international standards are given by e.g. the World Health Organisation (WHO, International Standards for Drinking Water) and the European Commission;
- Protected area legislation. National designated areas for the protection of cultural. archaeological, historical, environmental or biodiversity conservation, taking into account the transboundary nature of certain impacts, which may affect protected areas in neighbouring countries;
- National and local planning regulations in floodplain areas; and
- International conventions, e.g. the Ramsar Convention on the wise use of wetlands, the CITES convention on the International Trade of Endangered Species and the Indigenous and Tribal Peoples Convention of the ILO.

Certain environmental priorities and preferences may be valued by the government, non-governmental organisations or the general public without being reflected in environmental laws and regulations. Examples at the global level are biodiversity, climate change and cultural values. At the local level this may include sites, flora and fauna valued by local communities for cultural, historical or medicinal values and the visual landscape.

Important issues for the assessment of the significance of an impact on the natural resources and the resource use, as well as on the social values/quality of live are:

- Loss of rare or endangered species, or their breeding and foraging habitat;
- Reduction of species diversity, or increase in exotic species;
- Loss of critical productive wildlife habitat;
- Transformation of natural landscapes, e.g. wetlands;
- Toxicity impacts to human or wildlife health;
- Reduction in the capacity of renewable resources to meet the needs of present and future generations; and
- Loss of lands and resources currently used for traditional or cultural purposes.

The Asian Development Bank (ADB) offers additional guidance in assessing impact significance. Questions which the ADB recommends to be posed in assessing projects include:

1. Will the project create unwarranted losses in precious or irreplaceable biological diversity or other resources;
2. Will the project induce an unwarranted acceleration in the use of scarce resources and favour short-term over long-term economic gains;
3. Will the project result in unwarranted hazards to endangered species;
4. Will the project intensify undesirable rural-to-urban migration to an unwarranted degree;
5. Will the project tend to increase the income gap between the poor and affluent sectors of the population;
6. Will the project contribute to global effects (e.g., increasing carbon dioxide emissions, ozone depletion, climate change); and
7. Will the project have effects on national financing.

4.3.10 Mitigating measures

Mitigation is the stage of the EIA process when measures are identified to avoid, minimize or remedy adverse impacts or to enhance environmental and social benefits of a proposal. Mitigating measures should be addressed early on in the EIA process in a dialogue between the environmental and the design team; this enables incorporation of mitigating measures in alternatives and design options. However, mitigation commonly only receives attention once the extent of the potential impacts of a proposal is reasonably well understood, i.e. after impact identification and prediction.

Two categories of mitigating measures are distinguished: structural measures, such as design or location changes, engineering modifications or site treatment and non-structural measures, such as economic incentives, legal, institutional and policy instruments, provision of community services and training and capacity building.

A three step approach for impact mitigation is recommended:

1. Impact avoidance. This step is most effective when applied at an early stage of project planning. It can be achieved by:
   - not undertaking certain projects or elements that could result in adverse impacts;
   - avoiding areas that are environmentally sensitive; and
   - putting in place preventative measures to stop adverse impacts from occurring.

2. Impact minimization. This step is taken during impact identification and prediction to reduce the degree, extent, magnitude or duration of adverse impacts. It can be achieved by:
   - scaling down or relocating the proposal;
   - redesigning elements of the project; and
   - taking supplementary measures to manage the impacts.
3. Impact compensation. This step is usually applied to remedy unavoidable residual adverse impacts. It can be achieved by:
   - rehabilitation of the affected site or environment, for example, by habitat enhancement and restocking fish;
   - restoration of the affected site or environment to its previous state or better, e.g. restoration of construction sites
   - replacement of the same resource values at another location, for example, by wetland engineering to provide an equivalent area to that lost to drainage or infill.

Development of environmentally better alternatives to the proposal is a way of mitigation. The effectiveness of mitigating measures to reduce adverse impacts has to be described, as well as their feasibility and the costs and benefits involved.

Recommended feasible mitigating measures for each of the potential environmental impacts of flood risk management projects are summarised in the Checklist of Environmental, Economic and Social Impact given in Appendix 6.

4.3.11 Environmental management plan

An important component of the EIA report is the environmental management plan (EMP).The EMP should give an overview of the mitigating measures and other project implementation conditions required to ensure compliance with environmental laws and regulations and to reduce or eliminate anticipated adverse impacts. At the same time it summarizes available measures to enhance environmental conditions. A monitoring plan is usually part of the EMP. The EMP has to make sure that once the proposed project is approved, environmental issues will remain closely scrutinized and forms the basis for impact management during project construction and operation.

The following aspects are typically addressed in an EMP:

- Summary of potential impacts: the predicted adverse environmental impacts for which mitigation is required have to be identified and briefly summarized;
- Description of mitigation measures: each mitigation measure has to be briefly described with reference to the impact to which it relates and the conditions under which it is required (for example, continuously or in the event of contingencies);
- Description of the monitoring program;
- Institutional arrangements: responsibilities for mitigation and monitoring have to be clearly defined;
- Implementation schedule and reporting procedures: the timing, frequency and duration of mitigation measure have to be specified in an implementation schedule. Procedures to provide information on the progress and results of mitigation and monitoring measures have to be clearly specified as well;
- Contingency plan when impacts are more serious than predicted; and
- Cost estimates and sources of funds for both the initial investment and recurring expenses for implementing all measures contained in the EMP.

The EMP has to contain conditions that are binding and provides the basis for a contract with the responsibilities of the proponent. In turn, the proponent can use the EMP to establish environmental performance standards for those carrying out the works or providing supplies.

4.3.12 Monitoring

Monitoring in the EIA process serves a number of purposes:

- Assessment of the baseline conditions;
- Checking project compliance with agreed-upon conditions for the project's approval;
- Review the extent and severity of the environmental impacts against the predicted impacts;
- Identification of trends in impacts;
- Evaluation of the effectiveness of the prescribed mitigation measures; and
- Evaluation of the overall effectiveness of the EMP.

As such, environmental monitoring has to be performed before and during project planning as well as during project implementation and operation.

Monitoring is carried out on the basis of an environmental monitoring plan that describes the parameters to be measured, how, when, and where the monitoring activities will be undertaken, who will carry them out, and who will receive the monitoring report. More in detail the monitoring plan has to contain information on:

- The scope and objectives of monitoring for each of the impacts/key indicators selected for monitoring;
- The selection of sites for observation, measurement and sampling;
- The methods to be applied for sampling and collection of data;
- The frequency and period of observation, measurement or sampling;
- The level of accuracy required;
- The data analysis procedures to be followed;
- A system for recording, organizing and reporting of the data;
- Independent checks for quality control and assurance of data;
- Thresholds of impact acceptability and requirements for management action if monitoring indicates these are exceeded (emergency plan); and
- The budget, resources and personnel, required for carrying out the monitoring program.

In designing the monitoring program the technical, financial, and management capabilities of the institutions that have to carry out the monitoring have to be considered. If needed proposals for improvement have to be made.

Furthermore it is recommended to also make use of simple observation and reporting techniques, particularly by locally affected parties.

4.3.13 Reporting requirements

The EIA report or impact statement is first of all a document for decision-making. However, the audience for an EIA report not only includes the authorizing and implementing agencies, but also other interested parties and the affected public. The information obtained and a synthesis of the results of the studies and consultations undertaken has to be reported, as well as a full, yet concise, account of the likely environmental impacts of a proposal. Besides, the recommended measures for mitigating and managing these impacts and the significance of any residual effects have to be presented.

What is needed is a coherent statement of the potential impacts of a proposal and the measures that can be taken to reduce and remedy them, to be used by:

- The proponent to implement the proposal in an environmentally and socially responsible way;
- The responsible authority to make an informed decision on the proposal, including the terms and conditions that must be attached to an approval or authorization; and
- The public to understand the proposal and its likely impacts on people and the environment.

A successful EIA report that meets these requirements will be:

- Actionable: a document that can be applied by the proponent to achieve environmentally sound planning and design;
- Decision-relevant: a document that organizes and presents the information necessary for project authorization and, if applicable, permitting and licensing; and
- User-friendly: a document that communicates the technical issues to all parties in a clear and comprehensive way.

Because of its importance as a communications tool, the EIA report needs to be well organized and very clearly written. An effective report will be written both in plain language understandable for non-experts, but is also up to appropriate technical standards.

In most countries, the information to be included in an EIA report is specified in legislation, procedures or guidelines (see Section 4.2). International Financing Institutions like the World Bank and ADB also have pre-described reporting formats. Normally, the content of an EIA report will be prepared in accordance with specific terms of reference established during the scoping process.

An EIA report typically includes many or all of the following headings and items:

- Executive or non-technical summary (which may be used as a public communication document);
- Statement of the need for, and objectives of, the project;
- Reference to applicable legislative, regulatory and policy frameworks;
- Description of the project and how it will be implemented (construction, operation and decommissioning);
- Comparison of the project and the alternatives to it (including the no-action alternative);
- Description of the project setting, including the relationship to other proposals and relevant policies and plans for the area;
- Description of baseline conditions and autonomous developments (bio-physical, socio-economic etc;
- Review of the public consultation process, the views and concerns expressed by stakeholders and the way these have been taken into account;
- Consideration of the main impacts (positive and adverse) that are identified as likely to result from the project, their predicted characteristics (e.g. magnitude, occurrence, timing, etc.) proposed mitigation measures, the residual effects and any uncertainties and limitations of data and analysis;
- Evaluation of the significance of the residual impacts, preferably for each alternative, with an identification of the best practicable environmental option;
- An environmental management plan that identifies how proposed mitigation and monitoring measures will be translated into specific actions as part of impact management. The environmental management plan can be included in or annexed to the report; or may even be a separate document; and
- Appendices containing supporting technical information, description of methods used to collect and analyze data, list of references, etc.

The executive summary gives a concise description of the main findings and recommendations. It is not meant to summaries all of the contents of the EIA report. Instead the focus is on the key information and options for decision-making. The executive summary should be kept short, since it is often the only part of the report that decision makers and most people will read. It can be written for distribution to the public as an information brochure.

The executive summary should describe:

- The project and its setting;
- The terms of reference for the EIA;
- The results of public consultation;
- The alternatives considered;
- Major impacts and their significance;
- Proposed mitigation measures;
- The environmental management plan; and
- Any other critical matters that are important for decision-making.

4.3.14 Environmental Impact Assessment quality review

Review of the quality of an EIA report has to ensure that the information provided by the report complies with the EIA guidelines/terms of reference and is sufficient for decision-making purposes. It is a final check on the completeness and quality of the information gathered in the EIA report and submitted for project authorization. Often, the review leads to a requirement for additional information on potential impacts, mitigation measures or other aspects.

The objectives of EIA review can be summarized as:

- To assess the adequacy and quality of an EIA report;
- To take account of public comments;
- To determine if the information is sufficient for a final decision to be made; and
- To identify any deficiencies that must be addressed before the report can be submitted.

A comprehensive review of the adequacy and quality of an EIA report has to address the following issues:

- Does the report address the Terms of Reference for the EIA study;
- Is the necessary information provided for each major component of the EIA report;
- Is the information correct and technically sound;
- Have the views and concerns of affected and interested parties been taken into account;
- Is the statement of the key findings complete and satisfactory, e.g. for significant impacts, proposed mitigation measures, etc.;
- Is the information clearly presented and understandable by decision makers and the public; and
- Is the information relevant and sufficient for the purpose of decision-making.

The last question is the most significant aspect for review conclusions, and determines whether or not an EIA can be submitted as is or requires revisions.

To ensure objectivity of EIA review, the use of inter-agency committees or independent panels or tribunals is advised. Public input is considered an integral means of reinforcing objectivity and assuring the quality of information presented. Public involvement requires reasonable time and opportunity for interested parties to comment. A set period for public review and a formal

notification procedure are recommended. The notification should indicate where the EIA report is displayed and how comments can be filed. Preferably an open review process, using public hearings and other means to gain the views of all interested and affected parties should be followed.

4.3.15 Public participation

Timely, well planned and appropriately implemented public involvement programs contribute to EIA studies and to the successful design, implementation, operation and management of projects. Public involvement provides valuable information on the (bio-physical and socio-economic) baseline conditions, the resource use by local communities, the key impacts, potential mitigation measures and the identification and selection of alternatives. It also ensures that the EIA process is open, transparent and robust.

Public involvement has to encompass both public consultation (or dialogue) and public participation, which is a more interactive and intensive process of stakeholder engagement. As a minimum, public involvement must provide an opportunity for those directly affected by a proposal to express their views regarding the proposal and its environmental and social impacts.

The objectives of public participation in the EIA process can be summarizes as:

- Improved project design by:
  - improved identification of possible impacts from the project, including issues of cultural sensitivity and local significance;
  - incorporation of local and traditional knowledge in the process;
  - identification of project alternatives, mitigating and management measures, which are acceptable to affected peoples; and
  - maximization of benefits and minimization of conflicts;
- Improved ownership and acceptance of the project by affected parties; and
- Informed and equitable decision-making.

The following stakeholder groups have to be involved in the process:

- Directly affected people who live or work in the project area and who are affected positively or negatively by the project;
- Indirectly affected people who live in neighbouring areas, or who use resources such as water derived from the project area;
- Public sector agencies ministries, provincial or local government, government mandated mass organizations;
- Private developers, private companies with a direct investment in the project and their subcontractors and financiers; and
- Others at local, provincial, national or even international level: donors, interested NGOs, external advisers, academics, the business sector etc.

Most EIA systems make some type of provision for public involvement. The legal and procedural requirements for this purpose vary from one country to another, but ideally, public involvement has to commence during the preparatory stage of project development and has to continue throughout the whole EIA process, with an emphasis on:

- Screening: the responsible authority should consult with people likely to be affected in order to gain a better understanding of the nature and significance of the likely impacts. This information can assist in determining if an EIA is required and at what level;
- Scoping: public involvement in this phase is crucial to ensure that all the significant issues are identified, local information about the project area is gathered, and alternative ways of achieving the project objectives are considered;
- Impact analysis and mitigation: involvement of the public in these phases of EIA can help to avoid biases and inaccuracies in the analysis, identify local values and preferences, support the design of mitigation measures, help in selecting the most practical alternative; and
- Review of EIA quality: the EIA reports have to be made publicly available for comment and public hearings or meetings have to be organized as part of EIA review.

Furthermore the public should be involved during project implementation and follow up when the environmental impacts are monitored.

The terms of reference for the EIA study have to include specifications for the proposed public involvement. These specifications could also be in the form of a separate Public Participation Plan. Such a plan should outline:

- The public participation activities to be undertaken;
- The actions needed to implement them;
- The roles and responsibilities of those involved;
- The available budget; and
- The schedule of events.

It is the responsibility of the governmental responsible authorities and the developer involved in the project, to ensure that public participation takes place in a timely and appropriate manner during the EIA process.

A description of activities undertaken as part of the public participation process should be presented in the final EIA report. This will enable the reviewers to identify whether affected people have been consulted during the EIA process and that their opinions and concerns have been addressed within the report, its recommendations and its Environmental Management Plan.

The EIA report should therefore include a description of the following items:

- The public consultation plan, including work schedule, timing, and budget;
- Methodologies used to inform and involve stakeholders in the EIA process;
- A list of stakeholders and documentation of public meetings and interviews, including dates, names, topics of discussion, and important outcomes;
- A presentation of the information and feedback gathered during the consultation, including the key issues and concerns raised, and an analysis and discussion of this data;
- Recommendations on how the project might address or mitigate issues raised during public consultation; and
- Recommendations for ongoing public consultation during the implementation of the project or program and its Environmental Management Plan.

4.3.16 Strategic Environmental Assessment

EIA is applicable at the level of individual projects/measures. To judge policies, plans or programs on their broad socio-economic and environmental impacts another approach has to be followed: the Strategic Environmental Assessment (SEA).

Strategic Environmental Assessment is defined as a suite of approaches that aims to integrate environmental considerations into policies, plans and programs and evaluate their inter-linkages with economic and social considerations (Netherlands Commission for Environmental Assessment, www.eia.nl). As such SEA is a tool to structure the public and government debate in the preparation of policies, plans and programs. It feeds this debate through a robust assessment of the environmental and, where required, social and economic consequences. Finally the procedure ensures that the results of the assessment and the debate are taken into account during decision making and implementation. Public participation, transparency and good quality information are key principles. If applied well, SEA contributes to sustainable development, poverty reduction and good governance.

Advantages of SEA are:

- Enhanced credibility in the eyes of stakeholders, leading to swifter implementation;
- Better understanding of the cumulative impact of a series of smaller, individual, projects;
- Better insight in the trade-offs between environmental, economic and social issues; and
- In a later stage, easier assessment at the project level because strategic discussions, e.g. on locations, have already been brought to a conclusion.

Whereas EIA aims at better projects, SEA aims at better strategies, ranging from legislation and country-wide development policies to more concrete sector and spatial (transboundary) plans. The key phases of SEA resemble those of EIA. However, the actual tasks during those phases may be quite different:

Table 4.1 Comparison between an SEA and EIA.

	SEA	**EIA**
Process	**Iterative**	**Linear**
Screening	**Mostly decided case by case**	**Projects requiring EIA are often listed**
Scoping	**Combination of political agenda, stakeholder discussion and expert judgment**	**Combination of local issues and technical checklists**
Public Participation	**Focus on representative bodies**	**Often includes general public**
Assessment	**More qualitative (expert judgment)**	**More quantitative**
Quality review	**Both quality of information and stakeholder process**	**Focus on quality of information**
Decision making	**Comparison of alternatives against policy objectives**	**Comparison against norms and standards**
Monitoring	**Focus on plan implementation**	**Focus on measuring actual impacts**

SEA for Mainstream dam construction

Eleven hydropower schemes are at various stages of project preparation for the Lao, Lao-Thai, and Cambodian reaches of the Mekong mainstream. Implementation of any or all of the proposed schemes could have profound and wide-ranging socio-economic and environmental impacts in the four riparian countries of the LMB.

MRC Member States, at the Informal Joint Committee Meeting held in Vientiane in June 2008, agreed on the understanding that there are clear advantages in moving environmental assessment away from individual projects towards considering the cumulative and basin-wide impacts of multiple projects using Strategic Environmental Assessment (SEA) techniques. This view was shared by participants of the regional consultation meeting on the MRC Hydropower Programme held in Vientiane in September 2008.

Under the new Initiative on Sustainable Hydropower, MRC will shortly initiate a SEA that seeks to identify the potential opportunities and risks of hydropower as well as the potential contribution it can make to regional development. This will be done by assessing current trends and alternative mainstream hydropower development strategies, with respect to economic development, social equity and environmental protection.

The SEA will consider all planned and committed hydropower and other development activities in the Lower Mekong Basin (LMB), focusing on the Mekong mainstream. Its results will feed into the broader basin-wide assessment of various development scenarios being undertaken by BDP2. The assessment will demonstrate the process and benefits of SEA in identifying likely positive and negative impacts on environmental variables in the LMB, as well as their temporal and spatial distributions. Key outputs will include recommendations on the mitigation and monitoring of impacts, and technical, policy and institutional guidance for SEA and hydropower development in the LMB. The exercise will also build capacity for SEA, principally within the National Mekong Committees, national agencies responsible for power development and those concerned with facilitating the application of SEA and environment impact assessment.

CHAPTER 5

PRACTISES FOR SOCIAL EVALUATION

5 PRACTICES FOR SOCIAL EVALUATION

5.1 Purpose and scope

The purpose of the social evaluation of FRM measures is to define the strategies and specific measures that will:

1. Enhance the social objectives of the project, for example, to reduce poverty;
2. Ensure equitable benefits for different social groups;
3. Promote local ownership for the FRM measures through stakeholder participation;
4. Minimize and compensate adverse social impacts, particularly those that affect vulnerable groups; and,
5. Monitor the social outcomes and impacts to identify any needs for further measures.

As an integral part of the environmental, economic and social evaluation of a project to implement FRM measures, the social assessment encompasses following activities:

1. Gather and analyze quantitative and qualitative data about different stakeholders, how they affect and/or are affected by the FRM measures and the resources and capacities they have to address potential benefits and adverse impacts;
2. Facilitate a process to disseminate and exchange information between project proponents, beneficiaries and other stakeholders during preparation, implementation and monitoring of the project; and,
3. Engage a participatory planning process to define project strategies that strengthen and take into consideration the socio-cultural and institutional contexts.

Items 2 and 3 refer to stakeholder participation for which the guidelines are given in Chapter 3. This section of the guidelines outlines the principal methods and tools that are used for analysing how different stakeholders are affected by flood risk management measures.

Several methods are employed to collect and analyze information about existing conditions and trends and to identify the key social issues related to the potential benefits, and adverse impacts of the FRM project. The different activities are carried out by the project proponent (and/or its consultants), in collaboration with relevant government departments and other stakeholders and, to ensure a participatory approach, in consultation with the communities and social groups that are the beneficiaries of the project. The stakeholder analysis (see Section 3.9.3) and the socio-economic profiles provide the basic information about who has an interest in the project and the existing conditions and trends that affect the capacity of different groups to benefit from and/or address potential adverse impacts. In some instances, the socio-economic profiles will be augmented by looking in further details at different social groups such as women, poor households and minority ethnic groups. The institutional analysis is an important tool to understand the roles, responsibilities and capacities of the government agencies and other organizations that are responsible for the implementation of the project, as well as the resources of affected communities.

5.2 Socio-economic profiles

5.2.1 Purposes and uses of socio-economic profiles

Socio-economic profiles document the existing conditions and future trends in the project area for population and household characteristics, social development (health and education), economic activities, and land and other productive assets etc. The socio-economic profiles provide a benchmark for the identification and assessment of economic and social impacts; they also document the vulnerability of communities to the risks and effects of flooding.

Socio-economic profiles are used in several ways as part of social and environmental assessments of projects to implement FRM measures, including:

1. To document the economic, social and cultural situation of people and groups living and working in the local communities in the project area of the FRM measure: who are the groups living in the project area, what are the key demographic and social development characteristics, what are the economic conditions and livelihoods, what are the types of social organization, etc.?
2. To understand the key issues, opportunities and constraints related to how people may benefit from and/or be adversely affected by the FRM measure: how is the project likely to affect different groups, what do people see as the potential benefits of the project, what concerns do they have about possible adverse impacts?
3. To establish a baseline against which changes resulting from the FRM measure can be assessed: has change occurred and how?

The socio-economic profiles are used as part of different aspects of the environmental and social assessments of the FRM project, including:

1. Social assessment: To identify key social groups and issues that need to be addressed in the development of the project, for example, the need to develop strategies to ensure that women benefit equally from the improved flood risk management.
2. Land acquisition and resettlement: To document the conditions, opportunities and constraints of the social groups that are affected by land acquisition for the project; and, to establish a baseline to assess whether these groups are able to restore living conditions and livelihoods following land acquisition and/or relocation.
3. Environmental assessment: To document the health, socio-economic and other conditions of groups/ communities in the project area in terms of the potential impacts of the project.

5.2.2 The scope of a socio-economic profile

The information that may be included in a socio-economic profile is summarized in Table 5.1. The following guidelines should be considered in what to include and how to organize it:

1. A good socio-economic profile will be succinct, concentrating on the social, economic and other conditions that are most important in the context of the FRM project. The types and amount of information will respond to the following questions:
   a. What are the anticipated benefits or adverse impacts of the project?
   b. In the context of these anticipated benefits and impacts, what do we need to know about the people and their conditions in the project area?

2. The socio-economic profile will, nonetheless, provide sufficient detail to understand how different groups are affected by the project. Information will be included to highlight special conditions for some or all of the following groups:
   a. Gender: What are the conditions of men and women, that is, the sex structure of households and communities (heads of households, male/female ratios); the level of social development of men and women (education, literacy, health status); the roles and responsibilities of men and women for livelihoods, health or other concerns of households; the level of participation of men and women in user groups, community organizations and local government?
   b. Ethnicity: What are the distinct conditions of different ethnic groups, that is, the demographic characteristics and social organization of households and communities; the level of social development including languages; the types of livelihoods and use of natural resources; participation in user groups and community organizations; important cultural characteristics?

c. Poverty: What are the opportunities and constraints for poor and non-poor households or groups, for example, demographic characteristics of households; level of social development; livelihoods, economic activities and incomes; access to land and other resources; participation in community affairs, etc.?
d. Age groups: What are the opportunities and constraints for young adults, the elderly or other age groups, for example, related to level of social development (education, literacy, health status); livelihoods and economic activities, including non-agricultural activities, migration, etc.; social and economic vulnerability, etc.?

Table 5.1 Types of information needed for a socio-economic profile.

Socio-Economic Profiles: types of Information		
Demographic factors	▪ Household: age/sex structure, household size, household head ▪ Community: size, density, ethnicity, population growth, migration patterns	
Social development	▪ Education: school enrolments, levels of education attained and literacy rates; access to schools, physical conditions and available resources ▪ Health: mortality and malnutrition rates, principal diseases, women's and children's health status; access to health care, physical conditions and available resources	
Land, housing and other assets	▪ Land: land uses, areas and tenure by principal types of productive land (agricultural, fish ponds), residential and urban land (commercial, institutional, industrial) and common land (common-use land, unallocated land) ▪ Houses and other structures: structures by use, construction and ownership ▪ Assets: transportation, productive and other household assets	
Rural livelihood activities	<u>Categories of activities</u> ▪ Rice cultivation ▪ Other food and cash crops ▪ Aquaculture / capture fishing ▪ Livestock ▪ Harvesting natural resources (forests, wetlands)	<u>Types of information</u> ▪ Types of rice, food and cash crop, aquaculture/ fishery, livestock, harvested products ▪ Number of households by types of crops, livestock, etc. ▪ Area of holdings per household by type of crop (and irrigation) ▪ Annual yields by crop; used and sold ▪ Agricultural inputs
Local and regional economic activities	<u>Categories of activities</u>: ▪ Household businesses/cottage industries ▪ Markets/market vendors ▪ Local commercial/ industrial enterprises ▪ Regional commercial/industrial enterprises	<u>Types of information</u>: ▪ Types of activities for each category ▪ Number of people involved by types of activity: men, women, owners, employees, unpaid workers ▪ Trends and plans for future development
Income and poverty levels	▪ Household income: principal sources of income, income levels ▪ Wage/ non-agricultural income: access to wage opportunities, men/ women engaged in wage employment ▪ Job-related migration: cyclical and long-term movements, men / women involved in job migration, role of remittances in household income ▪ Income poverty levels: % of households by household characteristics, ethnicity, etc. ▪ Non-income dimensions of poverty: key issues	
Infrastructure	<u>Categories of infrastructure</u> ▪ Irrigation ▪ Water supply/sanitation ▪ Electricity ▪ Transport (road, inland waterway) ▪ Communications	<u>Types of information</u> ▪ Types of equipment and/or services by category ▪ Number of households, businesses or others serviced
Social organization (households, communities)	▪ Kinship exchange patterns (e.g., minority ethnic groups) ▪ Decision-making in the household (roles, responsibilities) ▪ Participation in community affairs (by gender, roles and responsibilities) ▪ Community user groups (e.g., irrigation, water supply, farmers, etc.) ▪ Community organizations (women, ethnic groups) ▪ Other stakeholder organizations (goals, priorities, etc.) ▪ Stakeholder needs and values (by social groups, etc.)	
Local governance	▪ Local government institutions, roles, responsibilities and capacities	

5.2.3 Methods for preparing socio-economic profiles

The socio-economic profiles should be prepared as early as possible in the planning and design of the FRM project. Different methods and tools can be used to gather the data and information that will be reported in the profiles. These include:

1. Government data sources: Government statistics, policies and programs often include relevant information, for example, statistical yearbooks for the local district, government policies on poverty or reports of census data and socio-economic surveys.

Table 5.2 Examples of LMB governments' data sources.

Government data sources: examples	
Cambodia	▪ Census reports (www.nis.gov.kh) ▪ Socio-economic surveys ▪ Demographic and health surveys ▪ Labour force surveys ▪ National human development reports ▪ Commune database
Lao PDR	▪ Census reports (www.nsc.gov.la) ▪ Lao Expenditure and Consumption Surveys ▪ Demographic and health surveys ▪ Labour force surveys ▪ Other poverty and socio-economic surveys
Thailand	▪ Census (www.nso.go.th) ▪ [*to be determined*]
Viet Nam	▪ Census reports (www.gso.gov.vn) ▪ Viet Nam Living Standards Surveys ▪ Demographic and health surveys ▪ National human development reports ▪ Statistical yearbooks (province, district)

2. Other secondary data sources: Donor agencies and project reports for donor-funded and other projects as well as university studies are all valuable sources of information.
3. Primary data collection: Sample surveys in the project area can collect relevant quantitative data from households and businesses, or more generally, from local authorities.
4. Participatory methods: In some instances, it may also be useful to establish a consultative process with the people living in the project area, in order to gather information, identify key issues and discuss options and strategies.

5.2.4 Gender assessment

Women have important roles in the livelihood and economic activities of rural areas; they work alongside men to cultivate rice, they are often responsible for growing food crops and women are often responsible for processing agricultural and fish products for use by their households and for sale. They are also responsible within their households for the health and well-being of children, making sure there is sufficient food for household members and caring for the elderly and the sick. Floods have significant impacts on the activities of women; and, FRM measures have important potential benefits for women. In general, the socio-economic profiles will include sex-disaggregated data and analysis, for example, the proportion of female-headed households in the project area for the FRM project. However, it may be necessary to conduct a separate gender assessment to identify the benefits and risks for women and to provide the basis for a gender strategy and/or specific gender actions. In the context of a project to implement FRM measures, the gender assessment will ask several key questions:

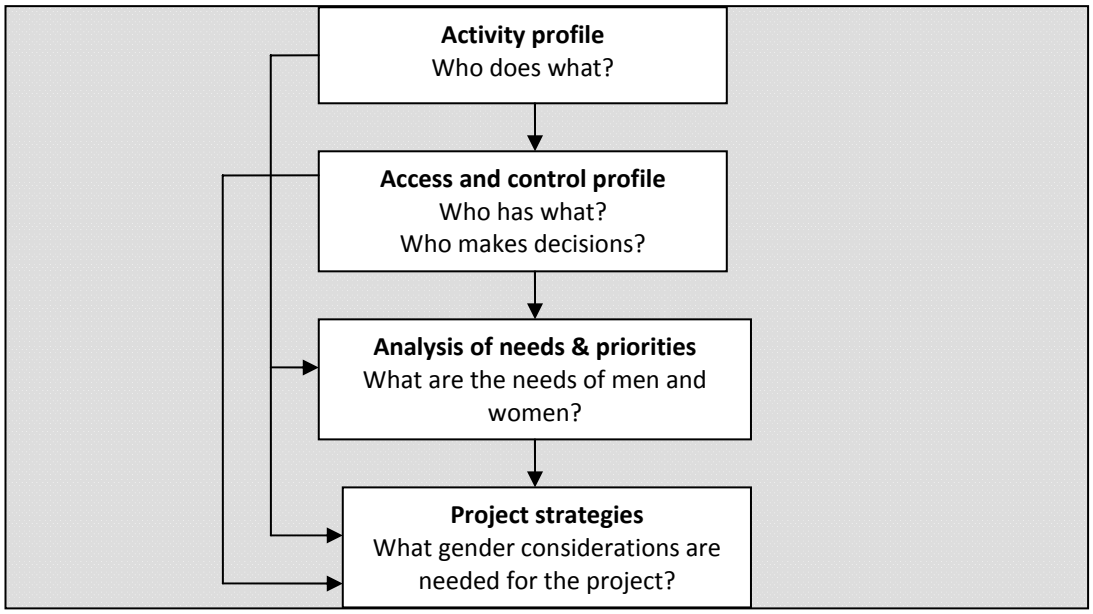


Figure 5.1 Gender assessment steps (sources: www.grdc.org; www.genie.ids.ac.uk/gem/index_sectors/infrastructure/in_tools1)

Who does what?

The activity profile considers all types of activities: (i) productive activities such as subsistence agriculture, self-employment and paid work; (ii) reproductive activities such as domestic work, raising children and caring for the sick and elderly; and (iii) community activities such as participation in user groups, community organizations and local government.

1. Who does what tasks? This answers the questions about what tasks are men's responsibilities and which are women's for different types of activities, e.g., preparing rice fields, planting and transplanting rice, weeding, harvesting, etc.
2. How much time is spent on different tasks and activities? For example, how often is water or firewood collected? How much time do different activities take? How does the task and the time required to do it different, for example, between the dry season and the flood season?
3. Where do different activities take place? Do they occur in or the near the house, elsewhere in the village, in specific locations (such as markets), in rice fields? What are the distances and travel times involved in these activities?

Who has what?

In understanding gender relations, it is very important to understand which assets and resources are available to and controlled by men and by women. These include human assets (e.g., literacy and health status); natural assets (access to productive and other types of land, labour); social assets (i.e., social networks); physical assets (e.g., tools, equipment and infrastructure); and, financial assets (capital and income; access to credit). The key questions are:

1. What livelihood assets and opportunities do men and women have access to?
2. What constraints do they face?

Who make decisions?

Equally important are questions about what decisions are made by men and women at (i) the household level, that is, decisions over household expenditures and (ii) the community level, that is, decisions about the management of community affairs and resources. The key questions are:

1. What decision-making do men and/or women participate in?
2. What decision-making do men and/or women usually control?
3. What constraints do they face?

What are the needs of men and women?

In the context of the FRM project and based on the gender analysis, the next step is to identify what the needs and priorities of men and women that should be addressed in the design and implementation of the project. The key questions are:

1. What are women's and men's needs and priorities?
   The answers may include practical needs such as safe drinking water during wet and dry seasons to facilitate women's work of providing water for household need; and/or, strategic needs of women such as new opportunities such as increasing women's roles and participation in decision-making for irrigation systems.
2. What are the capacities of men and women with respect to benefiting from and participating in the project? What constraints do they face?

5.2.5 Poverty profiles

The adverse impacts of FRM measures may affect poor households more than non-poor households, or in significantly different ways. Many poor people build their houses of poor-quality materials and locate them on flood-prone land, for example, in towns and urban areas where other, safer land is not available. Due to poverty, they may also have difficulty to benefit from FRM measures in ways that will contribute to their well-being. Therefore, if the socio-economic profiles for the project reveal high levels of poverty, it may be useful to prepare separate poverty profiles for disadvantaged social groups or geographic areas (e.g., villages).

In a poverty profile, it is important to consider both income and non-income dimensions of poverty. Income poverty is a common measure of the household well-being used by governments, donor agencies and other groups. A poverty line is normally established as the amount of money required to purchase sufficient food plus other basic household necessities. In Cambodia, for example, the poverty line is set at US$0.50 per person per day; in Viet Nam, it is the level of expenditures required for each person to consume at least 2,100 calories per day.

Non-income dimensions of poverty are also very important. They measure different aspects of the well-being of a household and its members. Some of the most important and widely-recognized non-income dimensions of poverty include:

1. Location in flood-prone areas. Poor people are more likely to be living in low-lying, flood-prone areas because this is where there is land that is available to them at little or no cost.
2. Landlessness or lack of secure tenure to productive land. In rural areas of the LMB, households that do not have agricultural or other productive land most often must rely on their labour to generate income. The lack of secure tenure to productive land reduces the incentives to invest in improving agricultural productivity and, therefore, the well-being of the household.

3. Low education and/or literacy levels, particularly among the household head. Women and men who have little education and/or cannot read and write are often unable to participate in activities such as training or community affairs. For both men and women, low education is related to low levels of job skills that limit people's work opportunities.
4. Low health status that may be the result of lack of access to safe drinking water, high malnutrition rates or, among women, poor reproductive health. Poor health undermines the productive capacity of people; high health costs reduce the money available for food and other household expenditures. The cost of medical care is a common reason that people sell land and other productive assets, increasing the risks of landlessness, etc.
5. High proportion of children and other dependents in the household. This means that there is, relatively speaking, less adult labour to contribute to meeting household needs; also, the working adults must produce enough to support the dependents as well as themselves.
6. Lack of access to markets. At a community level, the inability of people to reach markets to sell agricultural produce and other goods reduces their opportunities to generate cash income to meet household needs. Related to this, communities that do not have year-round road or other transport access are at risk of higher levels of poverty than more accessible communities.

The socio-economic profile should clearly document the available information on the poverty levels in the FRM project area, as well as the characteristics of poor and non-poor households in relation to non-income dimensions of poverty. Local authorities are good sources of information about what households are designated as poor and what are the challenges and difficulties they face. In addition, organizing focus groups with local people to discuss how and why people are poor will quickly provide much valuable information about what may be needed to ensure that poor as well as non-poor households benefit from the FRM measures.

5.2.6 Ethnic profiles

The Asian Development Bank (ADB) defines minority ethnic groups as "those with a social or cultural identity distinct from the dominant or mainstream society, which makes them vulnerable to being disadvantaged in the processes of development." Minority ethnic groups may have social, economic and other livelihood customs and conditions that differ significantly from those of the majority ethnic group in the project area, and that contribute to greater difficulties to benefit from FRM measures and/or greater risks of being adversely affected.

Throughout much of the lowlands of the LMB, most people living in these areas belong to the majority or dominant ethnic group in each country. Other ethnic groups living in these areas share many of the same livelihoods and living conditions. However, in Cambodia, the Cham are more likely than the Khmer to be fishers; in the Mekong delta in Viet Nam, ethnic Khmer are less likely than Kinh households to be involved in shrimp farming. Minority ethnic groups tend to live in upland areas in the LMB countries. Traditionally, many of these groups cultivated upland rice. They tend to rely on harvesting non-timber forest products such as wild herbs, medicines and building materials; and, they often have sacred sites located in forests and other areas near their communities.

In general, the major mainstream floods in the LMB will have little or no impacts on minority ethnic groups. However, flash floods in upland areas and combined floods in some localities will affect communities that include many – even a majority of – minority ethnic groups. The socio-economic profile should clearly document the available information on different ethnic groups in the FRM project area; the information collected should be organized to indicate clearly any difference in livelihoods and living conditions. Nonetheless, as with issues of poverty, it may be useful in certain areas where there are minority ethnic groups, to organize focus groups to know more about their livelihoods and what may be needed to ensure that all ethnic groups benefit from the FRM measures.

5.3 Land acquisition, compensation and resettlement

The location and design of the FRM measure may require the acquisition of land. As a consequence, individuals, households and communities may lose productive or other types of land, as well the crops, trees, structures and other assets located on the land. It may also require the relocation of housing, businesses and other activities. In the event of land acquisition, an important social strategy for the FRM project will be the preparation of a Resettlement Plan (RP) that documents (i) who is affected and how, (ii) what their rights and entitlements are to compensation and other assistance and (iii) what are the different components of planning, implementing and monitoring the land acquisition process.

There are several very good handbooks that provide detailed guidelines for the preparation of a RP. The following can be downloaded from the internet: (i) Handbook on Resettlement, A Guide to Good Practice, published by the Asian Development Bank (ADB, 19984); and (ii) Handbook for Preparing a Resettlement Plan, published by the International Finance Corporation (IFC, 2002 5). Therefore, this section will provide only guidance for the assessment of the land acquisition requirements in the IFRM planning process.

At the very beginning of work on planning and design of the FRM project, a field reconnaissance should be conducted to make an initial assessment of land acquisition requirements, including identification of (i) the location, types and areas of land that are affected, as well as (ii) affected assets on this land. This should be done for any project alternatives that are being considered.

The evaluation and choice of a preferred project alternative should include, as a key criterion, the land acquisition requirements, namely:

1. Is there a viable project alternative that does not require the acquisition of land, damage to or loss of crops, structures and other assets and/or the displacement of people and businesses?
2. How can the location and design of the project be modified to avoid or minimize the requirement to acquire land?

For the preferred project alternative, the reconnaissance work should produce an initial estimate of:

1. types and amount of land to be acquired;
2. the number of people, households, businesses or institutions that are affected by land acquisition; and
3. whether it will be necessary to displace anyone or any activity.

This assessment should be used to determine what personnel, time and other resources will be needed to carry out the detailed assessment and prepare the RP.

5.4 Institutional capacity assessment

The primary responsibility for the environmental and social assessment of the FRM project lies with government agencies, particularly at the provincial level. At the same time, the involvement of a wide variety of stakeholders is necessary to establish a participatory approach and, in many instances, to facilitate the identification of issues and impacts and to implement

[4] www.adb.org/Documents/Handbooks/Resettlement/default.asp

[5] www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_resettle/$FILE/ResettlementHandbook.PDF

the measures to address them. This includes local governments (districts, communes), NGOs and community-based organizations. Therefore, it is important to conduct an institutional capacity assessment of the relevant stakeholders as part of the project preparation process. The results of this assessment will identify requirements for training and capacity building, particularly with reference to provincial and local governments.

5.5 Social management plan

The social management plan (SMP) describes actions that are required to mitigate and manage adverse social impacts of the FRM project and, as well, to enhance the benefits that arise from the improved flood risk management. It is closely related to and often integrated into the environmental management plan that is part of the EIA process (see Section 4.3.11).

In general the SMP includes:

Social action plan

The social action plan responds to the overall assessment of social and socio-economic impacts of the FRM project. It describes the mechanisms, strategies and components that are included in the project design to avoid or reduce adverse impacts; it also describes strategies to help people participate in the benefits of the FRM measures.

Gender action plan

The gender analysis will indicate whether and in what ways it may be necessary to strengthen the design and implementation of the FRM project to ensure equitable benefits for both men and women. The gender action plan is similar to the social action plan except that it looks in more depth at the issues that confront women, as well as how both women and men can participate in the benefits of the FRM project.

Specific actions for vulnerable groups

In the event that there are significant impacts for poor households, minority ethnic groups or other vulnerable groups or they require special assistance to benefit from the FRM project, it may be necessary to (i) design specific actions that are integrated into the social and/or gender action plans or (ii) prepare a separate action plan. In conjunction with these actions and/or plans, it is necessary to identify specific indicators to measure progress towards the objectives of the plans.

Training and capacity building program

The institutional capacity assessment will provide information about the requirements for training and capacity building for different government agencies and other organizations that will be involved in different aspects of the EIA, social assessment, consultation and land acquisition activities for the FRM project.

CHAPTER 6

PRACTISES FOR ECONOMIC EVALUATION

6 PRACTICES FOR ECONOMIC EVALUATION

6.1 Introduction

The economic analysis of flood damage reduction and development projects should follow the international best practice for economic project analysis of comparing both benefits and costs on a 'with-project minus without-project' basis, thereby including the autonomous developments (both positive and negative) of the 'without-project' situation and the flood damage reduction and development potential of the envisaged project intervention.

6.2 Net benefits

The project net benefits consist of the following key components:

1. ***Reduction of direct and indirect flood damages***

Project measures designed to change the flood hazard in the project area may result in a new damage probability curve. Annual avoided flood damages are measured therefore as the total area between the damage probability curves without the project intervention and the new damage probability curved with the project intervention.
It is essential to have the flood damage probability curve for the project area before identifying potential benefit from proposed flood measures. What is flood protection level? If the embankment for flood protection is designed for 50 years return period for example (equivalent to probability of 2%), the potential annual flood damages reduction by the control measures in project area can be identified by the area under the damage probability curve (Fx) from 2% to 99% probability.

$$\text{Annual flood reduction}_{p=2\%} = \int_{2\%}^{99\%} Fx.dx$$

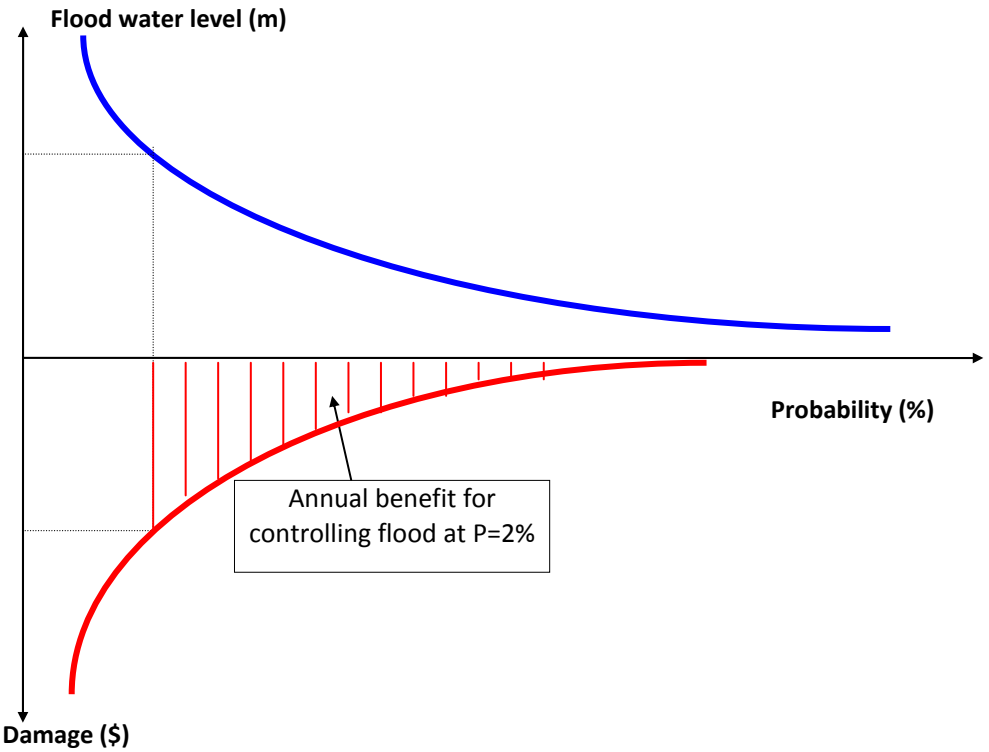


Figure 6.1 Flood damage-probability curve and potential flood reduction.

2. ***Increase of net benefits resulting from the envisaged change in land use***

The proposed flood control measures could delay the flooding in areas which are presently unprotected, or measures that provide full flood control. These protection measures may result in increasing cropping intensity from 100 to 200 or even 300%). The proposed flood control measures for presently unprotected areas would consist of dykes and gates. It may also include drainage canals to reduce inundation status and provision of irrigation as well. In this case the benefits in project area not only the reduction of flood damages but also the benefits from higher agricultural production in the area due-to higher yield and cropping intensity. These increases in cropping intensity and yields are additional benefit of the provided flood protection measures, which may be even more significant than the reduction of flood damages: see Figure 6.2.

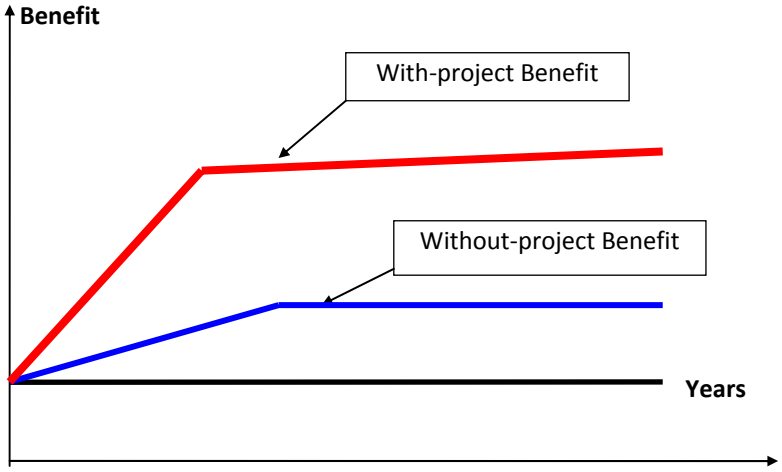


Figure 6.2 Benefits from changes in land-use.

3. ***Reduction of natural fish and soil fertility***

The proposed protection measures may have negative impacts on natural fish due to reducing and/or eliminating flooding in the areas (as reduction in flooded area and flooding period). Moreover, flooding provides (i) annual silt deposition on the rice field; (ii) leaching toxicity accumulated during cultivation; (iii) improving soil texture and controlling pests. It results in higher crop yield for Winter-Spring paddy (November-March) after a big flood, especially in Vietnam Mekong Delta.

These losses in natural fish and soil fertility due to the proposed control flooding measures would be investigated from intensive field survey, focus group discussion with local people and from related secondary information/documents available. The losses are evaluated in monetary terms and are taken into account in the economic analysis. Although valuation of benefits is difficult, It is recommended that if any benefit can not be valued, the analysts take factors in to account through subjective evaluation because they can make an important contribution to the objective of the FRM.

4. ***Environmental and social benefits***

There are many other types of benefit resulting from the project. They may be a reduction of transport cost due to better roads; change in a location of sale due to improvement of access roads; cost reduction through mechanization by providing tractors and pedal threshers; external benefit of the project to the society.

Beside the tangible benefits mentioned above, almost development projects have intangible benefits. These may include a creation of new job opportunity in case of unemployment rate being above the natural unemployment rate; better health as a result of better nutrition and improved rural water supplies. It is recommended that if any benefit can not be valued, the analysts need to state clearly in the text for decision maker consider during approval process.

6.3 Costs

In most project analyses, identification of costs is much easier than benefits. The costs of project usually consist of the following items:

1. ***Cost of project structures*** which include all necessary infrastructure for controlling the flood. They may be embankment or dykes, dams, gates, irrigation facilities and drainage pumping stations as required;

2. ***Cost of labour*** The labour inputs used for project implementation during construction and operation period must be evaluated based on shadow price of labour in economic analysis and market rate for financial analysis. The shadow wage rate of labour reflects the level of un-employment. The higher un-employment rate is, the bigger differences between shadow and market rate would be.

3. ***Cost for resettlement*** which includes compensation for land and structure acquisitions, rehabilitation of income for project affected peoples and other related social/community development. Again one could make a clear distinguish in economic and financial cost. Compensation price of land determined by compensation rate issued by the provincial government for type of land and its location is financial cost. To estimate value of land in economic analysis, one should use a concept of the opportunity cost of the land. The economic value of land equals to annual net benefit multiplies present worth of an annuity factor. Compensation for demolished structure/house is at a replacement cost, which are not economic value. The economist must convert financial value into economic value by using conversion factor to reflect the average remaining value of demolish structure/house.

4. ***Survey and design costs***. All expenditures for surveying (topography, geology and social economic) planning and design associated with project design documentation, proposed investment plan and implementation agencies involved are included.

5. ***Supporting programs*** To obtain the targets of flood risk management, agricultural production for applying new cultivation techniques, high-yielding variety, irrigation methods and new crops in crop diversification program, it is necessary to support local authorities in capacity building, agricultural extension services and research institutions as a project component to ensure benefit can be realized as planned.

6. ***Externality costs***. The proposed flood control measures may have negative impacts in upstream and downstream the protected areas. These flood water level changes would be analysis based on hydraulic modelling and potential external economic losses would be evaluated. These costs have to be considered as project cost.

7. ***Sunk costs.*** Sunk costs are those costs incurred in the past upon which a proposed new investment will be based. The project may take partly or fully advantages of existing structures such as access roads, port, warehouse, canal system and hydraulic works, When we analyze a proposed investment, we consider only future incremental costs and future incremental benefits. Expenditures in the past do not appear in our analysis except costs for improving those existing structures to meet requirement of the project.

8. ***Operation & maintenance costs.*** After construction of the project infrastructures completed, operation and maintenance is in place to ensure the functioning of project components is as design. All the costs associated with operation & maintenance of the system have to be taken into account of the cost-benefit analysis. It would include, among others, salary and administrative cost for operation company, cost for yearly maintenance the system.

9. ***Replacement equipments***. The project may include mechanical equipments as gates, pumping station etc. These items have specifics time required for replacement. The analysis has to take this information from engineer in-order to put schedule for replacement equipments. These replacement costs will be in the cost benefit analysis table.

6.4 Benefit cost analysis

Benefit-Cost analysis (BCA) is a process of comparing in common units all the gains and losses resulting from specific actions to determine which one provides the most economic value and the most efficient use of resources to the society. The fundamental principle in the BCA is to compare effects that due to a development intervention from those that will occur without it. The analysis should follow the international best practice for economic project analysis which is available in economic text books[6] and on website of ADB[7]. The following economic principles should be kept in mind during evaluation of cost and benefit of the project.

1. ***Economic price of good and services***: The analyst has to point out the flood damages from the viewpoint of the society as a whole. To reflect a view point of the society, the economic and shadow prices of good and services - opportunity cost are used in estimating flood damages, additional benefits and project cost;

2. ***Discounting technique***: In economic analysis the economist compares value of money at a different time instead of the amount of money. To do this the economist uses discounting technique for converting value of money to a specific time/date;

3. ***Constant price***: Project analysis is conducted to determine the economic viability of investing in a project. It entails choosing the project components that are expected to provide the highest net economic returns in the future. The stream of future costs and benefits that is compiled is termed the economic project statement. In preparing this statement, prices are used to express the inputs and outputs of a project in value terms to arrive at a common denominator. A consistent set of prices must be used for all future costs and benefits;

4. ***With and without project concept***: The concept of "with and without" project is used instead of a "before and after" approach. By comparing benefits and costs on a 'With-project minus Without-project' basis, the autonomous developments (both positive and negative) of the Without-project situation and the flood damage reduction and development potential of the envisaged project intervention are taken fully into account. Moreover, the "with and without" principle is also very useful in determining which resources need to be fully evaluated in BCA and which can be ignored. If the level of a particular resource is the same in with and without cases, then it needs not be analyzed as a part of the BCA. The BCA considers only the changes in types and quantity of resources.

[6] J. Price Gittinger, Economic Analysis of Agricultural Projects, Johns Hopkins, 1982
[7] http://www.adb.org/Documents/Guidelines/Eco_Analysis/default.asp

6.4.1 Benefit cost analysis for flood control project




The principle of benefit cost analysis requires that a project results in an increase of economic welfare, i.e. the benefits generated by the project should exceed the cost of the project. The following economic criteria, among others, are used in benefit cost analysis.

1. ***Net Present Value,*** The Net present value (NPV) or net present worth (NPW) is defined as the total present value (PV) of a time series of cash flows. It is a standard method for using the time value of money to appraise long-term projects. Used for capital budgeting, and widely throughout economics, it measures the excess or shortfall of cash flows, in present value terms. NPV is discounted at selected opportunity cost of capital. Economic NPV is an indicator of how much value an investment or project adds to the national economy or society. The project is economic feasibility or break even or not feasibility if the NPV is positive, zero or negative respectively.

2. ***Internal Rate of Return,*** The discount rate often used in capital budgeting that makes the net present value of all cash flows from a particular project equal to zero.. Generally speaking, the higher a project's internal rate of return, the more desirable it is to undertake the project. As such, IRR can be used to rank several prospective projects and/or development alternatives. Assuming all other factors are equal among the various projects, the project with the highest IRR would probably be considered the best and undertaken first. The IRR is sometimes referred to as "economic rate of return (ERR)". If the IRR is greater than the cut-off rate, the project is economic feasibility. If the IRR is equal to the cut-off rate, the project is at break even. And If the IRR is less than the cut-off rate, the project is not economic feasibility.

3. ***Benefit-Cost Ratio (BCR)*** is an indicator, used in the formal discipline of cost-benefit analysis, that attempts to summarize the overall value for money of a project or proposal. The BCR is the ratio of the benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms. All benefits and costs should be expressed in discounted present values. project is economic feasibility, break even or not economic feasibility if the BCR is greater than 1, equals to 1 or less than 1.

4. ***Net benefit-Investment Ratio*** As the BCR, the N/K ratio is a performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. To calculate the N/K, the net benefit of an investment is divided by the total investment. The result is expressed as a percentage or a ratio. The N/K ratio should be equal or greater than 1 to consider project as break even or economic feasibility.

Advantages and disadvantages of the measures

The NPV, IRR, BCR and N/K use the same information and discounting technique. “Therefore one would expect that these measures would yield the same conclusions on which projects should be adopted and which should be rejected” [*John B. Loomis 1993*].

The Net Present Value

This measure has a scale dimension. The bigger size of the project, the higher NPV of the project is. Therefore, it is difficult to compare economic efficiency between projects having different size by using the NPV.

The Internal Rate of Return

The IRR is potential interest rate that project can pay for the use of resources. It is easily for people to understand economic efficiency of the project. It is unaffected by the scale of the project, that one can compare IRR among projects regardless their size.

The Benefit-Cost Ratio

This measure is expressed as how many dollars could gain from one dollar spends in investment. It is easily for people to understand economic efficiency of the project. It has no dimension scale that one can compare BCR among projects regardless their size.

Criteria Used for Selecting Project

Project may be selected if it has a net present value of zero or greater, an internal rate of return equal to or above the cut-off rate, or a benefit-cost ratio or a net benefit-investment ratio of 1 or greater.

However, there may have a set of prepared projects but funding availability is limited which is usually the case in practice. The economists have to make a trade-off between projects to select those projects to generate maximum efficiency of using the resources. If a project has high IRR but low NPV (due to small size) and there is no opportunity to find out any other project to use all the fund, the economists may select other project of bigger size which has lower IRR but higher NPV and consume all the fund available for the development.

6.4.2 Benefit cost analysis for optimum flood protection level

Economic framework for analysis of flood protection strategies and their effectiveness In the FRM has been suggested in a form of economic optimization. The results following the economic optimization should be considered as a technical advise to policy makers and a basic foundation for establishing national technical design standards for flood protection.

1. ***Risk cost reduction curve***

Risk cost is the cost of not providing a level of flood protection. The risk cost is computed as an expected value by the integral of the flood damage probability curve Fx as shown in a below formula. The risk cost reduction owing to flood protection infrastructure is the difference between the present risk cost and the estimated risk cost for flood protection plan at protection level of P= p_1, p_2, p_3 etc

Risk cost reduction at protection level $_p$ = $\int_{P\%}^{99\%} Fx.dx$

Risk cost reduction curve is thus produced by the expected values of the risk density curves of different flood protection levels or return periods of flood protection infrastructure plans. The risk cost reduction naturally means the benefit owing to flood control infrastructure construction.

Taking an example in Tam Nong focal area, Dong Thap province, Vietnam. The food hazard was analyzed in 97 hydrological data set from 1910-2006 as a basic foundation for flood damage assessment in the area. The damage probability curve was developed (relationship between flood damage and probability). Flood risk reduction is calculated directly from the damage probability curve. See Table 6.1, Figure 6.3 and Figure 6.4.

Table 6.1 **Flood damage and risk reduction.**

P (%)	T (Year)	Flood damage (M US$/yr)	Risk reduction (M US$/yr)	P (%)	T (Year)	Flood damage (M US$/yr)	Risk reduction (M US$/yr)
1.0%	98.0	14.84	2.606	26.5%	3.8	4.47	0.485
2.0%	49.0	13.44	2.454	27.6%	3.6	3.97	0.440
3.1%	32.7	12.91	2.317	28.6%	3.5	3.90	0.399
4.1%	24.5	11.89	2.185	29.6%	3.4	3.86	0.359
5.1%	19.6	11.68	2.064	30.6%	3.3	3.86	0.320
6.1%	16.3	11.59	1.945	31.6%	3.2	2.94	0.281
7.1%	14.0	10.87	1.827	32.7%	3.1	2.91	0.251
8.2%	12.3	10.35	1.716	33.7%	3.0	2.85	0.221
9.2%	10.9	10.33	1.610	34.7%	2.9	2.81	0.192
10.2%	9.8	8.53	1.505	35.7%	2.8	2.65	0.163
11.2%	8.9	7.70	1.418	36.7%	2.7	2.26	0.136
12.2%	8.2	7.35	1.339	37.8%	2.6	2.08	0.113
13.3%	7.5	7.18	1.264	38.8%	2.6	1.99	0.092
14.3%	7.0	7.17	1.191	39.8%	2.5	1.50	0.072
15.3%	6.5	7.00	1.118	40.8%	2.5	1.31	0.056
16.3%	6.1	6.99	1.046	41.8%	2.4	0.98	0.043
17.3%	5.8	6.71	0.975	42.9%	2.3	0.74	0.033
18.4%	5.4	6.42	0.906	43.9%	2.3	0.59	0.025
19.4%	5.2	5.62	0.841	44.9%	2.2	0.56	0.019
20.4%	4.9	5.42	0.783	45.9%	2.2	0.40	0.014
21.4%	4.7	5.20	0.728	46.9%	2.1	0.36	0.010
22.4%	4.5	4.80	0.675	48.0%	2.1	0.19	0.006
23.5%	4.3	4.68	0.626	49.0%	2.0	0.11	0.004
24.5%	4.1	4.63	0.578	50.0%	2.0	0.07	0.003
25.5%	3.9	4.49	0.531				

Source: Tam Nong focal area, Dong Thap province, Vietnam

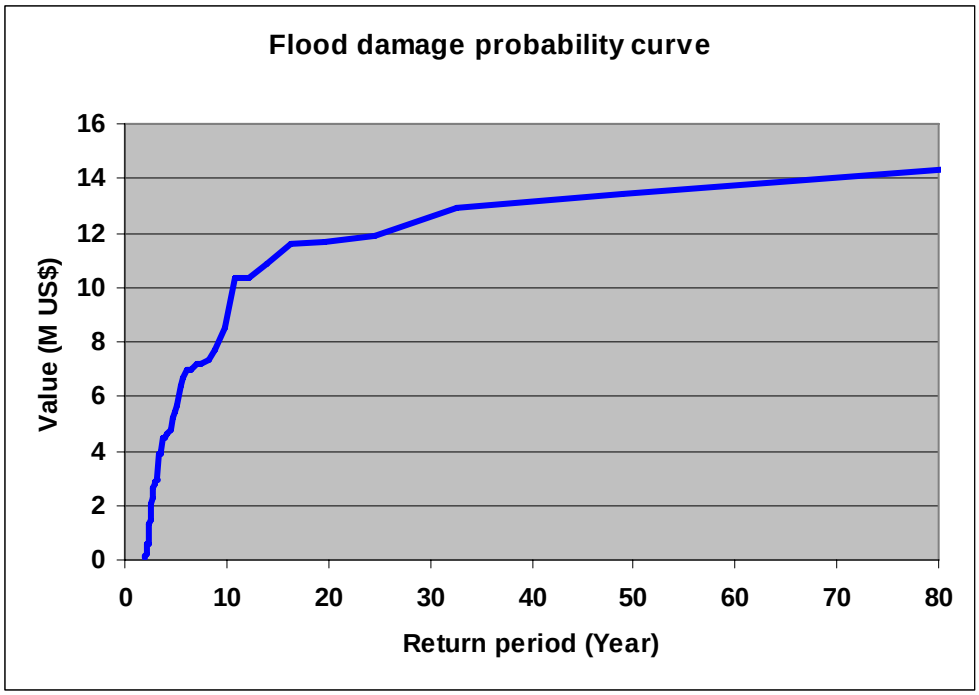


Figure 6.3 Flood damage probability curve.

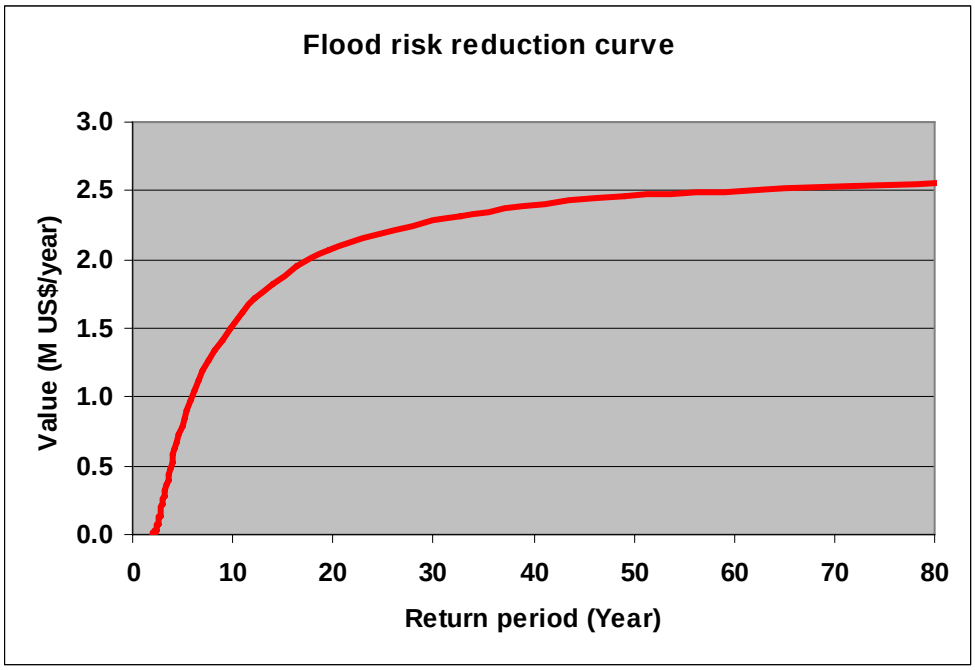


Figure 6.4 Flood risk reduction curve.

2. **Capital-cost curve**

The total cost for flood control infrastructure is the sum of initial cost, maintenance cost and replacement cost. The initial cost or capital cost means the construction cost of flood control infrastructure, which should be spent in four or five years or even more during construction period. The operation and maintenance cost is annual expenditures to keep the infrastructure running properly as designed. The replacement cost for mechanical equipments (gates, pumps, etc.) is cost for replacing the old ones. All these costs should be expressed in terms of cash flow on an annual basis for estimation of Present value of costs. The annual capital cost (annuity) of a plan at a certain flood protection level can be calculated by the following formula. Of which A is an annual capital cost, PV is present value of capital cost; i is a discounted rate; and n is number of years.

$$A = PV\frac{i(1+i)^n}{(1+i)^n - 1}$$

The capital cost curve is a relation between capital cost and design probability level of the flood control infrastructure plan. The capital cost in the capital cost curve includes the maintenance and replacement costs for simplicity. See Table 6.2 as standard table format for estimating the annual capital cost for the flood protection probability. To do it for all probability from 1% to 50% to obtain the capital cost curve as shown in Figure 6.5.

Table 6.2 Standard table format for estimating annual capital cost.

Year	Flood protection at P1%				Flood protection at P2%			
	Invest	O&M	Repl.	Cash-flow	Invest	O&M	Repl.	Cash-flow
1	I-1.1			C-1.1	I-2.1			C-2.1
2	I-1.2			C-1.2	I-2.2			C-2.2
3	I-1.3			C-1.3	I-2.3			C-2.3
4	I-1.4	M-1.4		C-1.4	I-2.4	M-2.4		C-2.4
.....	.....	.....	.....	.....	.....	.....	.....	.....
15		M-1.15	R-1.15	C-1.15		M-2.15	R-2.15	C-2.15
.....	.....	.....	.....	.....	.....	.....	.....	.....
30		M-1.30		C-1.30		M-2.30		C-2.30
				NP-1				NP-2
				A-1				A-2

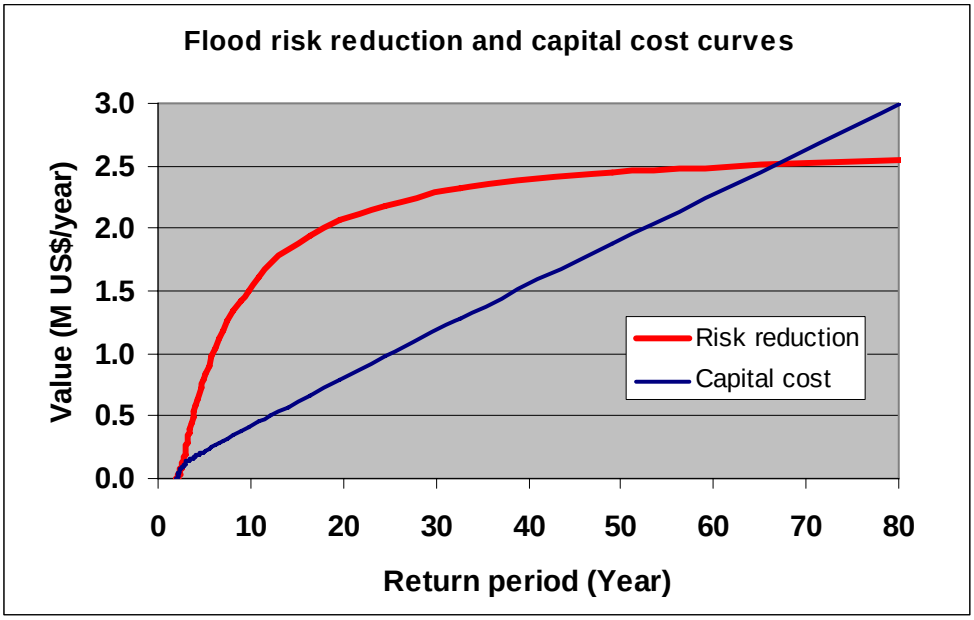


Figure 6.5 Flood risk reduction and capital cost curves.

3. **Optimal flood protection level**

The benefit-cost comparison equations can be used to determine the optimal flood protection level of flood control infrastructure. By combining the Risk-Cost Reduction Curve with the Capital-Cost Curve, we obtain the Benefit-Cost Curve, as shown in Figure 6.6.

The flood protection level (return period) having the maximum value of B-C is determined as the optimal flood protection level. However, the flood control project would be economic feasible when the benefits exceeds the cost.

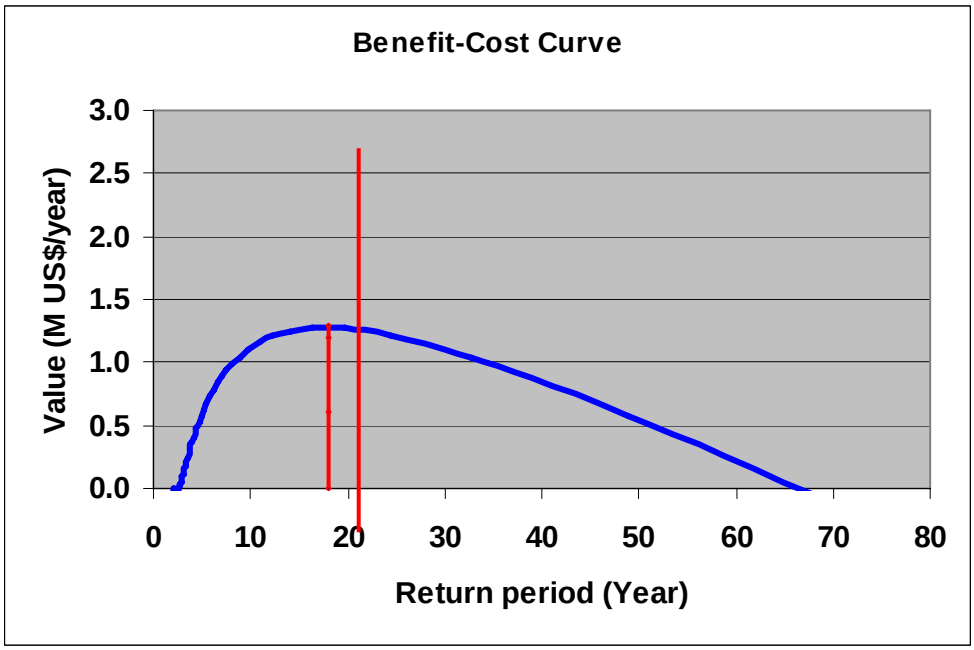


Figure 6.6 Benefit-cost curve and optimum flood protection level..

CHAPTER 7

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7 REFERENCES

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APPENDICES

Appendix 1 Glossary

Alternative	A possible course of action, instead of the proposed action, that would meet the same purpose and need.
Compensation	The provision for enhancement, replacement, restoration, and/or restitution measures for victims of unavoidable negative impacts of project development. Funds may also be used to recreate lost habitat or other valued resources.
Competent authority	The authority which is responsible for judging and then approving or rejecting the proposed activity.
Cumulative impacts	Environmental impacts (usually negative) caused by multiple human activities; and/or natural events which are either repeated or occur in combination.
Damage curve	The functional relation between inundation characteristics (depth, duration, flow velocity) and damage for a certain category of elements at risk.
Direct damage	All harm which relates to the immediate physical contact of flood water to people, property and the environment. This includes, for example, damage to buildings, economic assets, loss of standing crops and livestock, loss of human life, immediate health impacts and loss of ecological goods.
Environment	The totality of the natural and human environments (often called the biophysical and socio-economic environments) which forms the subject of EIA studies. It includes: (a) all biophysical components of the natural environment of land, water and air, biological resources, and inorganic and organic matter both living and dead; (b) all socio-economic components of the human environment including, but not limited to, social, economic development, human resources, quality of life, administrative, cultural, historical, archaeological, architectural, structures, sites and things, land and resource usage, and human health, nutrition and safety.
Environmental enhancement	An intentional change which amplifies the anticipated positive impact of a proposed project on one or more environmental components.
Environmental impact assessment (EIA)	An environmental assessment report prepared at the feasibility level that contains the systematic study, quantified and valued of the impacts of a proposed plan or project plan management recommendations for the subsequent development.
environmental impact or effect:	Any change (positive or negative) that a project may have on an environmental component.
Environmental impact statement	The report resulting from the EIA process, continuing a comprehensive evaluation of the environmental and social impacts of the proposed activity, the significance of these impacts, potential

	alternative actions, mitigating measures and an Environmental Management Plan.
Environmental management plan	A plan for environmental activities during project implementation designed to ensure sound environmental management, minimising/ mitigating adverse environmental impacts and maximizing beneficial environmental effects within an overall aim of sustainable development.
Environmental monitoring	Measurements over time of environmental components (often at regular intervals) to detect direct and/or indirect changes caused by specific project interventions.
Exposure	The people, assets and activities that are threatened by a flood hazard.
Flood control	A structural intervention to reduce the flood hazard.
Flood damage	Damage to people, property and the environment caused by a flood. This damage refers to direct as well as indirect damage.
Flood damage risk (= Flood risk)	The combination or product of the probability of the flood hazard and the possible damage that it may cause. This risk can also be expressed as the *average annual possible damage* or *expected damage*.
Flood hazard	A flood that *potentially may* result in damage. A hazard does not necessarily lead to damage.
Flood hazard map	Map with the predicted or documented extent / depth / velocity of flooding with an indication of the flood probability.
Flood proofing	A process for preventing or reducing flood damages to infrastructural works, buildings and/or the contents of buildings located in flood hazard areas.
Flood risk management	Comprehensive activity involving risk analysis, and identification and implementation of risk mitigation measures.
Flood risk management measures	Actions that are taken to reduce the probability of flooding or the possible damages due to flooding or both.
Flood risk map	Map with the predicted extent of different levels / classes of *average annual possible damage.*
Hydrological hazard	A hydrological event (discharge) that may result in flooding.
Impact matrix	An array of rows (for project activities) and columns (for important environmental components) used for presenting the analysis environmental impacts of a project.
Indirect damage	All damage which relate to the disruption of economic activity and services due to flooding.

Initial environmental examination	The first stage in the EIA of a project study for identifying and assessing possible environmental impacts.
Integrated flood risk management	The approach to Flood Risk Management that embraces the full chain of a meteorological hazard leading to flood damages and considers combinations of structural and non structural solutions to reduce that damage.
Interested party	See STAKEHOLDER, nowadays the more widely-used term.
Magnitude of impact	The degree of change in an environmental component that results from a project intervention.
Meteorological hazard	A meteorological event (storm) that may result in a hydrological hazard and, eventually, in flooding
Mitigation	The elimination, reduction or control of an adverse environmental impact of a project.
Monitoring	Activity involving repeated observation, according to a pre-determined schedule, of one or more environmental components to detect their characteristics (status and trends).
Project	(a) Physical work such as construction, operation, modification, rehabilitation, decommissioning, abandonment or other undertaking relating to a structure or other physical intervention; (b) a conceptual plan, study, design or programme (at any level or stage – including local, regional and national; prefeasibility, feasibility, and design) undertaken to ascertain the desirability of proceeding with physical works and associated activities or as part of the implementation process.
Project proponent	The person, body, authority, government or funding agency responsible for proposing or implementing the project.
Public participation	The process by which the stakeholders are able to become involved in the EIA process.
Residual environmental impact	Any environmental impact that remains (or will remain) after implementation of the measures specified in the EMP.
Resilience	The ability of a system / community / society to cope with the damaging effect of floods
Scoping	The initial process by which the important environmental issues and possible alternatives are identified for the various project alternatives.
Screening	Preliminary activity undertaken to classify proposals according to the level of assessment that should occur.
Significant environmental impact	An environmental impact which is sufficiently important (i.e. severe) to need specific attention in an EIA.

Socio-economic environment	All aspects of the human environment: social, financial/economic, cultural and historical.
Stakeholder	A person or organization likely to be directly or indirectly affected by, or having an interest in, a proposed project. Stakeholders include: residents of the project area (the general public and, especially, beneficiaries and project affected people); community representatives (elected and traditional); non government organizations (NGOs); local, regional and national government officials; technical specialists, and national and international funding agencies.
Susceptibility	The opposite of resilience, that is to say the inability of a system / community / society to cope with the damaging effect of floods
Vulnerability	The potential damage that flooding may cause to people, property and the environment

APPENDIX 2 PARTICIPATORY TOOLS SELECTION MATRIX

Participation tools	Participation objective (Awareness, Education, Input, Decision-making)	Effectiveness In achieving the objective	Efficiency Time/cost commitment, staff skill & capacity	Equity Public perception of engagement

APPENDIX 3 STAKEHOLDER ANALYSIS MATRIX

Stakeholder Name / Group	Directly affected (Y/N)	Proximity to the project area	How impacted (Positively / Negatively)	Potential Supporter or Non-supporter	Contact person for the stakeholder type / group	Contact information

APPENDIX 4 GUIDING QUESTIONS - STAKEHOLDERS' CONSULTATION

1. How many people live in this area and what category do they belong to?

2. What are the livelihoods opportunities in the area?
a. Fishing b. Agriculture c. labour d. others (describe)

3. When do the floods occur and how serious are they for people and assets?

4. How serious are the floods that affect only agricultural land?

5. Which flood management structures at present in your area that you are of aware of?

6. How closely have you been involved with any flood control study?

7. If a new flood control structure such as construction of dikes along the river, diversion of flood water with controlled gates is to be constructed in your area, how will it impact you?

8. If these structural measures do not directly impact you, which other people will be directly affected?

9. If the structural flood protection measure is aiming at early flood protection and thereby, creating opportunity for growing two crops, how would you be prepared to adapt to this change?

10. If the structural flood protection measure is aiming at full flood protection and thereby, creating opportunity for growing three crops, how would you be prepared to adapt to this change?

11. What type of support from the Government or Private sector do you foresee if the change means growing two or three crops instead of one or two crops in a year?

12. Will these structural measures affect fishing activities? If yes, what does it mean for your livelihoods?

13. If the structural measures do not affect your fishing activities directly, which other people will be directly affected?

14. According to you, what are the options available for flood control or better coping with the floods?

15. What type of development do you want to see in your area?

APPENDIX 5 PUBLIC PARTICIPATION PLAN FOR STRUCTURAL FLOOD PROTECTION MEASURES

Stakeholder Groups

Involved in project preparation exercise:	*For consultation:*
Project implementing agency National and provincial line agencies Contractors Provincial governments	Local governments (province, district, commune) Village leaders, village members Community-based organizations (Farmers' groups, Water-User Groups, Conservation / Forest User Groups) Civil society organizations or mass organizations (eg. Women's Union)

Project type	Structural Flood Protection Measures		
Stages	**Activities**	**Events**	**Resource required**
During Stage 2: Demonstration Phase			
1. Project Conceptualization:	1.1 Prepare a clear fact sheet describing the project, its expected location and coverage, and the estimated costs. The language and terminology used in the description should be accessible to those people who will be affected by the project. Provide information on who to contact to know more about the project. 1.2 Conduct stakeholder analysis with project implementing agency, line agencies (national and provincial), and concerned local governments to determine which groups, household, settlements will be most affected by the project, in particular vulnerable groups. 1.3 Distribute the fact sheet in the affected area as widely as possible through leaflets, and posting in community spaces. 1.4 Organize a public information session open to all to inform the community about the project and answer questions. 1.5 At the public information session, collect contact information from those that consider themselves affected or inform them of how to notify the project that they wish to attend future consultations. 1.6 Map out the communities to be consulted in the design based on most affected settlements, and representation of different types of geographic/ethnic areas that will be affected. 1.7 Assess the important characteristics of communities in the target area that must be considered in assessments and consultations. These will include: ▪ Language and cultural practices for community decision-making ▪ Opportunities and constraints to women's participation in planning ▪ Potential sources of conflict / competition for resources that need to be considered	Stakeholder inception workshop Public information session.	International PP Spec. National SS Specialist Leaflets / Information poster Workshop and travel costs.

Project type	Structural Flood Protection Measures		
Stages	**Activities**	**Events**	**Resource required**
	in the participatory process.		
2. Project Design: Assessment	2.1 Identify key NMC and/or Project Executing Agency personnel or Sub-contractors (Mass organizations / NGOs) that can be trained to lead consultation and planning exercises in communes and villages. This group would be the Community Facilitators 2.2 Conduct a rapid training needs assessment of the Community Facilitators. 2.3 Adapt sets of participatory development and social tools to be relevant to structural project design preparation. ▪ Participatory Hazard, Vulnerability and Capacity Assessment, including assessing negative and positive impacts of flooding, traditional coping mechanisms, and needs for external support in flood protection and disaster management. ▪ Participatory Rural Appraisal Tools for Mapping land use and community resources and assets, historical changes, ▪ Social Assessment: Key informant interviews and Focus Groups with Affected populations to contribute to assessment of social impacts: on land-use, forest use, water use, Gender assessment, Ethnic profile as per the guidelines. 2.4 Establish a format for summarizing information from the consultations for use by the Project Executing Agency in the design process. 2.5 Conduct a Training of Community Facilitators. ▪ Day 1 of Training would be Introduction to design of Structural Flood Protection Works in the LMB ▪ Day 2 - 3: Training on tools and facilitation skills for participatory planning, including practicum in one of the communities to be consulted within the project preparation.		International Public Participation Specialist National SS Specialist
3. Project Design: Analysis of Impacts and Mitigation	3.1 Based on mapping from 1.6 Community Facilitators conduct consultations, focus groups sessions and key information interviews in targeted localities with support from National SS. 3.2 Identify one person (e.g. leader of a community-based organization) in each settlement cluster to be a focal point for continued feedback on the design and progress of the project. 3.3 Hold debriefing session of National SS Specialist and Community Facilitators at mid-way point between consultations to review quality of information collection and summarization. 3.4 Finish consultations and document results of social impacts and community		Int. PP Spec National SS to supervise the CF and assist in compilation of results. CFs : Travel allowances Travel costs

Project type	Structural Flood Protection Measures		
Stages	**Activities**	**Events**	**Resource required**
	priorities for flood protection / livelihood development and their inputs on how to mitigate negative impacts of the proposed project. 3.5 Use information from the communities in finalizing the project design. Develop options for compensation of negative impacts of the project, or options to support communities to be able to take advantage of positive impacts (eg. Diversifying cropping patterns based on flood protection; training on alternatives to agricultural production in areas of potential increased flooding). 3.6 Design resettlement plans and land compensation in keeping with government / donor regulations. 3.7 Hold community consultations to either i) validate the options that will be included in the project design for compensation or ii) select among the options according to community priorities. Whether the purpose is validation or selection will depend on the nature of the project, and the resources available to compensate affected people. 3.8 Identify other supports in the community (other projects, NGOs, Government programs) that can support communities to mitigate negative impacts or take advantage of positive impacts of changes brought by the project. 3.9 Identify existing community-based organizations (Water User Groups, Mass Organizations, Co-operatives, Disaster Management Committees) that could play a role in Operation and Maintenance.		Workshop and meeting costs
4. Dissemination of Public Participation Practice in other NMCs.	4.1 Review and refinement of public participation process and tools based on the experience by National SS and International PP. 4.2 Experience sharing workshop / training on Public Participation in each country by National SS Spec. (could also be held at the regional level). 4.3 Finalization of Public Participation in Toolkit and documentation of recommendations for its future use in project design.	Experience Sharing Workshop	International PP Spec. National SS Spec.

During full implementation of Structural Measure			
Stage	**Activities**	**Events**	**Resources**
5. Project Implementation & Monitoring	The process of public participation in the implementation of structural projects would be elaborated in more detail within the final project based on the specific type of project, location, and following the Guidelines on Public Participation, and Environment, Economic and Social Impact. The important steps in this process would be : 5.1 Disseminate information about the project final design, start-up and progress through media, local broadcasts and other available means.	Press releases, Press conferences Workshops with stakeholder groups. Community	International Public Participation Specialist National Social Sector / Public Participation Specialists Allowances for Community

Project type	Structural Flood Protection Measures		
Stages	**Activities**	**Events**	**Resource required**
	5.2 Refresher training on facilitation skills with Community Facilitators to re-engage them in the process. 5.3 Mobilize existing or new Community-based organizations (Women's Union, Water User Groups, Farmer Groups) for participatory monitoring of project implementation. 5.4 Establish checklist to monitor: ▪ Access routes, waste disposal, use of land, environmental impacts during construction ▪ Quality of construction when appropriate ▪ Monitoring and reporting of negative impacts on land and natural resources as construction progresses ▪ Implementation of compensation packages ▪ Implementation of resettlement plan 5.5 Community facilitators provide training on project design and activities to be monitored by the community. 5.6 Establish feedback mechanism with Project Executing Agency, Contractors, relevant Government Authority to address problems during construction, or adjust design for unanticipated negative impacts. Establish mechanism for reporting and solving problems related to resettlement and compensation packages.	monitoring meetings.	Facilitators Travel costs Workshop and meeting costs
6. Project Implementation: Operation and Maintenance	6.1 Provide training on Operation and Maintenance to final Project Holder (local government, line agency, etc.). 6.2 Identify in the training how the community can be involved in the Operation & Maintenance, depending on the type of structural work, size, location and anticipated maintenance requirements. 6.3 Based on information from consultations, work with Project Holder to form community O & M groups. 6.4 Provide training and support to Operation & Maintenance groups organizational development (Statutes of operation, Schemes to recover costs of maintenance where appropriate, small supports for operations) depending on the type of structure. 6.5 Prepare materials and organize community meetings on what they should do or not do to contribute to maintenance of the structure.	Training on O & M - to Community Facilitators / Project Holders - to community	

APPENDIX 6 SCREENING LIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS

SCREENING QUESTION	Yes	No	Remark
A. PROJECT SITING **IS THE PROJECT AREA ADJACENT TO OR WITHIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS?**			
– in or near sensitive and valuable ecosystems (e.g., protected areas, wetlands, wild lands, coral reefs, and habitats of endangered species)			
– in or near areas with cultural heritage sites (e.g. archaeological, historical sites or existing cultural or sacred sites)			
– densely populated areas where resettlement may be required or pollution impacts and other disturbances may be significant			
– regions subject to heavy development activities or where there are conflicts in natural resource allocation			
– watercourses, aquifer recharge areas, or reservoir catchments used for potable water supply			
– lands or waters containing valuable resources (e.g. fisheries, minerals, medicinal plants, prime agricultural soils)			
B. POTENTIAL ENVIRONMENTAL IMPACTS **IS THE PROJECT LIKELY TO LEAD TO:**			
– permanent conversion of potentially productive or valuable resources (e.g. fisheries, natural forests, wild lands)			
– destruction of natural habitat and loss of biodiversity or environmental services provided by a natural system			
– risk to human health and safety (e.g. from generation, storage, or disposal of hazardous wastes, inappropriate occupational health and safety measures, violation of ambient water or air quality standards)			
– encroachment on lands or rights of indigenous peoples or other vulnerable minorities			
– displacement of large numbers of people or businesses			
– absence of effective mitigation or compensation measures			

APPENDIX 7 PARAMETER LIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL PARAMETERS FOR FLOOD RISK MANAGEMENT PROJECTS										
Environmental Concerns			Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact		
								Small	Moderate	Major
A	**Environmental concerns related to project sitting**									
	1	Land acquisition	1	Loss of productive land and/or sources of income. Displacement of households, and/or economic activities. Social/ community disruption.	1	Avoid or minimize by careful design. If not possible, compensate for losses and provide assistance to relocate and/or restore living conditions/ livelihoods. Prepare & implement participatory Resettlement Plan.				
	2	Encroachment on and/or damage to historical, cultural, religious or other sites and monuments that are important to the community and/or to social groups	2	Loss of valued sites. Disruption of social / community rituals. Indirect impacts: Loss of tourism potential. / income.	2	Avoid, minimise or offset activities by careful design and consultation with local communities. Compensate for damage to or displacement of sites, graves, etc.				
	3	Encroachment into or restricted access to forest/swamplands / wetlands	3	Loss of biodiversity, rare and endangered species. Loss of forest/swamp / wetland related production functions. Indirect impacts: Increased household expenditures for food, building materials, medicines, etc., that were harvested. Reduced strategies to deal with food shortages. Increased risks of poverty.	3	Avoid or minimize by careful design and consultation with local communities. Compensate and/or offset economic losses through replacement of resources, identification of alternative income sources, etc.				
	4	Loss of agricultural/aquaculture land	4	Loss of household income from sales and/or work as hired labour (with different impacts for men and women, landless HH). Loss of business revenues and wage employment (commercial agriculture, agro- and fish processing, etc.) Indirect impacts: Increased HH expenditures for food; reduced food security. Distress sales of land and other assets. Increased risk of out-migration to look for work. Increased poverty.	4	Consultation with affected communities and HH to identify and implement feasible alternative income sources. Training for new job skills, establishment of micro-enterprises. Compensation for economic losses.				
	5	Impediment to movements of wildlife,, including obstruction of fish migration paths	5	Impediment of wildlife, reduction in biodiversity and fish stocks Indirect impacts: Loss of income from fishery	5	Careful planning, design, and operation, construction of fish passages				
	6	Impediment to movements of people (e.g., navigation) and their animals	6	Disruption of economic activities and social movements.	6	Careful planning and design				
	7	Loss of aesthetic, visual or recreational value of the areas	7	Loss of precious values, economic losses	7	Careful planning and design				
B	**Environmental concerns related to project implementation and construction activities**									
	1	Soil erosion	1	Water quality impact, loss of productive soil, sedimentation problems Indirect impacts: Reduced drinking water quality; higher agricultural input costs / reduced productivity and incomes.	1	Minimise clearing activities, limit activities to dry season, optimise soil cover and apply soil management techniques to minimise soil loss				

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL PARAMETERS FOR FLOOD RISK MANAGEMENT PROJECTS										
Environmental Concerns			Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact		
								Small	Moderate	Major
	2	Increased turbidity	2	Impact on flora and fauna, sedimentation problems. Indirect impacts: Reduced drinking water quality (stream/rivers & water supply systems)	2	Apply fencing, use silt screens in sensitive areas.				
	3	Sedimentation of river beds	3	Loss of habitat, problems with navigation Indirect impacts: Temporary restrictions on navigation/accessibility for economic activities, social networks	3	Remove deposited sediments.				
	4	Loss of habitats	4	Loss of biodiversity, reduction in fish stocks Indirect impacts: Reduced incomes from fishing/fish processing (differential impacts on men and women); reduced food security	4	Careful planning and design of disposal sites.				
	5	Loss of soil fertility	5	Loss of agricultural production, Indirect impacts: Loss of income (potential differential impacts on men and women); reduced food security; increased poverty risks	5	Careful planning and design of soil movement, set aside fertile topsoil. Supply fertilisers.				
	6	Worker accidents	6	Health impacts, economic losses due to injuries, loss of life; increased public health care costs	6	Implement safe working practices through training, site supervision and provision of safety equipment.				
	7	Traffic accidents	7	Health impacts, economic losses due to injuries, loss of life; increased public health care costs.	7	Identify alternative routes, limit & post driving speeds. Provide community awareness programs.				
	8	Disruption of access to productive land (e.g., farm land, fishing areas, forests) and/or to community facilities/services	8	Temporary loss of income from farming, fishing and processing activities (differential impacts on men and women); reduced food security. Temporary disruption of local businesses, business income, wage income for employees. Temporary disruption of community services (e.g., access to clinics).	8	Identify alternative routes to facilitate continued access; limit disruptions to periods of low economic activity, e.g. outside harvest periods, Compensate for loss of business income and employee wages, Assist to temporarily relocate community facilities/services to maintain access.				
	9	Obstruction to navigation	9	Temporary restricted access and/or extra costs for transport related to economic activities; restricted fishing activities, Temporary restricted and/or more expensive transport to support social network.	9	Identify alternative routes, limit to periods of low economic activity, e.g. outside main fishing periods				
	10	Disruption of utility services	10	Temporary disruption and/or extra costs for local businesses, economic activities (e.g., agricultural processing) and community facilities/services (e.g., health clinics).	10	Careful planning and quick repair in case of accidents. Provide community awareness and information programs.				
	11	Noise/vibration/air pollution	11	Temporary reduced living conditions (dust, noise); temporary increased risks of health impacts (e.g., due to dust).	11	Limit working hours in populated areas, use proper and well maintained equipment.				

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL PARAMETERS FOR FLOOD RISK MANAGEMENT PROJECTS										
Environmental Concerns			Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact		
								Small	Moderate	Major
	12	Soil /water contamination related to leakage and inappropriate storage of fuels and other chemicals, dumping of construction wastes or improper sanitation	12	Loss of flora and fauna. Increased risks of health problems, e.g., skin rashes/eye infections from contaminated surface water, cuts, abrasions, etc., from unsafe dumping of construction wastes. Contamination of drinking water sources with related health risks (diarrhoea, dysentery).	12	Containment of fuels stored on site and off-site refuelling., follow appropriate procedures, proper maintenance of equipment, collection and proper handling of construction wastes, provision of proper sanitation facilities.				
	13	Groundwater pollution related to leakage and inappropriate storage of fuels and other chemicals, dumping of construction wastes or improper sanitation	13	Contamination of drinking water sources with related health risks (diarrhoea, dysentery).	13	Containment of fuels stored on site and off-site refuelling., follow appropriate procedures, proper maintenance of equipment, collection and proper handling of construction wastes, provision of proper sanitation facilities.				
	14	Influx of non-local workers for project construction and other people attracted by economic opportunities	14	Social tensions due to competition for paid work and other economic opportunities related to FRM project, inappropriate behaviour of non-local people, lack of knowledge/respect for local customs.	14	Contractor contracts specify (i) employment of local workers, (ii) local purchase of goods and services, (iii) awareness programs about local customs and appropriate behaviour.				
	15	Health impacts/disease hazards due to influx of workers and other non-local people	15	Increased risks of sexually transmitted diseases including HIV/AIDS, increased risks of other infectious diseases.	15	Contractor contracts specify robust HIV/AIDS awareness and prevention program targeting workers and people in surrounding communities. Plan proper domestic and human waste management. Support local health clinics to meet new demands.				
	16	Pressure on water supply and sanitation due to influx of workers	16	Increased health risks related to poor drinking water and sanitation conditions (diarrhea, dysentery), Possible loss of business income due to lack of adequate water supply/sanitation.	16	Appropriate planning and design of water supply and sanitation facilities, including supplementary resources. Plan proper domestic and human waste management;. Support for local health clinics to meet new demands.				
	17	Employment opportunities for local people	17	Poverty reduction, improved welfare.	17	Contractor contracts specify (i) employment of local workers, (ii) local purchase of goods and services, (iii) awareness programs about local customs and appropriate behaviour.				
C	**Environmental concerns related to project design, management, operation and maintenance**									
		Project induced changes in hydrology/hydraulics: the timing, extent, depth and duration of flooding, resulting in:								

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL PARAMETERS FOR FLOOD RISK MANAGEMENT PROJECTS										
Environmental Concerns			Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact		
								Small	Moderate	Major
	1	Loss of agricultural production (loss of flood benefits)		Increased input costs and reduced yields; loss of business revenue and household incomes; possible loss of jobs for agricultural workers. Indirect impacts: reduced food security, increased incidence of distress sales of land and other assets, increased incidence of out-migration to look for work, increased poverty risks.		Allow sufficient flooding to safeguard silt and water supply and prevent pests Strengthen and provide agricultural extension and other technical assistance to enhance agricultural productivity, diversify crop production, expand livestock raising, etc. (including services targeting men's and women's agricultural activities).				
	2	Loss of capture fisheries production (loss of flood benefits)		Loss of household incomes Indirect impacts: reduced food security, increased poverty risks.		Allow sufficient flooding to maintain fish migration patterns and fish spawning, breeding, nursing and feeding areas.				
	3	Loss of wetland area/productivity (loss of flood benefits)		Ecological impacts; loss of biodiversity. Economic losses (loss of income, extra expenditures), decreased food security, increased poverty risks.		Allow sufficient flooding to safeguard silt and water supply.				
	4	Hindrance to navigation/ transport by boat (loss of flood benefits)		Economic losses due to reduced accessibility and/or higher transport costs for businesses, marketing and other economic activities. Social impacts due to reduced mobility / travel to maintain social networks.		Allow water levels high enough to make navigation possible.				
	5	Reduced water availability in the dry season (loss of flood benefits)		Economic losses due to lack of water for agriculture, other economic activities. Social and health impacts due to lack of safe drinking water; decreased food security, increased poverty.		Allow sufficient flooding to safeguard replenishment of groundwater and surface water storage.				
	6	Changes in river morphology		Economic losses due to hindrance to navigation, impacts on sand mining industry.		Dredging, construction of bank protection works.				
	7	Changes in salt water intrusion		Damage to agriculture and aquaculture; loss of business revenue and household incomes; potential loss of jobs for agricultural/ aquaculture workers.		Maintain minimum flows.				
	8	Decline in delta growth		Reduction in economic opportunities due to decline in land accretion.		Maintain minimum (sediment carrying) flows.				
D	**Positive impacts related to project design, management, operation and maintenance**									
	1	Increased safety		Improved well-being, reduced poverty.						
	2	Improved sanitation and health situation		Improved well-being, reduced poverty.						
	3	Decreased flood damage		Improved well-being, reduced poverty, improved food security.						
	4	Increased agricultural production		Improved well-being, reduced poverty, improved food security.						
	5	Improved mobility/transportation network		Social and economic welfare, reduced poverty.						
	6	Poverty reduction/improved food security		Improved well-being.						

APPENDIX 8 THE BEST PRACTICE GUIDELINES AND PROJECT PHASES/ STAGES

In order to manage an engineering project properly, it is normally divided in project phases. Common is a division in the following five phases:

1. Initiation
2. Planning/ Development/ Design
3. Production/ Execution
4. Monitoring/ Control
5. Closure

A project starts with an idea to solve or mitigate a problem, create a product or structure etc. In the initiation phase finances are mobilised, a project team is formed, the equipment and tools are acquired, and the idea is given its first shape. The second phase is the planning/ development/ design phase. The feasibility of the idea is tested, and, if successful, a project plan is elaborated and the design is made. In Phase 3 the plans and designs are implemented, i.e. the production takes place, the project is being executed. Monitoring during execution may reveal the necessity to correct the planning and/or design, and make adjustments in the execution. After completion of the works the project will be closed, i.e. the team will break up, the accounts will be closed, and the product or result may be handed over to a client.

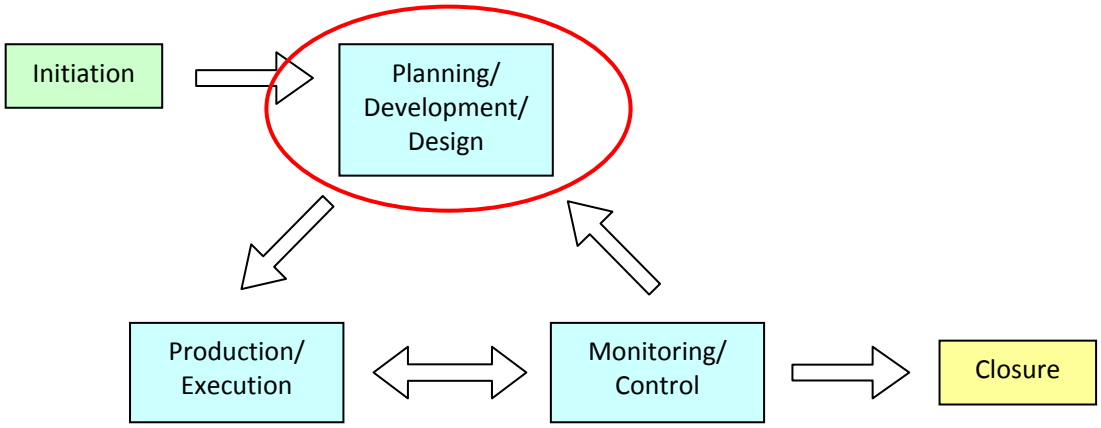


Figure 7.1 The phases of an engineering project.

The Best Practise Guidelines are almost exclusively applicable to Phase 2: Planning/ Development/ Design. This phase can be subdivided in various stages: see the list below. The number and content of the stages may differ, depending mainly on project type or country-specific preferences. The preliminary design stage for example is in engineering projects often included in the feasibility study.

a) Preliminary/ prefeasibility study
b) Feasibility study & overall planning
c) Preliminary design
d) Detailed design & detailed planning
e) Construction/ bid documents

Each section of the guidelines applies to one or more of the above stages. In the guidelines this will be indicated by displaying the above symbols in the page margin.

The five stages of Phase 2 contain the following:

a) Preliminary/ prefeasibility study

A prefeasibility study is the precursor to a feasibility and design study. Its main purpose is to decide whether it is worthwhile to proceed to the feasibility study stage and to ensure there is a sound basis for undertaking a feasibility study.

A prefeasibility study generally includes:

- Definition of achievable project outcomes;
- Analysis of the development situation and constraints the project is to address, based on collected data;
- Identification of related (government and other stakeholders) policies, programs and activities;
- Preliminary assessment of the viability of alternative approaches;
- Preliminary identification of likely risks to feasibility and benefits (including risks to sustainability).

b) Feasibility study & overall planning

If a project is considered to be feasible based on the prefeasibility study, a more thorough feasibility study can start. A feasibility study defines the project and its objectives in detail, and look at various forms of feasibility:

- Technical feasibility: Can the measures technically be realised in local context?
- Operational feasibility: Will the implemented measures be manageable by the local people?
- Economic feasibility: Is the cost-benefit analysis positive?
- Social feasibility: Are the objectives and measures socially acceptable?
- Environmental feasibility: Are the environmental impacts acceptable?
- Political feasibility: Will the measures be supported by the politicians?
- Overall feasibility: Will implementation of the envisaged measures result in accomplishment of the project objectives?

Field surveys, hydrological and hydraulic analyses (in flood mitigation projects), social and environmental assessments, stakeholder meetings, costs estimates etc. are the basis for answering the above questions. If the answers are positive, the operations/ management structure and management method will be defined, and any initial planning will be detailed.

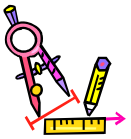
c) Preliminary design

If a project is deemed feasible, the preliminary design stage can start. This stage focuses on the technical measures and includes the following:

- Site surveys and investigations and computer modeling provide the data for preliminary design criteria;
- The design criteria are translated into the preliminary design of structures and measures in an integrated and balanced system in which the envisaged management activities are geared to one another;
- A review of the cost-benefit analysis (construction and operation) and analysis of environmental, social and political factors still show the viability of the project.

If necessary, the project planning will be adjusted based on new insights gained in this stage.

d) Detailed design & detailed planning



During the final design stage the detailed architectural and engineering drawings (the blueprints) of all physical components of the project are produced. Virtually all design problems must have been resolved before the end of the final design stage. Sufficient detail must be provided by the drawings and the report to allow reasonably accurate estimates of construction and operating costs, as well as the construction scheduling.

e) Construction documents/ bid documents

The detailed designs and construction scheduling are incorporated in construction documents and bid specifications, giving the contractors the information they need for construction.

If sections of the guidelines refer to other than the above-described phases (e.g. the construction or monitoring phase), the following symbol will be used: