USAID | ZAMBIA

FROM THE AMERICAN PEOPLE

Environmental Mitigation and Monitoring

Definition of mitigation

Mitigation is. . .

✓ **The implementation of measures designed to reduce the undesirable effects of a proposed action on the environment**

! **Mitigation is a key part of the EIA process. It is essential to achieving environmentally sound design.**

How does mitigation reduce adverse impacts?

Different types of mitigation measures act in different ways to reduce adverse impacts:

Type of measure	How it works	Examples
Prevention & Control measures	**Fully or partially prevent an impact/reduce a risk by:** **–Changing means or technique** **–Changing the site** **–Specifying operating practices**	**PREVENT contamination of wells, by SITING wells a minimum distance from latrines.** **OPERATE wastewater treatment system for a coffee-washing station.**
Compensatory measures	**Offset adverse impacts impacts in one area with improvements elsewhere**	**Plant trees in a new location to COMPENSATE for clearing a construction site.**
Remediation measures	**Repair or restore the environment after damage is done.**	**Re-grade and replant a borrow pit after construction is finished**

Do I mitigate EVERY impact?

NOT NECESSARILY.

Mitigation is directed at two targets.

1. **serious impacts**

First, the most serious impacts identified by the EIA process should ALWAYS be mitigated.

2. **easily mitigated impacts**

After addressing the most serious impacts, there may be small impacts for which mitigation is easy and low-cost.

Definition of monitoring

Environmental monitoring is BOTH.

✓ **1. Systematic measurement of key environmental indicators over time, within a particular geographic area**

✓ **2. Systematic evaluation of the implementation of mitigation measures**

! **Environmental monitoring is a necessary complement to mitigation. It should be a normal part of monitoring project results.**

Explaining monitoring, part I

Monitoring, part 1:

Systematic measurement of key environmental indicators over time, within a particular geographic area

The indicators are:

Signals of or proxies for aspects of

- **Environmental health &**
- **Ecosystem function**

The geographic area is:

The area in which the environmental impacts of the activity may be felt. This may be:

- **a stream, lake or pond**
- **a watershed, an ecosystem,**
- **a village, etc.**

Why measure environmental indicators?

There are 2 reasons to choose & measure environmental indicators:

1. ***To measure the environmental impacts of an activity.***
   - ❖ ***The most serious impacts***
   - ❖ ***Uncertain impacts (as identified by the EIA process)***
2. ***To understand whether mitigation measures are effective.***

! Therefore, Indicators are not chosen randomly.

An indicator is chosen because:

1. **It corresponds to these impacts**
2. **It allows the effectiveness of mitigation measures to be evaluated.**

Examples of indicators

Environmental components

Water	*Quantity, quality, reliability, accessibility*
Soils	*Erosion, crop productivity, fallow periods, salinity, nutrient concentrations*
Fauna	*Populations, habitat*
Env Health	*Disease vectors, pathogens*
Flora	*Composition and density of natural vegetation, productivity, key species*
Special ecosystems	*Key species*

Typical aspects of environmental health & ecosystem function that may be adversely affected by small-scale activities.

Indicators: sometimes complex, often simple

- Indicators may require laboratory analysis or specialized equipment & techniques
  - Water quality testing for fecal coliform, heavy metals
  - Automatic cameras on game paths for wildlife census
  - Etc.
- But indicators are often VERY SIMPLE
- This is especially true for small-scale activities
  - **Simple indicators can be more useful and appropriate than more complicated ones!**

!

For example

Examples of simple indicators

Erosion measurement.

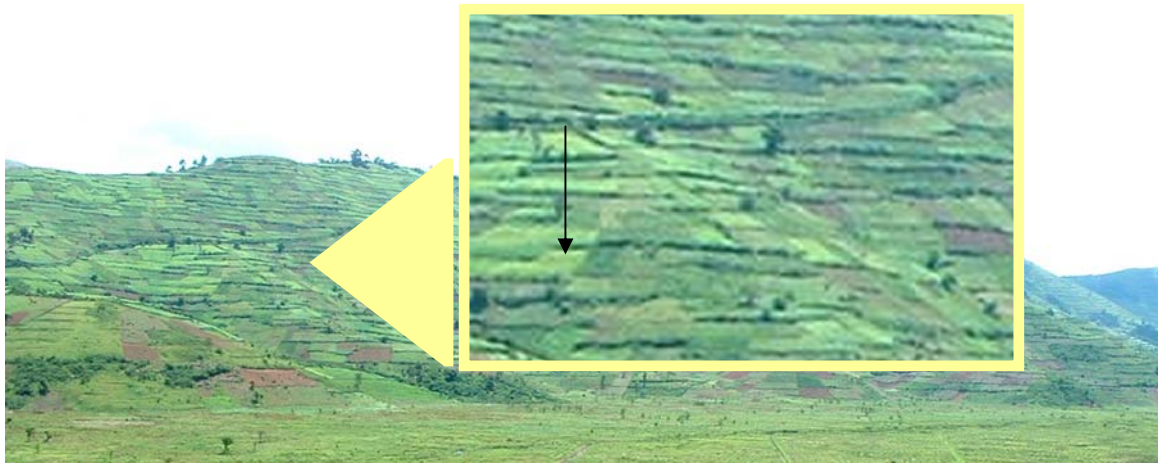
Topsoil loss from slopes upstream in the watershed **(top)** is assessed with a visual turbidity monitor **(bottom).**

Surface sewage contamination

Visual inspection behind the latrine **(top)** reveals a leaking septic tank **(bottom).**

What are the limitations of this indicator?

Examples of simple indicators



Soil depletion.
Visual inspections show fertility gradients within terraces. (Dark green cover indicates healthy soil; yellow cover indicates depletion)

Groundwater levels
Are measured at shallow wells with a rope and bucket.

! Choose the simplest indicator that meets your needs!

Design of monitoring

- Monitoring requires SYSTEMATIC measurement of indicators.

What does this mean?

It means measurement designed to distinguish the impacts of the activity from other factors.

Systematic measurement therefore requires decisions about:

1. **Location of measurement**
2. **Timing & frequency of measurement**

and often. . .

3. **Other factors**

For example

Design of monitoring

Example:
Water quality impacts of coffee-washing

1

Location
Water samples should be taken at the intake, and downstream of seepage pits.

2

Timing & frequency
Samples at different locations should be taken at the same time.
Samples should be taken at **high & low flow** during the processing season

3

What else?

Design of monitoring

Measuring water quality impacts from a point source of pollution (the previous example) is fairly straightforward

Often monitoring can be more complicated.

Some common monitoring strategies are:

Monitor the actual project, plus a similar non-project area (a "control")

Monitor at multiple stations/ sampling locations

Do research to obtain good baseline data

All are intended to show what the "normal" baseline conditions are, so the impacts of the activity can be distinguished from NORMAL VARIABILITY and other factors

Explaining monitoring, part 2

Monitoring, part 2:

Systematic evaluation of the implementation of mitigation measures

Evaluation means. . .

to ascertain whether or not the measures have been implemented as specified by the EMP or mitigation and monitoring plan.

This will often not show whether the measures are effective. This is the role of environmental indicators.

There are two basic ways to get the information required: "from your desk" or "in the field"

For example

Information sources to evaluate implementation of mitigation

Mitigation measure is:
"Clinic staff shall be trained to and shall at all times segregate and properly incinerate infectious waste."

From your desk:
You might ask the activity manager or field supervisor to report on the following:

- Percentage of staff trained?
- Spot inspections of waste disposal locations carried out? The result of these inspections?

In the field, you inspect waste disposal locations. Inspection shows clearly that segregation and incineration is NOT implemented implemented at facility B.

When do I obtain information

- **From my desk?**
- **From the field?**

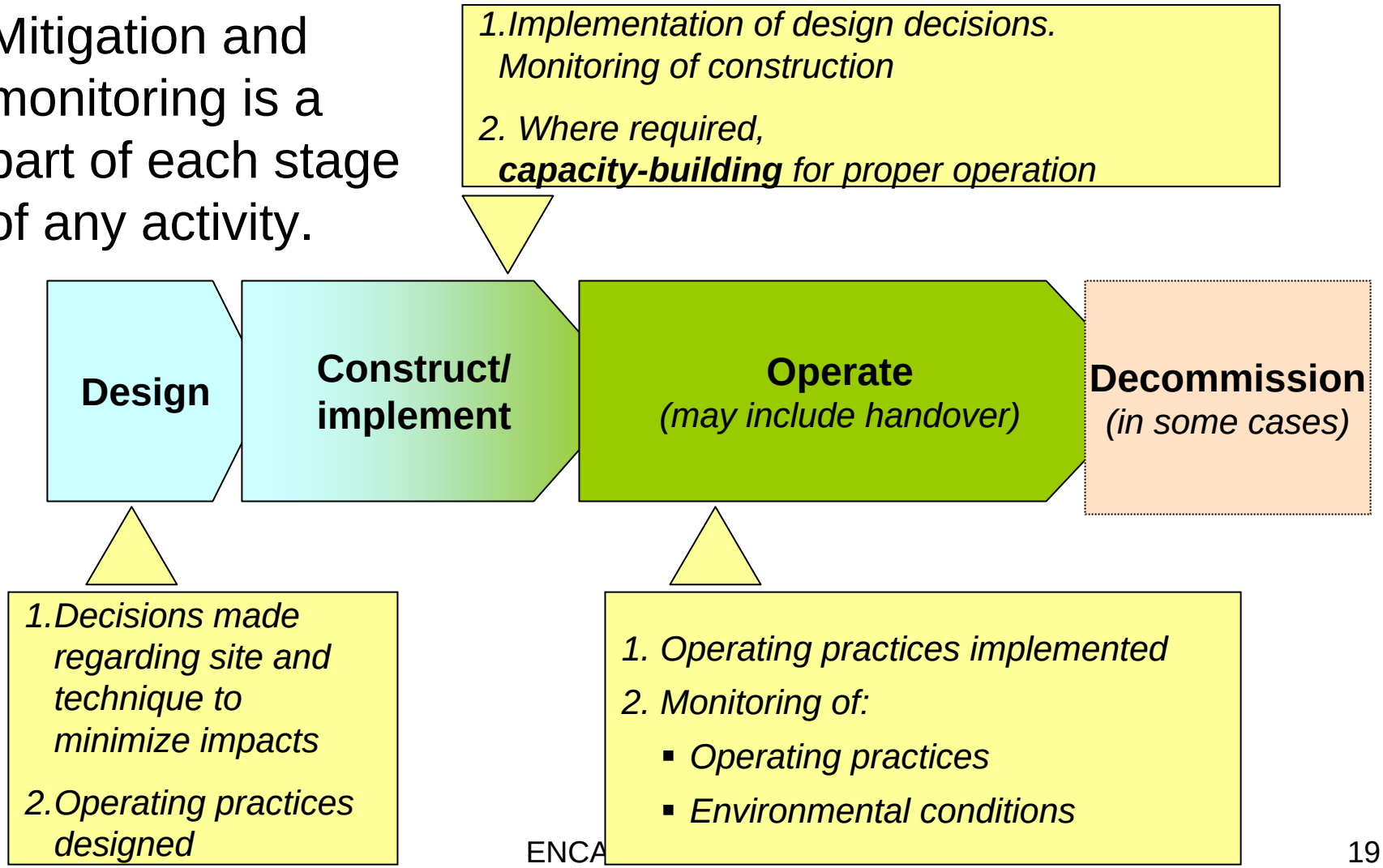
! **Get the information you need using the simplest means of collecting it.**

Monitoring: analysis and dissemination

- Analysis is an essential element of monitoring
  - Raw or unprocessed environmental data is not useful to decision makers
- Dissemination of monitoring results is critical

Mitigation & monitoring in the project lifecycle

Mitigation and monitoring is a part of each stage of any activity.



Mitigation and Monitoring plans

- Mitigation and monitoring for an activity is defined by the *Mitigation and Monitoring (or M&M) Plan*

  (also called an *Environmental Management Plan, or EMP)*

! **The Mitigation and Monitoring Plan is a critical part of any preliminary assessment and any full EIA.**

What does the plan contain

?

The MITIGATION portion of M&M Plans contain. . .

WHAT & WHY
What are the significant impacts that need to be mitigated?

For each significant impact, what are the proposed mitigation measures?

WHO
Who carries out mitigation measures? Who manages or verifies?

WHEN
At what stage in the project cycle is each measure implemented?
Is there ADAPTIVE mitigation?

WITH WHAT RESOURCES
What is the budget? Who pays?

Adaptive mitigation

Adaptive mitigation means that implementation of a mitigation measure is triggered when monitoring indicates a problem.

The mitigation plan should discuss any adaptive mitigation.

The MONITORING portion of M&M Plans contain. . .

WHAT
What are the indicators?

WHY
What is the purpose of each indicator?

WHEN & HOW
How & when will indicators be measured? How will the information be analyzed?

WHO
Who monitors? Who analyzes? Who reports? Who receives the information?

WITH WHAT RESOURCES
What is the budget? Who pays?

You should explain. . .

how the plan will remain flexible in response to project needs and to react to the unexpected

Making Mitigation & Monitoring effective

For mitigation and monitoring to be effective, it must be:

Realistic.
M&M must be achievable within time, resources & capabilities.

Targeted.
Mitigation measures & indicators must correspond to impacts.

Funded.
Funding for M&M must be adequate over the life of the activity

Considered early.
Preventive mitigation is usually cheapest and most effective. Prevention must be built in at the design stage.

Considered early.
If M&M budgets are not programmed at the design stage, they are almost always inadequate!

Making Mitigation & Monitoring effective

!

But most of all, it must be:

IMPLEMENTED.

Effective mitigation and monitoring requires implementing the Mitigation and Monitoring Plan.

Some key resources for Mitigation & Monitoring

USAID's Small-scale guidelines

ENCAP WEBSITE
www.encapafrica.org

Each sectoral write-up presents **mitigation options matched to impacts**. The **annotated bibliographies** provide more information.

Sourcebook materials

Key selections from a number of Mitigation and Monitoring resources are in the sourcebook.

Summing up

Mitigation & Monitoring are a critical part of environmentally sound design:

- ✓ **Mitigation minimizes adverse environmental impacts**
- ✓ **Monitoring tells you if your mitigation measures are sufficient & effective.**

Annual Environmental Compliance Review/Report

- Similar to Environmental Status Report
- Presents Environmental issues – reporting period
- Mitigation and monitoring commitments
- USAID and partner - evaluate likely eminent impacts of the project

Elements of Environmental Review Report

i. Brief summary of the project
ii. Description of activities
iii. Environmental Situation – focus on site characteristics e.g water supply, animal habitat, steep slopes
iv. Evaluation of activities wrt EI potential (before, during & post)
v. Environmental Mitigation Actions (including monitoring) –> Environmental Mgt Plan
   - Mitigation
   - Monitoring
   - Responsible persons plus cost
vi. Other relevant information
vii. Certification

Budget Implications?

- Part and parcel of M&E
- Mitigation measures should have been part of the project proposals, including costs

Thank You!!