



# Environmental Mitigation and Monitoring



GEMS Environmental Compliance-  
ESDM Training Series

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## SESSION OBJECTIVES:

1. Define environmental mitigation and monitoring
2. Recognize what an environmental indicator is and what information it provides
3. Discuss simple strategies to incorporate environmental mitigation and monitoring into projects

# PART I: ENVIRONMENTAL MITIGATION

A critical part of the EIA process—and of ESDM

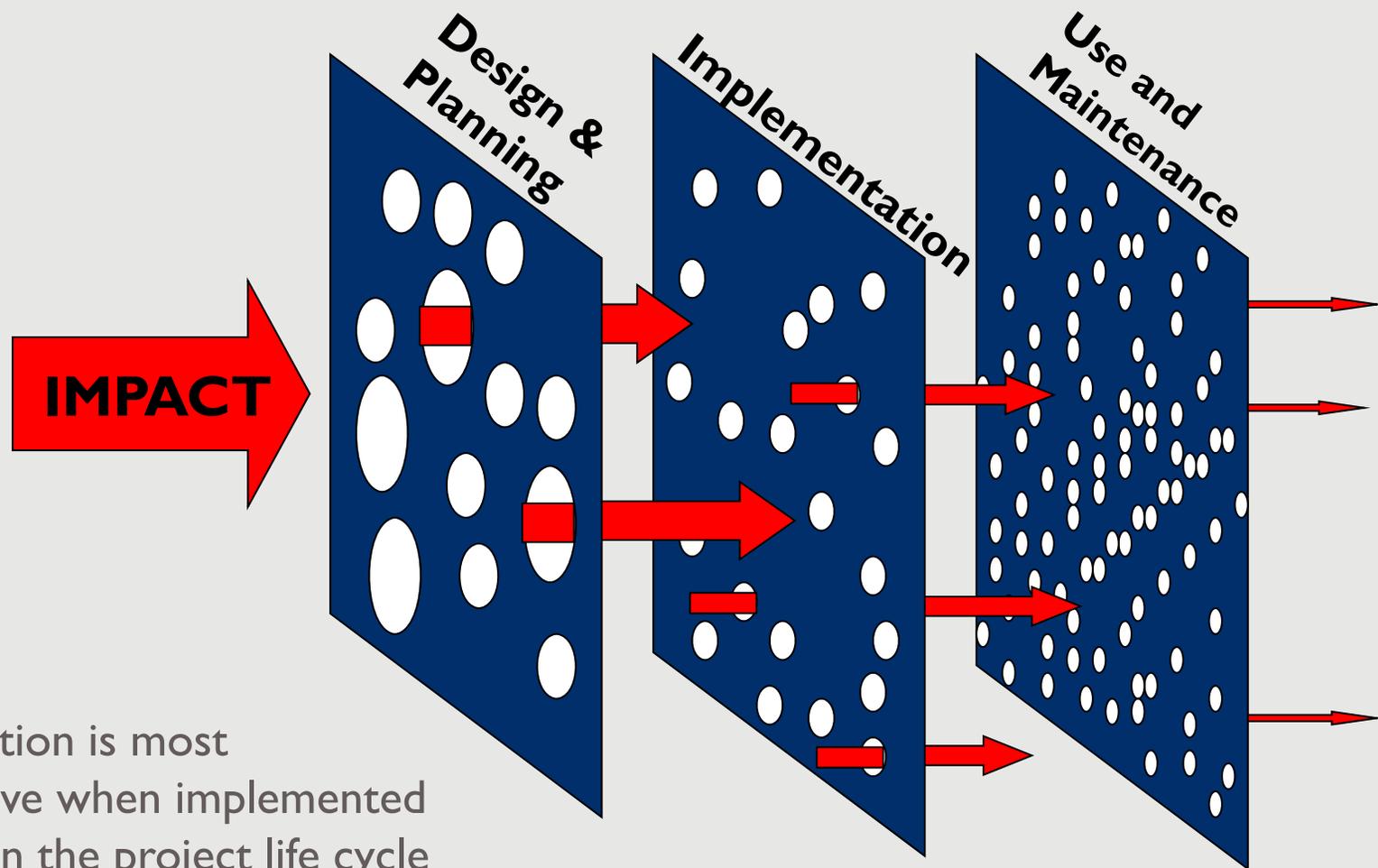
## MITIGATION IS...

The design and implementation of measures to avoid, eliminate, reduce, offset, or compensate for the undesirable effects of a proposed action on the environment or environment on an action.

## WHEN IT COMES TO CLIMATE CHANGE, MITIGATION IS ALSO USED IN ANOTHER SENSE

It refers to efforts to reduce or prevent emission of greenhouse gases through carbon sequestration

# MITIGATION THROUGHOUT THE LIFE OF A PROJECT



Mitigation is most effective when implemented early in the project life cycle (design phase) to avoid greatest impacts.

Only small impacts remain to mitigate during implementation.

# HOW DOES MITIGATION REDUCE ADVERSE IMPACTS?

**Prevention and Control Measures**

**Compensatory Measures**

**Remediation Measures**

... and sometimes you may need to **redesign the project** to modify or eliminate problematic components

# MUST **EVERY** IMPACT BE MITIGATED?

Mitigation specified in Phase I or Phase II of EIA process must be implemented

Environmental management criteria often require judgment in designing specific mitigations. Apply the following principle:

**PRIORITIZE!**

## POTENTIALLY SERIOUS IMPACTS/ISSUES

These must **ALWAYS** be mitigated to the point that the impact is non-significant

## EASILY MITIGATED IMPACTS

Then, mitigate less-serious impacts for which mitigation is easy and low-cost

# MITIGATION EXAMPLE: CHANGE SITE TO PREVENT AND CONTROL IMPACTS

## RURAL ROAD CONSTRUCTION

- **Potential impact:** the route crosses through the habitat of a threatened bird species
- **Mitigation measures:** Change the location of the route to avoid affecting the habitat; minimize sound and other alterations during their mating season



Credit: Stoughton/The Cadmus Group

# Part II: Environmental Monitoring

- ▶ Why should we monitor projects?



# ENVIRONMENTAL MONITORING IS BOTH...

1. Systematic observation of key environmental conditions
2. Systematic verification of mitigation measure implementation

## PURPOSE:

to tell you clearly and cost-effectively if **mitigation is happening, sufficient and effective**

Env. Monitoring should be a normal part of project M&E.

# MONITORING: PART I

## SYSTEMATIC OBSERVATION OF KEY ENVIRONMENTAL CONDITIONS

Systematic observation of key environmental conditions. These are environmental conditions that:

- correspond to impacts & mitigation measures
- Upon which the project depends for its success

**EXAMPLE:** an irrigation project may contaminate groundwater. **Ground-water quality** is monitored.

**EXAMPLE:** A water supply project depends on clean source water. **Source water quality** is monitored.

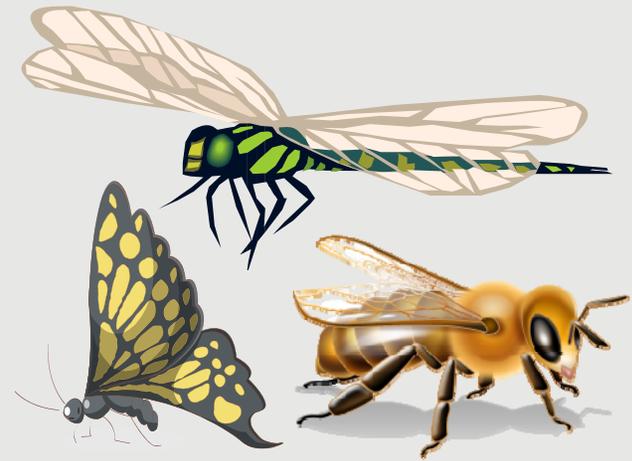
# MONITORING ENVIRONMENTAL CONDITIONS

I. SYSTEMATIC OBSERVATION of key environmental conditions means that environmental indicators are chosen and assessed systematically.

## INDICATORS ARE

Signals of  
or proxies for

- Environmental health
- Ecosystem function



***For example...***

# EXAMPLES OF INDICATORS

ENVIRONMENTAL COMPONENTS THAT MAY BE ADVERSELY  
AFFECTED BY SMALL-SCALE ACTIVITIES



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

# ENVIRONMENTAL INDICATORS: SOMETIMES COMPLICATED, OFTEN SIMPLE

- Environmental Indicators MAY require laboratory analysis or specialized equipment & techniques
  - Testing water for pesticide residues
  - Automatic cameras on game paths for wildlife census
  - Etc.
- But indicators are often VERY SIMPLE, especially for small-scale activities
  - Simple indicators can be more useful and appropriate than more complicated ones!



FOR EXAMPLE...

# EXAMPLES OF SIMPLE ENVIRONMENTAL INDICATORS

## EROSION MEASUREMENT



Topsoil loss from slopes upstream in the watershed (left) is assessed with a visual turbidity monitor (right).

## SURFACE SEWAGE CONTAMINATION



Visual inspection behind the latrine (left) reveals a leaking septic tank (right).

WHAT ARE THE LIMITATIONS OF THIS INDICATOR?

## ASSESSING ENVIRONMENTAL INDICATORS SYSTEMATICALLY

Monitoring often requires **SYSTEMATIC** measurement of indicators to distinguish the impacts of the activity from other factors

This requires decisions about:

1. Location of measurement
2. Timing & frequency of measurement and often...
3. Other factors

FOR EXAMPLE

# ASSESSING ENVIRONMENTAL INDICATORS SYSTEMATICALLY

## EXAMPLE: WATER QUALITY IMPACTS OF AGRIC. PROCESSING



Water intake



Processing facility



Seepage pit



Downstream

### LOCATION

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

### 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

# ASSESSING ENVIRONMENTAL INDICATORS SYSTEMATICALLY

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:

- 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 help distinguish impacts from **NORMAL VARIABILITY** and other factors

# MONITORING: PART 2

## SYSTEMATIC VERIFICATION OF MITIGATION MEASURE IMPLEMENTATION

Verifying whether or not the mitigation measures specified by the EMMP have been implemented.

This includes quantifying mitigation:

- How many staff trained?
- How many trees planted?

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:  
**PAPER REPORTS & FIELD INSPECTION**



FOR EXAMPLE

# WAYS TO QUANTIFY IMPLEMENTATION OF MITIGATION

## MITIGATION MEASURE IS:

“Clinic staff shall be trained to and shall at all times segregate and properly incinerate infectious waste.”

## DESK ASSESSMENT:

Clinics are asked to report:

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

Mitigation implementation indicators

Field inspection shows waste is segregated at point A, but not incinerated at point B.



# GOOD ENVIRONMENTAL MONITORING TELLS YOU CLEARLY AND COST-EFFECTIVELY IF MITIGATION IS SUFFICIENT AND EFFECTIVE

- Do no more than needed.
- Prioritize the most serious impacts & issues.
- Usually requires a combination of:
  - Mitigation environmental conditions indicators; and
  - Mitigation measure implementation indicators

Monitoring TOOLS Available:  
GEMS Visual Field Guides



**USAID**  
FROM THE AMERICAN PEOPLE

Version: 1 December 2009  
download at [www.encapaffrica.org/sectors/watson.htm](http://www.encapaffrica.org/sectors/watson.htm)  
comments and corrections to [encapinfo@coastmusgroup.com](mailto:encapinfo@coastmusgroup.com)

## ENCAP Visual Field Guide: WATER SUPPLY

for quick identification of serious environmental concerns in small-scale water supply activities

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**About the ENCAP Visual Field Guide Series**

ENCAP Visual Field Guides are intended for use during field visits by USAID and Implementing Partner staff who are not environmental specialists.

They are intended to ensure that the most common serious environmental deficits in activity design and management are quickly and easily identified for corrective action.

Note that an activity may be subject to environmental design and management conditions specified in its Environmental Assessment or Initial Environmental Examination but not captured in this document.

The field guides complement the more detailed guidance found in USAID's *Environmental Guidelines for Small Scale Activities in Africa*.

Consult the *Guidelines* for guidance regarding remedies, mitigation and corrective actions.

The *Guidelines* are available at [www.encapaffrica.org/egssa.htm](http://www.encapaffrica.org/egssa.htm).

*Disclaimer: This field guide was prepared by The Calmas Group, Inc. for International Resources Group, Ltd. (IRG) under USAID Africa Bureau's Environmental Compliance and Management Support (ENCAP) Program, Contract Number EPP-I-00-03-00013-00, Task Order No. 11. Its contents are the sole responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government.*

**PROBLEMS. A "YES" answer to any of the following indicates an environmental deficit in activity design or management. For USAID-funded activities, corrective action will be required. Notify the Chief of Party and the USAID Project Manager.**

1. Is a tank or well supplying water for domestic use uncovered?	YES  NO		<p><i>Issue: Easily results in contamination of water with pathogens. Can provide breeding habitat for disease vectors, including mosquitoes.</i></p> <p><small>(Photo depicts uncovered well.)</small></p>
2. Is there stagnant water around the water supply point?	YES  NO		<p><i>Issue: May provide habitat for disease vectors and attract livestock (see below).</i></p> <p><i>There is a high likelihood that stagnant water around a shallow well will contaminate water in the well.</i></p>
3. Do livestock share the water supply point?	YES  NO		<p><i>Issue: Easily results in contamination of water with livestock feces &amp; body fluids.</i></p> <p><i>May attract disease vectors (particularly flies) which are themselves a source of contamination.</i></p>
4. Is there soil erosion in the vicinity of the water supply point?	YES  NO		<p><i>Issue: Usually reduces the service period of the supply point by undercutting concrete aprons, well covers, and pump footings.</i></p> <p><i>Often leads to stagnant water around the supply point (see question 2, above).</i></p>

(Over)

# 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.

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

# HOW TO ORGANIZE PROJECT MITIGATION AND MONITORING INFORMATION?

## The Environmental Mitigation and Monitoring Plan (EMMP)

Activity	Adverse Impacts	Mitigation Measure	Monitoring Indicators/Criteria	Monitoring & Reporting Schedule	Responsible Party(ies)

### AN EMMP SETS OUT:

- ALL the mitigation measures required by the IEE or EA
- Indicators or criteria for monitoring their implementation & effectiveness
- Who is responsible for mitigation and monitoring

### Adaptive mitigation

***The EMMP, in particular, mitigation measures, may be modified during the LOA when the monitoring indicates an unforeseen problem or unexpected result...***

\*\*\* More to come on the EMMP in the next session...

## SUMMARY

Mitigation & Monitoring are critical core skills of EIA and ESDM

- Mitigation minimizes adverse environmental impacts
- Monitoring tells you if your mitigation measures
- are implemented, sufficient, and effective

**NOTE:** In a subsequent session, we will discuss how to report the results of environmental monitoring as is required under Reg. 216.

# GROUP DISCUSSION QUESTIONS

There are three discussion questions in the sourcebook. We'll share group discussion of the following question during report out.

- I. What are the main challenges/difficulties that projects face in the implementation of mitigation measure? And in the measurement of environmental indicators?