SESSION 7.
MITIGATION AND ENVIRONMENTAL MONITORING TECHNIQUES

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DEFINITION OF MONITORING

ENVIRONMENTAL MONITORING IS BOTH . . .

1. Systematic observation of key environmental conditions

2. Systematic verification of mitigation measure implementation

PURPOSE:

Tell you clearly and cost-effectively if mitigation is sufficient and effective.

Environmental monitoring should be a normal part of project M&E.
Systematic observation of key environmental conditions. These are environmental conditions that:

- correspond to impacts and 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.
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...*
EXAMPLE INDICATOR: COLIFORM CONTAMINATION

WATER QUALITY TESTS WITH SIMPLE, INEXPENSIVE TEST KIT . . .

Well used by humans & animals

Human-Use Only

Hotel Tap Water

Purple Color = Fecal Coliforms
Pink Color = Non-Fecal Coliforms
EXAMPLES OF INDICATORS

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

- **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

**INDICATORS**
ENVIROMENTAL INDICATORS:
SOMETIMES COMPLICATED, OFTEN SIMPLE

• Environmental Indicators **MAY** require laboratory analysis or specialized equipment and 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?**
EXAMPLES OF SIMPLE ENVIRONMENTAL INDICATORS

GROUNDWATER LEVELS
Are measured at shallow wells with a rope and bucket.

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

Choose the simplest indicator that meets your needs!
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
ASSESSING ENVIRONMENTAL INDICATORS SYSTEMATICALLY
EXAMPLE: WATER QUALITY IMPACTS OF AGRICULTURAL PROCESSING

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 and low flow** during the processing season.

3. WHAT ELSE?
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: 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 may 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?

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 and issues.
- Usually requires a combination of:
  - Environmental conditions indicators
  - Mitigation implementation indicators

Example: ENCAP visual field guides
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!
MITIGATION & MONITORING IN THE PROJECT LIFECYCLE

MITIGATION AND MONITORING IS A PART OF EACH STAGE OF ANY ACTIVITY.

1. Implementation of design decisions. Monitoring of construction.
2. Where required, **capacity-building** for proper operation

- **Design**
  1. Decisions made regarding site and technique to minimize impacts
  2. Operating practices designed

- **Construct/Implement**

- **Operate** (may include handover)
  1. Operating practices implemented
  2. Monitoring of:
     - Operating practices
     - Environmental conditions

- **Decommission** (in some cases)
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