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# **Environmental Mitigation and Monitoring: Strengthening Environmental Management Using Improved Indicators**

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# Environmental Mitigation and Monitoring

- 1. Mitigation** is designed to **reduce the undesirable impacts** of a proposed action on the environment
- 2. Monitoring** tells you if your mitigation measures are sufficient and effective

# **Session Objectives:**

- 1. Help participants and orgs improve environmental mitigation of projects**
- 2. Improve quality of each organization's M&E systems (through environmental management)**
- 3. Strengthen draft of environmentally-relevant indicators developed in previous workshops**
- 4. Assist organizations to incorporate environmental indicators into program implementation strategies and reporting**

# How does mitigation reduce adverse impacts?

Type of Mitigation Measure	How it Works	Examples
<b>Prevention &amp; Control</b>	Fully or partially prevent an impact/reduce a risk by: <ul style="list-style-type: none"><li>– Changing means or technique</li><li>– Changing the site</li><li>– Specifying operating practices</li></ul>	<b>PREVENT</b> contamination of wells, by <b>DESIGN</b> criteria such as protective fencing, pollution sources
<b>Operation &amp; Maintenance</b>	Plans ahead for operational cost recovery, repair costs	Community water committee transparent <b>MANAGEMENT</b> of water use fees
<b>Remediation</b>	Repair or restore the environment after damage is done	Re-grade and replant a borrow pit after construction is finished

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

# Mitigation: Design to **PREVENT** Impacts

## Potential Impacts:

- Contamination of water supplies
- Spread of disease

## Mitigation Measures:

- Fencing to keep livestock out
- Siting well away from contamination sources
- Provide separate sources for livestock watering







# Testing for Bacterial Contamination



Purple Color = Fecal Coliforms  
Pink Color = Non-Fecal Coliforms

# Environment, Conflict and Security Linkages

**Do the proposed mitigation measures affect the underlying power dynamics (socio-economic or political) in the community?**





# Road Rehabilitation Example:

**Potential Environmental Impact**

**Proposed Mitigation Measure**

**Indicators**

# Road Rehabilitation: Environmental Impacts

- ❖ Alteration of natural watershed drainage
- ❖ Erosion of road surface materials into habitats, productive agricultural land
- ❖ Roadside Gully formation with concentrated water flows
- ❖ Generation of dust and respiratory problems
- ❖ Inappropriate Extraction of materials for road surfacing
- ❖ Increase in transmission of disease vectors (HIV), charcoal export to markets



# Road Rehabilitation: **Environmental Mitigation**

## Sound Design Principles:

- ❖ Avoid steep grades, Follow land contours
- ❖ Culverts or Rolling dips for water drainage and diversion
- ❖ Side drainage to prevent flooding washout
- ❖ Slope stabilization with vegetated and physical means
- ❖ Dust reduction barriers
- ❖ Prioritized paving of vulnerable stretches
- ❖ Community Maintenance



# Questions:

- 1. Do most organizations use these mitigation measures as regular best practices?**
- 2. Should these environmental mitigation measures be part of regular program design criteria?**
- 3. Are you monitoring for these mitigation measures?**
- 4. With what budget??**

# Indicators for Environmental Management



- **Environmental Mitigation Indicators** need to be tied to environmental mitigation measure



- However, you will not be able to measure ALL!
  - **Prioritize and Budget** for the most serious impacts

**Good Indicators Can be Difficult to choose...!**



# Monitoring of Indicators: 2 Key Steps

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

## 1. Desk Study:

- Percentage of health staff trained?
- Is hazardous waste separated?
- Where is haz waste disposed or incinerated?
- Are inspections of waste disposal locations carried out?



## 2. Field Verification:

Waste is segregated at point A, but not incinerated at B.



# Goals and Objectives



**Increase Nbr. of Mitigation Indicators**



**Improve Quality of Mitigation Indicators**



**Mainstream Environmental Issues into “Program” Indicators**

# Definitions of Types of M&E Indicators

- # of wells rehabilitated for human use only
- # of people trained in sustainable agriculture practices

## 2. Effect (Outcome) –Mid-term Behavior Change

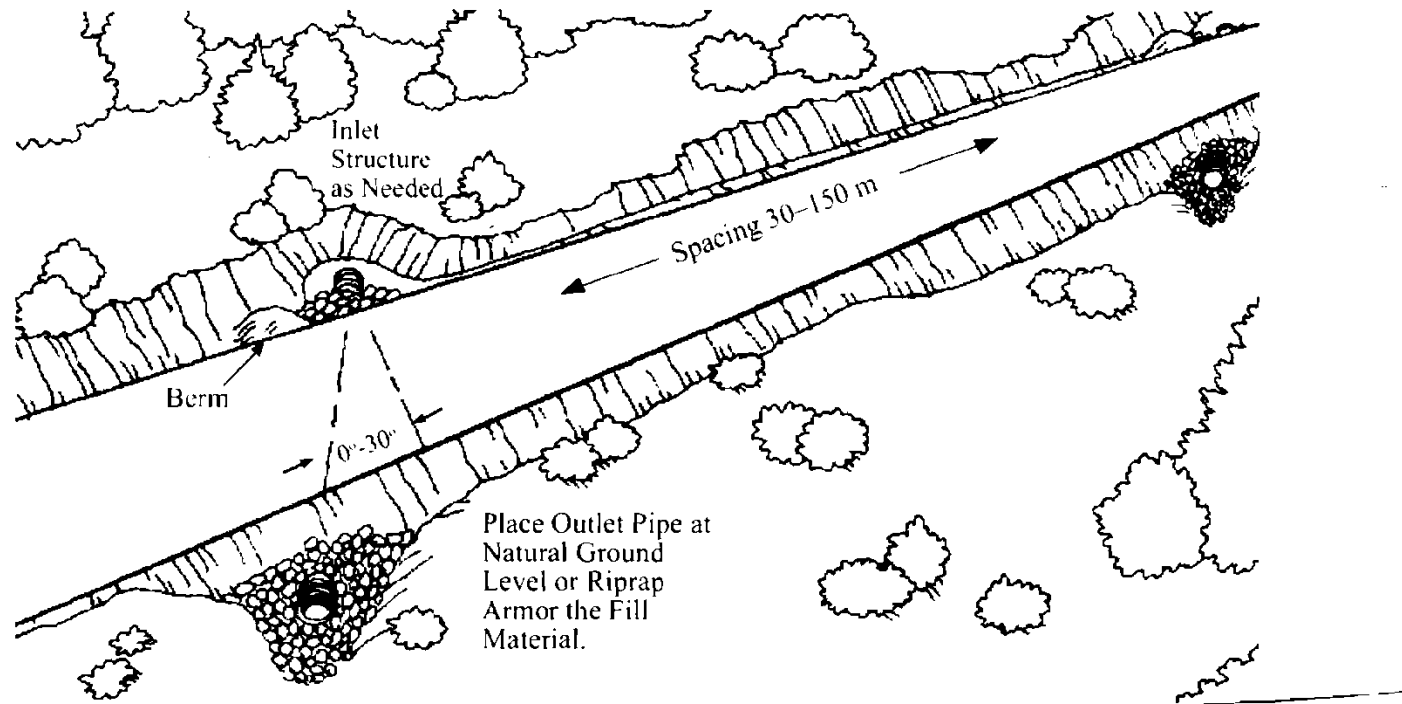
- # people using improved water source
- # farmers using sustainable practices

## 3. Impact – Long-term Results (Multiple)

- % decrease in water-born disease
- # increase in sustainable agricultural productivity
- Reduced Household Food Insecurity (Final)

# Distinguishing “Program” Indicators from “Environmental Mitigation” Indicators...

**Figure 7.4** Culvert cross-drains.



**Program Indicator: # of km of road rehabilitated**  
**Mitigation Indicator: # drainage devices installed**

# Road Rehabilitation: Program Indicators

- **Program Process Indicators:**

- # km of road rehabilitated (TYPICAL)
- # km of road under improved practices \*specify practices (BETTER)



- **Program Effect Indicators:**

- % Reduction in traveling time
- % of road with year-round access at end of program





# Road Rehabilitation: **Environmental Mitigation Indicators**

- **Mitigation Process Indicators:**

- # of people trained in road maintenance
- # of drainage ditches constructed
- # of vegetated erosion control on unstable slopes



- **Mitigation Effect Indicators:**

- Cubic meters of erosion per year
- Reduction in washout during rainy season



# Prioritization of Indicators



**Must I mitigate EVERY impact?**

**Yes, Required by 22 CFR 216.**

**Must I monitor EVERY mitigation measure?**

**No, Budget for most critical, highly variable.**

- ✓ You can mitigate for arsenic in potable water by analysis of test wells. No need to monitor once constructed because will not vary as is determined by geological deposits.
- ✓ You need to monitor for bacterial contamination because is highly variable and dependent on O&M.

# Life Cycle Analysis (LCA)



**“Crucial to Critically Look Forward”**

An interdisciplinary, objective process to evaluate the **environmental risks** associated with a product, process, or **activity** by identifying **energy** and **resources** used, **wastes** released, **damage** caused to the environment over the **life** of the activity

**“Sustainability”**

**“Cradle-to-Grave”**

# Strengthening Indicators, Example: Potable Water

**We are building a well and we are concerned water contamination may make people sick. Thus, in addition to digging the well, we cap and cover the well, and we build a fence to keep animals out.**

- **What are some **process** indicators we could use to monitor our mitigation measures?**
- **What are some **effect** indicators we could use to monitor our mitigation measures?**

# Process and Effect Indicators for Water

## Typical Process Indicator

- # of wells rehabilitated

## Improved Process Indicator

- # of wells rehabilitated **using established Standards \***

**Add  
Design Criteria**

**\* Define the Standards**

## Effect Indicator:

- % of water sources with no fecal coliforms per 100 ml
- % of water points established that are clean after 6 months



# Agroforestry & Tree Planting

**What is the purpose?** Diversify Income? Eroded Land rehabilitation? Combat Desertification? Fuelwood provision?

## ❖ **Typical Indicators:**

- **# of tree nurseries established\* (Process)**
- **# of trees planted\* (Process)**

## ❖ **Indicators:**

- ☐ **Hectares under forest management\* (Effect)**
- ☐ **# fuelwood lots established (Effect)**

**\* Define the Standards**

# ***Typical West Africa Gum Arabic Implementation***



***Acacia senegal  
Planted near  
Demilunes***



***Project Ends-  
Acacia  
Disappears***



***❖ USAID Projects Plant ~10,000s of Gum Arabic***

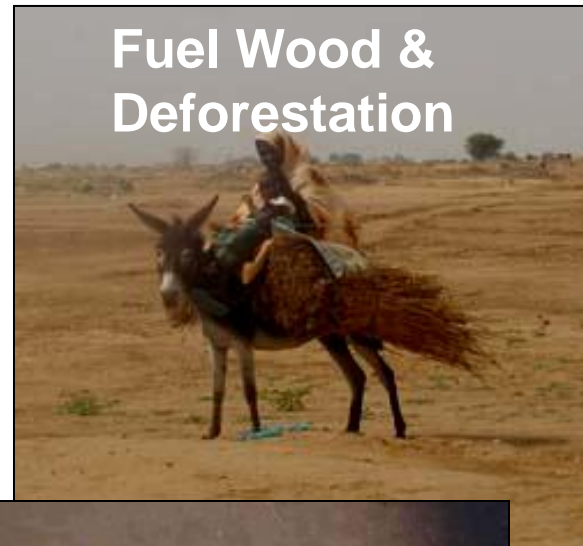
# Deforestation and Fuelwood Production



**How much firewood does a typical Food Aid program use?**

**~1 kg firewood/person/day\* x  
70,000 beneficiaries x 365 d  
~30,000 MT of firewood /yr**

**Improved Cook Stoves**



# Energy Sources for Commodity Preparation

- ❖ **Local availability of fuelwood is important when choosing type of food aid**

  - ❖ **some pulses have a longer cooking time**

- ❖ **Improved cooking practices (small wood pieces, insulating hay boxes, pre-soaking) & cookstoves (Greenfire)**

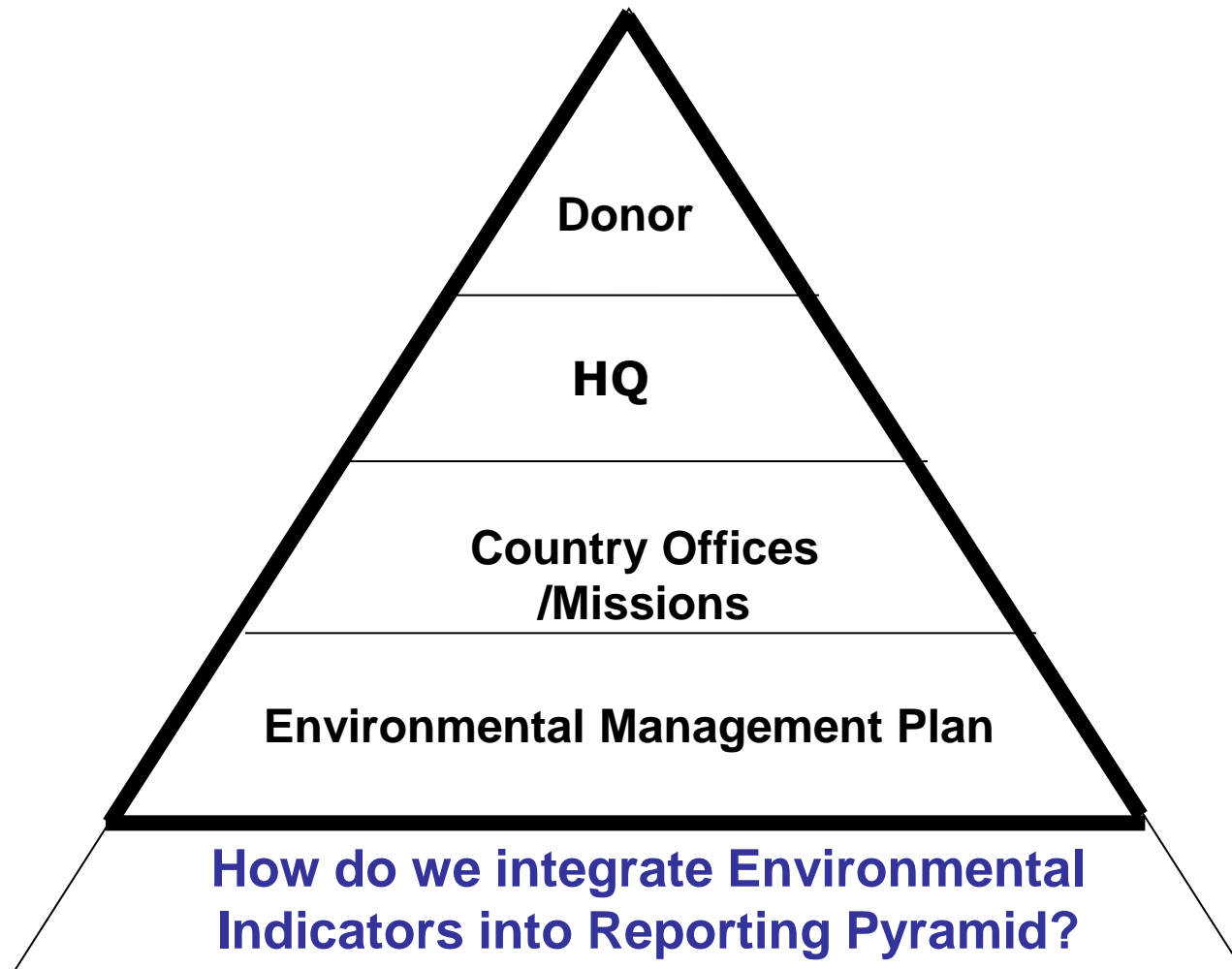
- ❖ **Indicators:**

  - ☐ **Amount of fuel or time saved by improved practices**

  - ☐ **NOT # of cookstoves distributed**

    - **This is a very poor process indicator and should never be used as stand alone.**

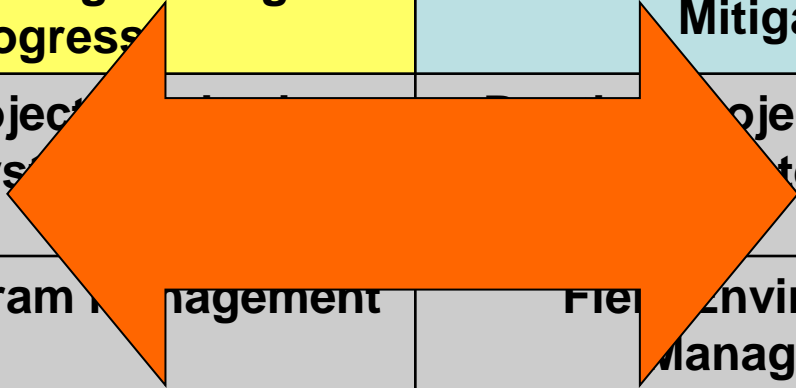
# Reporting on Indicators





# Where should these Environmentally-related indicators be monitored and reported?

	<b>Program Management (IPTT)</b>	<b>EMP/ESR*</b>
<b>Intent</b>	Annual Reporting of Program Progress	Annual Reporting of Specific Environmental Impact Mitigation
<b>Source of Data</b>	Routine Project Monitoring Systems	Project Monitoring Systems
<b>Primary Use by CS</b>	Overall Program Management	Field Environmental Management
<b>Specificity to Field Programs</b>	High-focused on program-wide impacts	High –focused on environmental impacts



**Organizational practice determines best placement of Environmental M&E indicators**

\* Title II

# Summing Up



**Include Budget for mitigation measures in program design\***



**Prioritize most critical & highly variable environmental indicators for regular mitigation monitoring**



**Mainstream Environmental Issues into “Program” Indicators**

**\* Required for all new FY10+ MYAPs**



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# **SOUTH TO SOUTH Haiti to Sierra Leone**



## **ENVIRONMENTAL INDICATOR BRAINSTORMING SESSION**

**Improving upon “Haiti 1<sup>st</sup> Draft” of  
Indicators by Development  
Professionals in Sierra Leone**



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# GROUP BRAINSTORMING SESSION

## **Key Question:**

**How can we improve indicators for environmental mitigation measures?**

## **Key Product:**

**A set of Environmental Mitigation Indicators for USAID and partners.**



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# Instructions

- 1. Participants work with their Teams on improving “Haiti 1<sup>st</sup> Draft” of **process** and **effect** Environmental Mitigation Indicators.**
- 2. Discuss how to include these indicators into programming and reporting.**
- 3. Report-out and discussion.**





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# ENVIRONMENTAL INDICATOR BRAINSTORMING SESSION

## How can we improve our indicators?

- The way we define our indicators helps us to define our indicators.
- Need to have clearly spelled out indicators, some of them seem ambiguous sometimes.
- # of farmers trained in Natural Resources Management - need a clear definition NRM for such an indicator
- How do we define “appropriate” techniques in our indicators?
- #3 and #5 – need to get rid of repeat, or seemingling repeat indicators
- #6 - # of trees planted – need to be specific as to what kind of trees



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# ENVIRONMENTAL INDICATOR BRAINSTORMING SESSION

## How can we improve our indicators?

- Need to add time components to our indicators
- #1 – number of hectares planted with fruit trees – this is not enough, need to have number of hectares planted under controlled management
- Number of land use plans developed
- Number of land use plans implemented
- By planting trees we are creating forest cover, but we need to define the utility of such forest cover – ie. In the case of flooding control, are the trees planted in the upper areas of the watershed?
- Indicators should be reorganized, some indicators could be captured and used for another one “down stream”



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# ENVIRONMENTAL INDICATOR BRAINSTORMING SESSION

## How can we improve our indicators?

- Our indicators need to reinforce accountability for our projects
- We can use proxy types of indicators – ie. Farmers opinions of how much relative erosion they have now compared to the past
- We are talking about output – when you are planting and maintaining, mitigating and monitoring, we cannot have one indicator to try to measure all of these things. We need to have separate indicators for such activities.
- Need to define whether we are defining maintenance or mitigation.
- The M&E people should refine these characteristics. Mixing the words “and” & “or” or other ambiguous words into indicators is not good. We need to get rid of that.



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# ENVIRONMENTAL INDICATOR BRAINSTORMING SESSION

## How can we improve our indicators?

- # of people using clean drinking water – water can be clean but not safe. The color of the water does not only determine how clean it is. We need to have uniform definitions of what clean water is.
- #2 should say percent increase in access to clean drinking water instead of just saying number of people with access.
- #4 should say number of protected water collection structures built – need to have this on a timeline as well.
- #11 # of wells built with local management structure training – should have indicator on # of local committees implementing such trainings
- # of hectares of cashew trees planted – this can serve as erosion control and provide food.



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# ENVIRONMENTAL INDICATOR BRAINSTORMING SESSION

## How can we improve our indicators?

- Number of linear meters of “wind break” trees planted – need to more specifically outline NRM measures in the indicators
- Need to spell out the types of NRM practices that we are implementing and their corresponding indicators
- #4 - number of farmers that have undergone training should be used instead





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## How can we improve our indicators?