

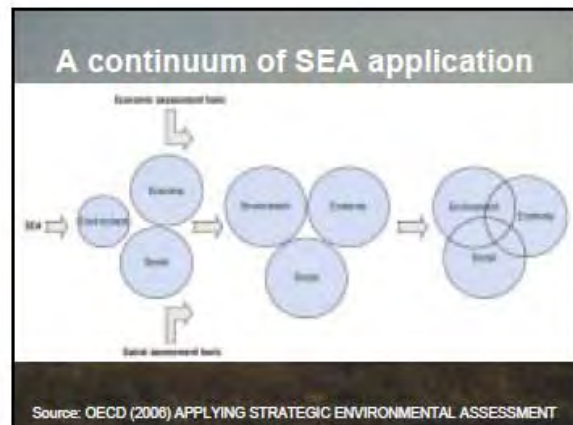
### 3. Environmental Impact Assessment

- ### Purpose of EIA
- Provide information for decision-making on the environmental consequences of proposed actions; and
  - Promote environmentally sound and sustainable development through the identification of appropriate enhancement and mitigation
- Source: EIA Training Resource Manual (UNEP, 2002)

- ### Aims and objectives of EIA
- EIA can
- modify and improve design
  - ensure efficient resource use
  - enhance social aspects
  - identify key impacts and measures for mitigating them
  - inform decision-making and condition-setting
  - avoid serious and irreversible damage to the environment
  - protect human health and safety.
- Source: EIA Training Resource Manual (UNEP, 2002)

- ### US National Environmental Policy Act (proclaimed in 1970)
- NEPA called for:
- consideration of environmental values in decision making
  - use of a systematic, interdisciplinary approach for this purpose
  - a detailed statement on;
    - the environmental impact of proposals for major federal actions
    - any adverse effects which cannot be avoided
    - alternatives to the proposed action
  - making the statement available to the public.
- This process became known as Environmental Impact Assessment

- ### Evolution of EIA
- early 1970s – initial development
  - 1970s to 1980s – increasing scope
  - mid to late 1980s – process strengthening and policy integration
  - mid 1990s – towards sustainability (SEA, Biodiversity)
- Source: EIA Training Resource Manual (UNEP, 2002)



## Integration within EIA

EIA process addresses the following environmental impacts:

- biophysical and resource use
- social and cultural
- health and safety
- economic and fiscal
- landscape and visual
- indigenous peoples rights and traditional areas

Source: EIA Training Resource Manual (UNEP, 2002)

## EIA – guiding principles

The EIA process should be:

- purposive – meeting its aims and objectives
- focused – concentrating on the effects that matter
- adaptive – responding to issues and realities
- participative – fully involving the public
- transparent – clear and easily understood
- rigorous – employing 'best practicable' methodology
- credible – carried out with objectivity and professionalism
- efficient – imposing least cost burden on proponents

Source: EIA Training Resource Manual (UNEP, 2002)

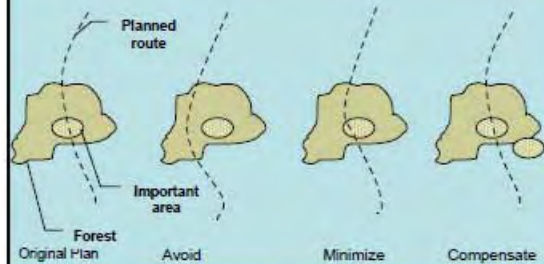
## Key operating principles of good EIA practice

EIA should:

- be applied to all proposals with significant impacts
- begin early in the project cycle
- address relevant environmental, social and health impacts
- identify and take account of public views
- result in a statement of impacts and mitigation measures
- facilitate informed decision making and condition setting

Source: EIA Training Resource Manual (UNEP, 2002)

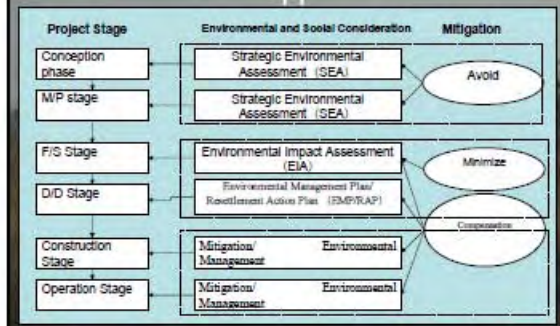
## Basic concept of EIA 1 Sequencing

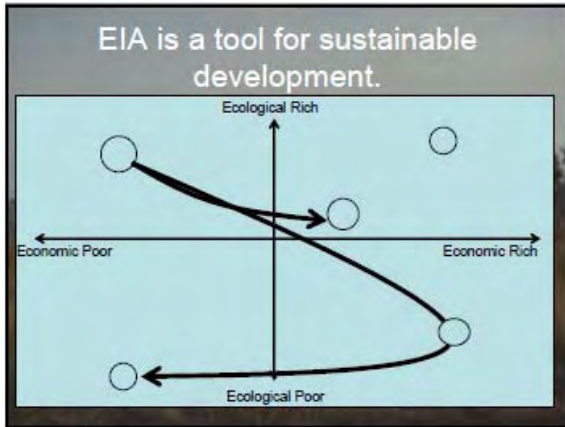


## Basic concept of EIA 2 No Net Loss

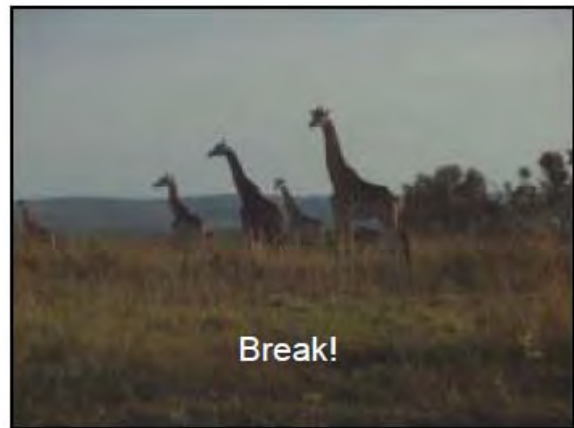
- "The same value of the environmentally loss caused by the project must be created by the project. We can keep development without losing natural environment."
- Mitigation Banking System
- Environmental Offset

## Basic concept of EIA 3 Tired Approach

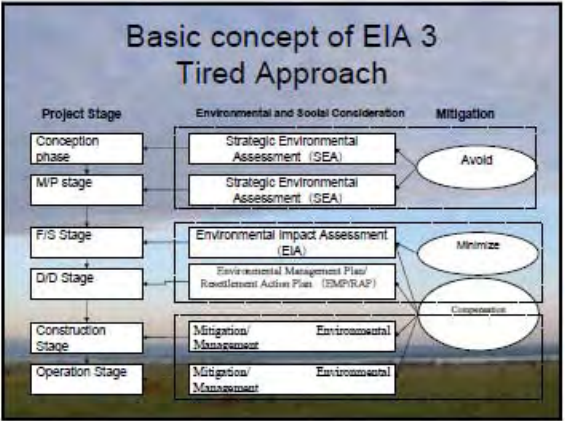




- ### Review topics
- Purpose of EIA
  - Aims and objectives of EIA
  - Evolution of EIA
  - EIA – guiding principles
  - Key operating principles of good EIA practice
  - Basic concept of EIA (Sequencing, No net loss, Tired approach)



# 4. Strategic Environmental Assessment



### What is SEA?

- systematic, transparent process
- instrument for decision-making
- addresses environmental effects of strategic proposals
- includes policy, plans and programme decisions
- undertaken when alternatives are still open
- applies EIA aims and principles
- flexible, diversified process

Source: EIA Training Resource Manual (UNEP, 2002)

### Why is SEA important?

- EIA of projects insufficient by itself
- effects of strategic decisions not assessed
- SEA rounds out coverage to this level
- gets at sources of environmental impacts
- responds to sustainable development agenda

Source: EIA Training Resource Manual (UNEP, 2002)

### Key aims and objectives of SEA are to:

- facilitate informed decision-making
- contribute to environmentally sound and sustainable development
- identify and address cumulative effects
- supplement and reinforce project-level EIA by;
  - clarification of scope and context
  - reducing the time and effort for review

Source: EIA Training Resource Manual (UNEP, 2002)

### Indicative list of areas subject to SEA

- sector-specific policy, plans and programmes
- spatial and land use plans
- regional development programmes
- natural resource management strategies
- legislative and regulatory bills
- investment and lending activities
- international aid and development assistant

Source: EIA Training Resource Manual (UNEP, 2002)

## Guiding principles for SEA process design and implementation

- *Fit-for-purpose* – customize to decision-making
- *Objectives-led* – identify environmental goals & priorities
- *Sustainability-driven* – ensure proposal promotes sustainable development
- *Comprehensive scope* – cover policies, plans, & programmes
- *Decision-relevant* – focus on issues that matter
- *Integrated* – include social, health effects
- *Transparent* – clear, easy to understand requirements
- *Participative* – provide for public information and involvement
- *Accountable* – implement fairly, impartially & professionally
- *Cost-effective* – meet objectives within time and budget limits

Source: EIA Training Resource Manual (UNEP, 2002)

## Some success factors in SEA practice

- Promote SEA as bonus not a burden
- Encourage creativity and innovation
- Tailor the approach to the needs of decision makers
- Provide start-up help
- Build a knowledge base from case experience
- Learn by doing when applying methods and procedures

Source: EIA Training Resource Manual (UNEP, 2002)

## Different types of SEA systems

- *EIA-based* – part of EIA law or separate procedure
- *Environmental appraisal* – comparable, less formalized process
- *Dual-track* – separate processes operated
- *Integrated policy and planning* – SEA part of policy and plan-making
- *Sustainable appraisal* – integrated assessment and review

Source: EIA Training Resource Manual (UNEP, 2002)

## Main forms of SEA

- *Policy SEA* – applies to highest level proposals
- *Sector plan and programme SEA* – applies to proposals for specific sector
- *Spatial plan and regional SEA* – applies to land use proposals for particular region

Source: EIA Training Resource Manual (UNEP, 2002)

## Policy SEA

- critical lever to influence development
- SEA difficult to apply at policy level
- often political and bureaucratic resistance
- policy-making itself not straightforward
- SEA needs to be adapted to process
- few countries make provision for policy SEA
- early adoption of non-statutory, minimum procedure
- policy SEA now legislated in some countries

Source: EIA Training Resource Manual (UNEP, 2002)

## Sector plan and programme SEA

- most developed form of SEA
- will be extended by European Directive
- sector EA applied to World Bank financed programmes
- carried out by borrowing countries
- use and scope of application increasing
- mainly applied to establish framework for EIA of sub-projects
- potential lies in evaluation of major alternatives
- other approaches also relevant to developing countries

Source: EIA Training Resource Manual (UNEP, 2002)

## Spatial plan and regional SEA

- long established form of SEA, e.g. in USA
- applies to land use plans for designated areas
- spatial planning is a systematic, transparent process
- easily integrated with SEA
- regional EA (REA) promoted by World Bank
- use limited compared to sector EA
- applies to group of sub-projects for a geographic area
- provides framework for analyzing cumulative effects
- other approaches also relevant to developing countries

Source: EIA Training Resource Manual (UNEP, 2002)

## Carrying out a strategic environmental impact assessment

- **screening** – whether and what level of review is needed?
- **scoping** – what are the key issues and alternatives?
- **identification & comparison of alternatives** – what are the implications & trade-offs?
- **inform & involve the public** – what are the views & concerns?
- **analyze and evaluate the impacts** – what are the main effects, how can they be mitigated?
- **document the findings** – what information is needed for decision-making?
- **review the quality of the information** – is it clear and sufficient for this purpose?
- **carry out follow up** – are agreed measures being implemented?

Source: EIA Training Resource Manual (UNEP, 2002)

## Assessment Approaches Complementary to Strategic Environmental Assessment

- Country environmental analysis: [ADB CEA tool kit by World Bank](#)
- Cumulative impact/effects assessment (CIA/CEA): [A practitioner's guide is available from the Canadian Environmental Assessment Agency \(CEAA 1999\)](#)
- Energy and Environment Review (EER): [the Energy Sector Management Assistance Programme \(ESMAP\)](#)
- Gender impact assessment: [A GUIDE TO GENDER IMPACT ASSESSMENT \(EU\)](#)
- Health impact assessment (HIA): [HEALTH IMPACT ASSESSMENT-A PRACTICAL GUIDE](#) (Univ. of New South Wales, Austria)
- Integrated Assessment: [ICAM - Integrated Climate Assessment Model](#) [IMAGE: Integrated Model to Assess the Greenhouse Effect](#)
- Peace and conflict impact assessment (PCIA): [PCIA](#)

Source: OECD (2006) APPLYING STRATEGIC ENVIRONMENTAL ASSESSMENT

## Assessment Approaches Complementary to SEA (continue)

- Poverty and social impact assessment (PSIA): [The PSIA User's Guide \(World Bank, 2002\)](#)
- Poverty impact assessment: [Handbook for Integrating Poverty Impact Assessment in the Economic Analysis of Projects \(ECR, 2001\)](#)
- Social impact assessment (SIA): [International Association for Impact Assessment \(IAIA\) - SIA page](#)
- Sustainability appraisal/assessment: [Towards a more efficient and effective use of Strategic Environmental Assessment and Sustainability Appraisal in spatial planning \(Community and Local Government, UK, 2010\)](#)
- Trade-related assessments: [Handbook for Conducting Environmental Assessments of Trade Negotiations](#)
- Integrated assessment of trade-related policies: [Community and Local Government](#)

Source: OECD (2006) APPLYING STRATEGIC ENVIRONMENTAL ASSESSMENT

## SEA Tools for predicting environmental and socio-economic effects

- Carrying capacity analysis (CCA): [Manual on Carrying Capacity based Regional Development Planning](#)
- Network analysis
- Ecological footprint analysis (Wackemagel, M. (1994), [Ecological Footprint and Atmospheric Carrying Capacity: A Tool for Planning Toward Sustainability](#))
- Social and economic analysis/surveys: [PSIA User's Guide](#) (World Bank)
- Expert judgment of direct and indirect impacts: [Delphi method](#)
- Geographical information system (GIS)
- Land use partitioning analysis: [Land Unit Partitioning](#)
- Mapping of transmission channels: [Understanding transmission channels](#)
- Modelling (also called forecasting)
- Overlay maps
- Participatory techniques for assessment: [Participatory SEA](#)
- Quality of life assessment (QoLA)

Source: OECD (2006) APPLYING STRATEGIC ENVIRONMENTAL ASSESSMENT

## SEA Tools for analyzing and comparing options

- Compatibility appraisal
- Identifying priorities and viable alternatives
  - Cost-benefit analysis (CBA)
  - Scenario analysis/sensitivity analysis ([Polestar, scenario planning](#))
  - Multi-criteria analysis (MCA)
- [Opinion surveys to identify priorities](#)
- Risk analysis or assessment: [Guidelines for Environmental Risk Assessment and Management](#)
- Vulnerability analysis

Source: OECD (2006) APPLYING STRATEGIC ENVIRONMENTAL ASSESSMENT

### SEA tools 1: MCDA

	A	B	C
Taste	5	4	3
Price	2	3	5
Atmosphere	4	2	1
Distance	3	5	4

	Weight	A	B	C
Taste	20	100	80	60
Price	50	100	150	250
Atmosphere	5	20	10	5
Distance	25	75	125	100
Total	100	295	365	415

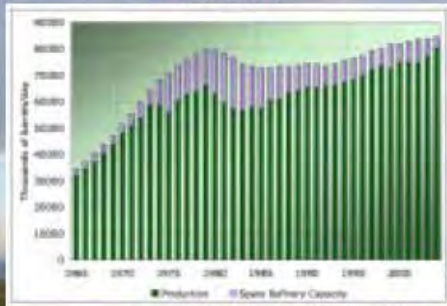
  

	Weight	A	B	C
Taste	40	200	160	120
Price	10	20	30	50
Atmosphere	40	160	80	40
Distance	10	30	50	40
Total	100	410	320	250

### SEA tools 2: Scenario analysis

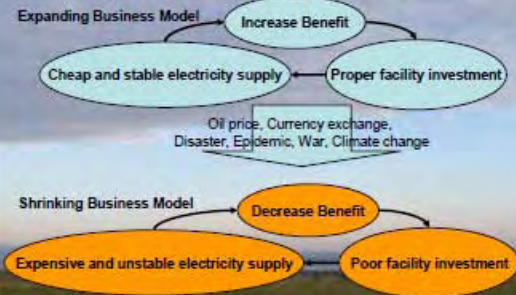
1. SWOT
2. Preparation of Business model
3. Scenario preparation
4. Wind tunnel experiment

Refinery production and spare capacity 1965-2004.



Source: BP Statistical Review of World Energy 2005.

### SEA tools 2: Scenario analysis Preparation of Business model



### SEA tools 2: Scenario analysis Wind tunnel experiment

	Accident scenario	Economic recession scenario	Abnormal weather
Option 1	Sustainable	Unsustainable	Unsustainable
Option 2	Unsustainable	Sustainable	Unsustainable
Option 3	Sustainable	Unsustainable	Sustainable

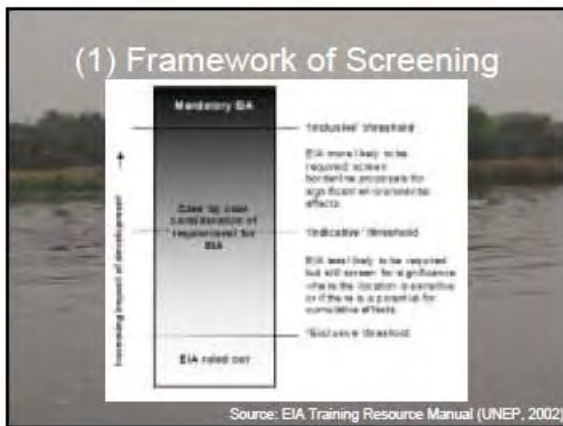
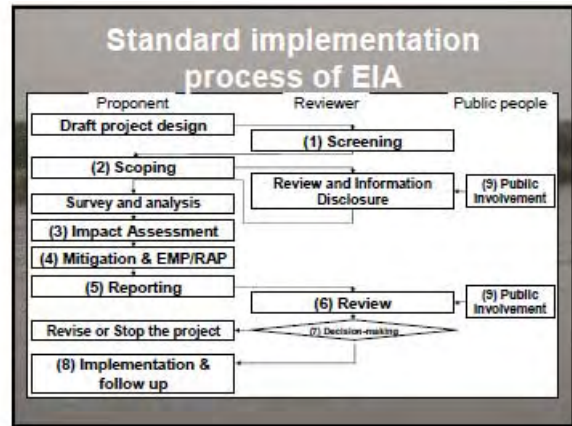
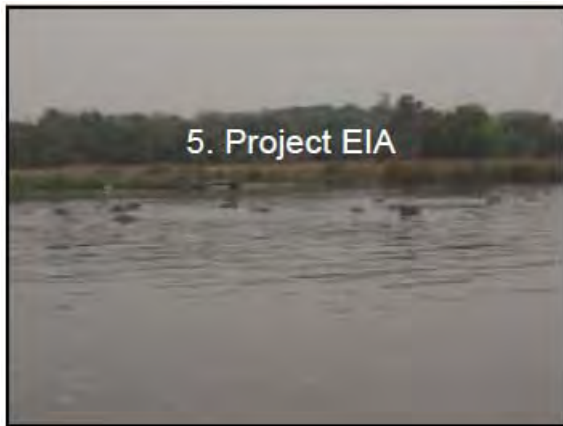
Questions?

### Exercise 3

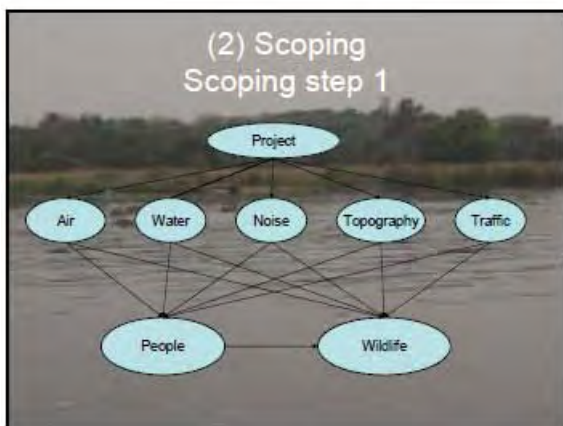
- What is the possible risk for MEMD?
  - List up as many as possible.
- Which policy, plan, programme in MEMD can be applicable SEA?
  - List up as many as possible.

Break





- ### (2) Scoping
- Key objective of scoping
- Inform and identify stakeholders
  - Find out their concerns
  - Consider feasible and practical alternatives
  - Identify the main issues and impacts to be studied
  - Define the boundaries of the EIA study
  - Agree on means of public involvement
  - Establish the Terms of Reference
- Source: EIA Training Resource Manual (UNEP, 2002)



### (2) Scoping

#### Scoping Step 2

	Area	Direct/indirect	Period	Probability	Reversible/irreversible	Intensity	Mitigable/n/mitigable	Concern	Prediction	Mitigation
Health impact of air pollution										
Impact on road-kill										
Impact on water use										

(2) Scoping  
Scoping support tools



The slide features a background image of a river with a forested bank. The text is centered at the top, and the logo is centered below it.

(3) Impact analysis involves:

- Identifying the impacts more specifically
- Predicting the characteristics of the main impacts
- Evaluating the significance of the residual impact

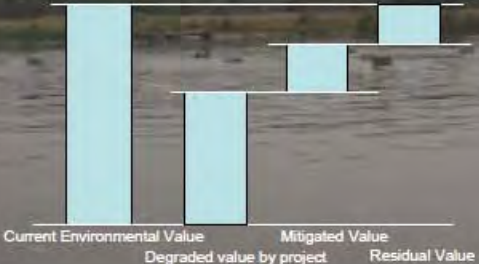
Source: EIA Training Resource Manual (UNEP, 2002)

(4) Mitigation  
The purpose of mitigation is to:

- Find better ways of doing things
- Enhance environmental and social benefits
- Avoid, minimize or remedy adverse impacts
- Ensure that residual impacts are within acceptable levels.

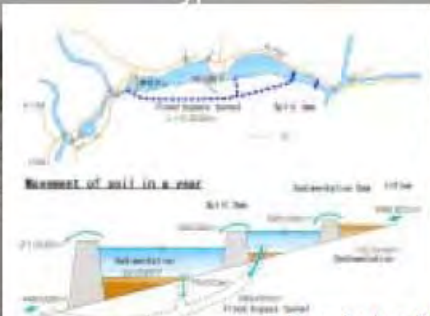
Source: EIA Training Resource Manual (UNEP, 2002)

(4) Mitigation  
What is the residual impact?



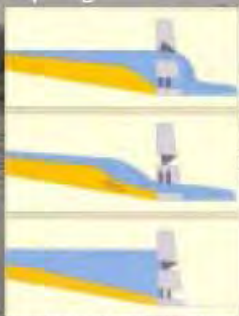
The bar chart illustrates the relationship between environmental values. The first bar represents 'Current Environmental Value'. The second bar, which is shorter, represents 'Degraded value by project'. The difference between these two bars is shaded in light blue. The third bar, which is shorter than the second, represents 'Mitigated Value'. The difference between the second and third bars is also shaded in light blue. The final bar, which is the same height as the second bar, represents 'Residual Value'.

(4) Mitigation  
Flood bypass tunnel



The diagram shows a cross-section of a dam and a bypass tunnel. It labels the 'Dam', 'Flood bypass tunnel', and 'Residual flow'. It also includes a 'Moment of soil in a year' graph showing the distribution of soil erosion over time. The source is cited as 'Source: brochure of Miwa Dam'.

(4) Mitigation  
Spilling out facilities



The diagram shows three cross-sections of a dam spillway. The top section shows the dam with water behind it. The middle section shows the dam with water spilling over the spillway. The bottom section shows the dam with water spilling over the spillway and flowing into a downstream channel. The source is cited as 'Dam Binran 2008 (http://www.soc.nil.ac.jp/jd/d/DamBinran/binran/TPage/TPPage1a.htm)'.

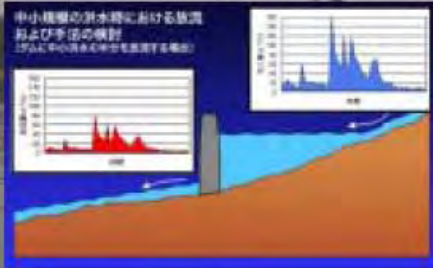
(4) Mitigation  
Sedimentation dam



(4) Mitigation  
Environmental Flow

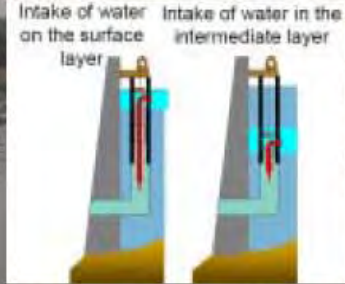
- Keep aquatic biodiversity
- Flow control depend on inflow
- References: Environmental Flows in Water Resources Policies, Plans, and Projects (World Bank, 2009) ([http://siteresources.worldbank.org/INTWAT/Resources/Env\\_Flows\\_Water\\_v1.pdf](http://siteresources.worldbank.org/INTWAT/Resources/Env_Flows_Water_v1.pdf))

(4) Mitigation  
Flow control depend on inflow



Source: (<http://www.yodogawa.kkr.mlit.go.jp/activity/manage/operation/index.html>)

(4) Mitigation  
Selective Water Intake



Source: ([http://www.mlit.go.jp/river/basic\\_info/eng/ish/pdf/RiverAdministrationInJapan\(e\).pdf](http://www.mlit.go.jp/river/basic_info/eng/ish/pdf/RiverAdministrationInJapan(e).pdf))

(4) Mitigation  
Wildlife overcrossing at Keechelus Dam (Oregon, USA)



Federal Highway Administration (<http://www.fhwa.dot.gov/index.html>)

(4) Mitigation  
Fish pass



Source: ([http://www.mlit.go.jp/river/basic\\_info/eng/ish/pdf/RiverAdministrationInJapan\(e\).pdf](http://www.mlit.go.jp/river/basic_info/eng/ish/pdf/RiverAdministrationInJapan(e).pdf))

#### (4) Mitigation Biotope on the dumping site



Miyagase dam, Kanagawa (<http://www.ktr.mlit.go.jp/sagami/dam/base/index.htm>)

#### (5) Reporting

A successful EIA report will be:

- Actionable – by the proponent
- Decision-relevant – to the responsible authority
- User-friendly – for the public

Source: EIA Training Resource Manual (UNEP, 2002)

#### (5) Reporting

EIA report – description of the proposal includes:

- Main elements, phases and alternatives
- Requirements for materials, water, energy, equipment
- Operational processes and products
- Summary of technical, economic and environmental features
- Comparison of options (e.g. size, location etc.)

Source: EIA Training Resource Manual (UNEP, 2002)

#### (5) Reporting

EIA Report – evaluating impacts for each alternative

- Prediction of each major impact
- Proposed mitigation measure
- Significance of the residual impact
- limitation, uncertainty and gaps in knowledge
- some mitigating measures not considered

Source: EIA Training Resource Manual (UNEP, 2002)

#### (6) Review

Purpose and objectives of review

The purpose of the review process is to establish if the information in an EIA report is sufficient for decision-making.

Key objectives are to:

- Review the quality of the EIA report
- Take account of public comment
- Determine if the information is sufficient
- Identify any deficiencies to be corrected

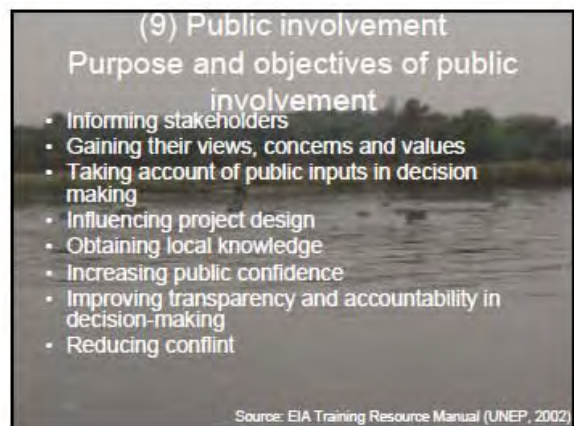
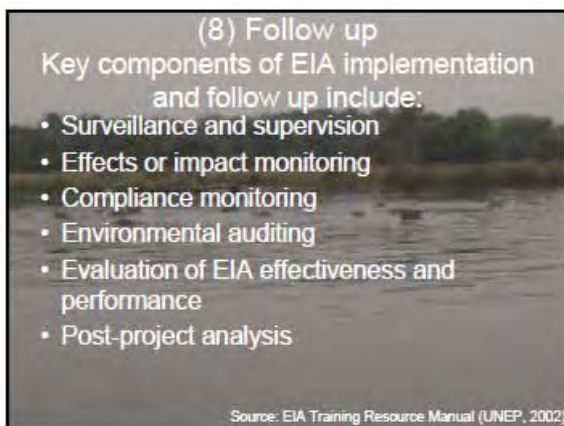
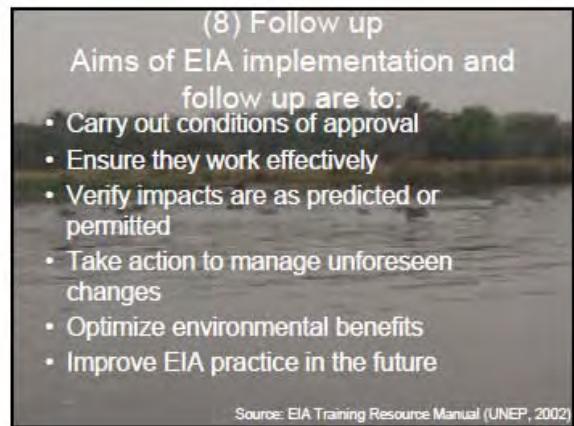
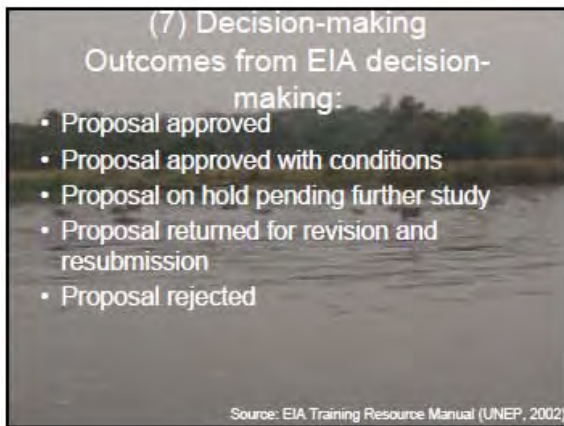
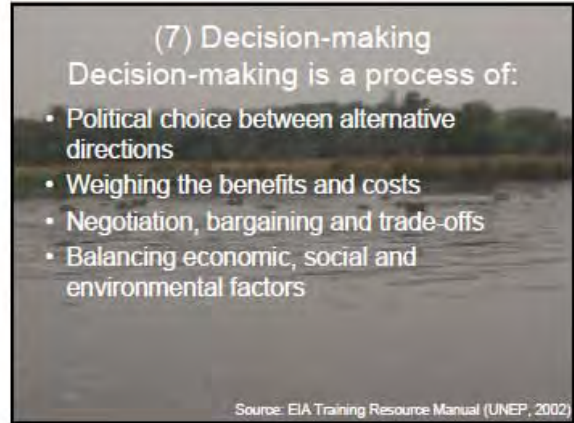
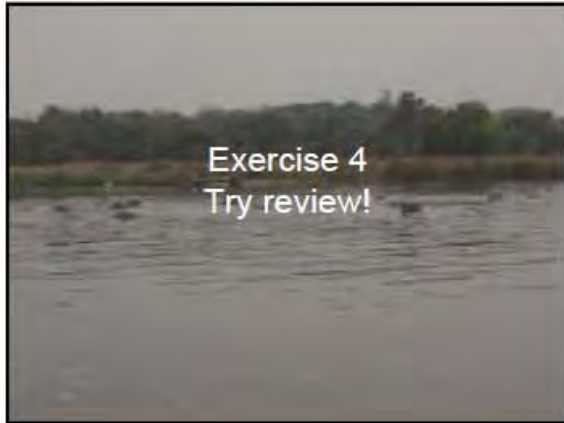
Source: EIA Training Resource Manual (UNEP, 2002)

#### (6) Review

EIA review – aspects for consideration

- Compliance with terms of reference
- Information is correct and technically sound
- Account taken of public comments
- Complete and satisfactory statement of key findings
- Information is clear and understandable
- Information is sufficient for decision-making

Source: EIA Training Resource Manual (UNEP, 2002)



## (9) Public involvement Levels of public involvement

- Information
  - (one way flow from proponent to public)
- Consultation
  - (two way exchange of information)
- Participation
  - (interaction with public)
- Negotiation
  - (face to face discussion)

Source: EIA Training Resource Manual (UNEP, 2002)

## (9) Public involvement The Expo Deliberative Meetings



Feb 1999

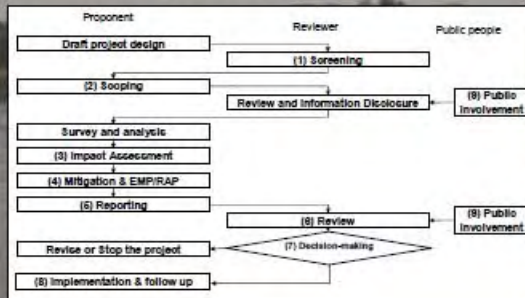


June 1999



Aug 2000

## Standard implementation process of EIA



Source: EIA Training Resource Manual (UNEP, 2002)

## Benefits of EIA include:

- environmentally sound and sustainable design
- better compliance with standards
- saving in capital and operating costs
- reduced time and costs for approval
- increased project acceptance
- better protection of the environment and human health

Source: EIA Training Resource Manual (UNEP, 2002)

## Delays are caused during EIA when;

- The EIA is commenced too late in the project cycle
- The terms of reference are poorly drafted
- The EIA is not managed to a schedule
- The EIA report is inadequate and needs to be upgraded
- There is a lack of technical data

Source: EIA Training Resource Manual (UNEP, 2002)

Questions?



## **Appendix K**

### **Stake Holder Meeting**



## **LIST OF CONTENTS**

Appendix K-1	Presentation on First Stake Holder Meeting
Appendix K-2	Presentation on Second Stake Holder Meeting
Appendix K-3	Presentation on Third Stake Holder Meeting

## **Appendix K-1**

### **Presentation on First Stake Holder Meeting**

**MEMD**

**1st Stakeholder Meeting For The Master Plan Study of Hydropower Development in the Republic of UGANDA**

11 December 2008  
State House

**Agenda**

Time	Program	Person / Organization in charge
9:00-9:30	Registration	HPDU
9:30-10:00	Preliminaries - Introduction of Participants and Guest - Opening Remarks	Director of MEMD Chief Representative of JICA
10:00-11:00	Presentation - Overview of the Project - Strategic Environmental Assessments - Explanation on Stage 1 and Stage 2	Mr. Otim Moses, HPDU
11:00-11:30	Break	
11:30-13:00	Question and Answer Discussion on Evaluation Framework (Stage 1 and Stage 2)	
13:00-13:30	Closing Remarks	MEMD NEMA

**Preliminaries**

9:30-10:00

- Introduction of Participants and Guests
- Opening Remarks

Director of MEMD  
Chief Representative of JICA

- Introduction of Participants**
- Relevant Ministries (MEMD, MWE, MFPEd, MLG, MTTI, Min. Gender, Labors & Social, Fisheries and Agriculture of MAAIF)
  - Universities (Makerere Univ. Kyambogo Univ.)
  - NGOs (WWF, IUCN, ACCORD, NBD, WGS, UWS, National Association Professional Environmentalist (NAPE), Nature Uganda)
  - Coordinator of Natural Resource of Districts (Jinja, Kamuli, Mukono, Kayunga, Masindi, Oyam, Amuru, Bulisa, Apac, Nakasongola)
  - Cultural leaders (Busoga, Buganda, Bunyoro, Acholi, Lango)
  - Media (Monitor, New Vision, East African)
  - Institution (NEMA, UWA, NEI (Nile Basin Initiative), UEGCL, UETCL, REA, ERA, National Forest Authority, National Planning Authority (NPA), NaFFIR)
  - Consultants (Isimba, Karuma, Bujagali)
  - Donor (SIDA, WB, AfDB, Germany, Norway)
  - Private Sector (Association of Uganda Tour Operators, Oil companies (Tullow, Heritage))

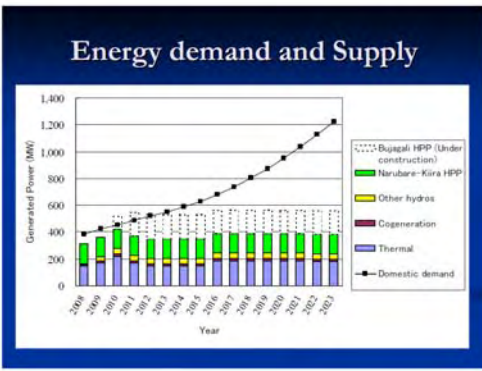
**Presentation**

10:00-11:00

- Overview of the Project
- Explanation of Strategic Environmental Assessments

**MEMD**

Over View of the project



- Outline of the study**
- Stage 1: Analysis of alternative power sources
  - Stage 2: Prioritization of potential hydropower sites in Uganda
  - Stage 3: Site survey and preliminary design on one selected prospective site
  - Stage 4: Preparation of the Hydropower Development Master Plan in UGANDA

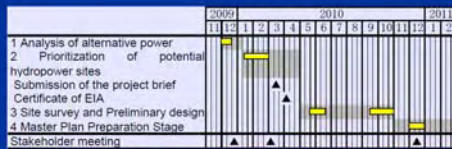
### Introduction of the study team (1/2)

No.	Name	Job Title	Organisation
1	Henry Bidassa – Igaga/ Cecilia Meny	Ass. Commissioner	MEMD
2	Jimmy C. Omona	Hydro-mechanical Engineer	Hydro Power Unit, UBOCL
3	Dan Walakira Mayanja	Technical Manager	UBOCL
4	Moses Kaizzi	Civil Engineer	UBOCL
5	Otim Moses	Environmental Specialist	Hydro Power Unit, UBOCL
6	Jackson Twimujuni	Ass. Commissioner	MWE
7	Godfrey Kitayimbwa	Electrical Specialist	Hydro Power Unit, UBOCL
8	Gerald Muganga	Manager Project Planning	
9	Ziria Tibalwa	Principle Engineer, Project Planning	UETCL
10	Emmanuel Ajuts	Economic/Financial Planning	MEMD
11	Past Omute	Surveyor	Hydro Power Unit, UBOCL
12	Zachary Baguma	Assistant Commissioner	MEMD (GSMD-Entebbe)
13	Jean Mutibwa	Senior Energy Officer	MEMD
14	Fred Sajabi	Senior Energy Officer	MEMD
15			MPPED
16			NEMA
17			UWA

### Introduction of the Study team (2/2)

Kazumoto Onodera	Team Leader /Power Development Planning
Masayuki Seino	Hydropower Planning /Hydro Civil Engineering A-
Tatsya Miyazato	Hydropower Design /Hydro Civil Engineering A-2
Tetsuaki Mori	Hydropower Construction Planning and Cost Estimation /Hydro Civil Engineering B
Yasushi Momose	Geography /Geology
Sohei Uematsu	Hydrology
Eiji Tsuchiya	Transmission Planning /Electromechanical Equipment
Yoshiaki Miyagawa	Power Demand Forecast /Power System and Interchange Planning
Tetsuro Tanaka	Economics /Finance /Investment Planning
Akiko Urago	Natural Environment and GIS
Riai Yamashita	Social Environment
Takeshi Washizawa	Coordination

### Schedule



### Output of the study

- Preliminary design of one selected prospective site
- Hydropower Development Master Plan in UGANDA
- TOR/EIA

### MEMD

Explanation of Strategic Environmental Assessment

### What is SEA and EIA?

SEA: Strategic Environmental Assessment

- The systematic and comprehensive process for evaluating the environmental consequences of proposed **policy, plan or programme** initiatives and its **alternatives**, in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision making on par with economic and social considerations
- **Purpose of SEA**
  - Assuring environmental sustainability of plans and programmes
  - Early consideration of the environmental sphere, proactive intervention

### EIA: Environmental Impact Assessment

The National Environment Act, CAP 153:

- "A systematic examination conducted to determine whether or not a project will have adverse impact on the environment"

### Basis for SEA

- The Constitution of Uganda (1995, article 39:
  - Every Ugandan has a right to a clean and healthy environment)
- The National Environment Policy, 1994, Energy Policy, Renewable energy policy and various sectoral policies
- National Environment Act CAP 153
- Sectoral Policies, laws, Regulations and guidelines all geared towards sustainable development
- Guidelines on SEA, EIA by development partners e.g World Bank, JICA, AfDB

### Basis of SEA cotnd

#### MEMD MANDATE

"To establish, promote the development, strategically manage and safeguard the rational and sustainable exploitation and utilization of energy and mineral resources for social and economic development".

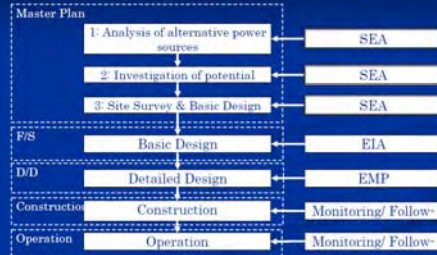
#### Energy Policy main Goal:

"To meet the energy needs of Uganda's population for social and economic development in an environmentally sustainable manner".

#### Government's Policy Vision for Renewable Energy is:

To make modern renewable energy a substantial part of the national energy consumption.

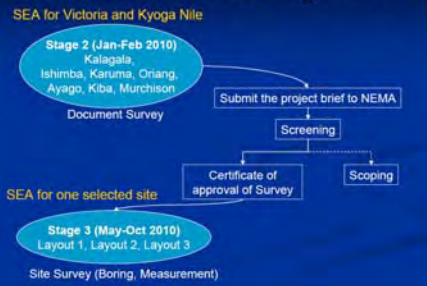
### Outline of Environmental Assessments



### Study Stage and alternatives



### EIA Procedures between Stage 2 and 3



### Environmental Guidelines for each stage

Stage	Type	NEMA	JICA
Stage 1	SEA	National Environment Act CAP 153 NEMA (2006) "Guideline for Strategic Environmental Assessment", Uganda	The JICA Guideline on Environmental and Social Considerations (2004)
Stage 2	SEA	National Environment Act CAP 153 NEMA (2006) "Guideline for Strategic Environmental Assessment", Uganda	The JICA Guideline on Environmental and Social Considerations (2004)
Stage 3	SEA (EIA)	NEMA (2004) "Environmental Impact Assessment Guideline for the Energy Sector", NEMA, Uganda	The JICA Guideline on Environmental and Social Considerations (2004)

### 4.5 TOR/SEA of Stage 1

#### Target

- Electricity supply plan for the system power demand plan until 2023

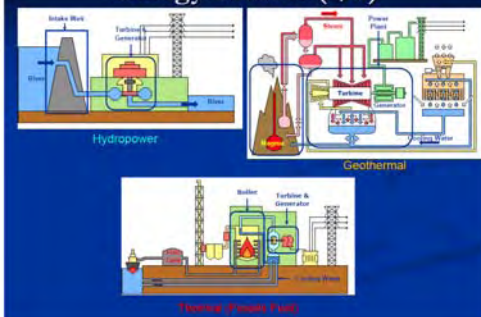
#### Target area

- Uganda

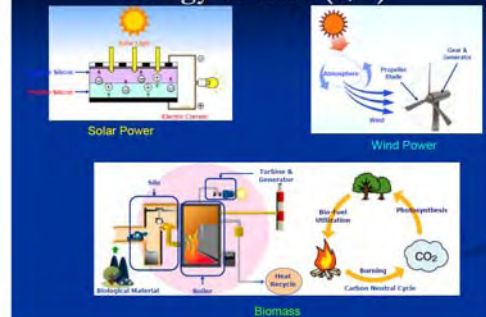
#### Kinds of power source

- Hydropower, geothermal, oil thermal, gas turbine, wind power, biomass, solar, and import energy, nuclear, municipal waste

### Energy Sources (1/2)



### Energy Sources (2/2)



#### 4.5 Evaluation Items of Stage 1

- |  |  |
|--|--|
| <p><b>Economic and technical</b></p> <ul style="list-style-type: none"> <li>■ Cost             <ul style="list-style-type: none"> <li>■ Development cost</li> <li>■ Operation &amp; Maintenance cost</li> <li>■ Unit cost of power generation</li> </ul> </li> <li>■ Power Potential             <ul style="list-style-type: none"> <li>■ Existing potential</li> <li>■ Feasible potential at present</li> </ul> </li> <li>■ Construction             <ul style="list-style-type: none"> <li>■ Survey maturity</li> <li>■ Lead time for construction</li> </ul> </li> <li>■ Operation             <ul style="list-style-type: none"> <li>■ Energy stability</li> </ul> </li> </ul> | <p><b>Environmental</b></p> <ul style="list-style-type: none"> <li>■ Air pollution</li> <li>■ Water pollution</li> <li>■ Consumption of natural resource</li> <li>■ CO2 emission</li> <li>■ Waste Management</li> <li>■ Water right/ water resource</li> <li>■ Impact on natural ecology</li> </ul> <p><b>Social</b></p> <ul style="list-style-type: none"> <li>■ Impact on Agriculture</li> </ul> |
|--|--|

#### TOR/SEA of Stage 2 (Long List)

- Target
  - Hydropower development plan until 2023
- Review area
  - Victoria and Kyoga Nile
- Evaluation potential points
  - Kalagala, Ishimba, Karuma, Oriang, Ayago, Kiba, Murchison
- Way of survey
  - Data collection and Literature Review



#### Evaluation Items of Stage 2(Long List)

- |   |   |
|---|---|
| <p><b>Economic and technical</b></p> <ul style="list-style-type: none"> <li>■ Cost             <ul style="list-style-type: none"> <li>■ Construction Cost</li> <li>■ O &amp; M Cost</li> </ul> </li> <li>■ Effectiveness             <ul style="list-style-type: none"> <li>■ Maximum Power</li> <li>■ Construction time</li> <li>■ Head (m)</li> <li>■ Distance to load center or existing grid</li> </ul> </li> <li>■ Development progress             <ul style="list-style-type: none"> <li>■ Time before commencement</li> <li>■ Financial Negotiation and close</li> <li>■ Commercial Operation Date</li> </ul> </li> </ul> | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>■ Length of water recession</li> <li>■ Rate of recession</li> <li>■ Affected protected area</li> <li>■ Wetlands affected</li> <li>■ Endangered species</li> </ul> <p><b>Social</b></p> <ul style="list-style-type: none"> <li>■ Land acquisition</li> <li>■ Flooding area</li> <li>■ Number of resettlement</li> <li>■ Ethnic minority and indigenous people</li> <li>■ Fish breeding and/or fishing</li> <li>■ Agriculture</li> <li>■ Cultural property</li> <li>■ Tourism</li> </ul> |
|---|---|

#### 4.6.2 TOR/SEA of Stage 2 (Short List)

- Target
  - Selection of a survey site
- Survey area
  - Nile river basin
- Evaluation sites
  - 3 (Not decided exact names)
- Way of survey
  - Document survey

#### 4.6.2 Evaluation Items of Stage 2 (Short List)

- |   |   |
|---|---|
| <p><b>Economic and technical</b></p> <ul style="list-style-type: none"> <li>■ Cost             <ul style="list-style-type: none"> <li>■ Construction Cost, O &amp; M Cost</li> </ul> </li> <li>■ Effectiveness             <ul style="list-style-type: none"> <li>■ Maximum power, Construction Time, Length of new access roads, Length of penstock, Head (m), Rock structure, Construction material (availability), Accessibility, Lead time, Volume of tunnel muck</li> </ul> </li> <li>■ Development Progress             <ul style="list-style-type: none"> <li>■ Time before commencement, Financial</li> </ul> </li> </ul> | <p><b>Environmental</b></p> <ul style="list-style-type: none"> <li>■ Length of water recession</li> <li>■ Rate of water recession</li> <li>■ Protected area</li> <li>■ Protected species</li> <li>■ Wetland ecosystem</li> <li>■ Degradation of underground water</li> </ul> <p><b>Social</b></p> <ul style="list-style-type: none"> <li>■ Land acquisition</li> <li>■ Existing infrastructure</li> <li>■ Flood area</li> <li>■ Loss of agricultural land</li> <li>■ Number of resettlement</li> <li>■ Landscape</li> <li>■ Ethnic minority and indigenous people</li> <li>■ Fishery</li> <li>■ Cultural property</li> <li>■ Archeology</li> <li>■ Tourism</li> </ul> |
|---|---|

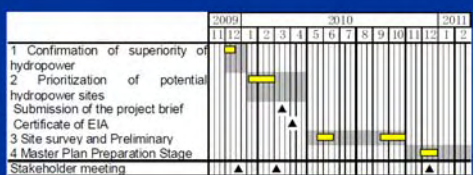
#### 5. Second Stake Holder Meeting (Feb. 2010)

- Result of the Evaluation
  - Evaluation matrix of Stage 1
  - Evaluation matrix of Stage 2 (Long List)
  - Evaluation matrix of Stage 2 (Short List)
- TOR/SEA of Stage 3
  - Framework of the Evaluation Matrix

#### 6. Third Stakeholder Meeting (Dec. 2010)

- Result of the evaluation
  - Evaluation Matrix of Stage 3
- Guideline for Stakeholder Meeting
- TOR/EIA for the next study

## 7. Schedule



MEMD

Tea Break

11:00-11:30

### Question & Discussion

11:30-13:00

- Question and Answer
- Discussion on Evaluation Framework (Stage 1 and Stage 2)

MEMD

Question and Answer

### Discussion on Evaluation Framework

- The listed power source, location
- Evaluation items
- Evaluation method
- Recommended data source

MEMD

Fill in Questionnaire

### Closing Remarks

13:00-13:30

- MEMD
- NEMA

MEMD

Thank you very much!

See you on the second meeting on February 2010.

## **Appendix K-2**

### **Presentation on Second Stake Holder Meeting**





## Session 1



### Table of contents

1. Overview of the Master Plan Study
  - 1.1 Power Development Plan
  - 1.2 Hydropower Master Plan
  - 1.3 Pre-Feasibility Study
  - 1.4 Schedule
2. Result of Stage 1
  - 2.1 Review of Demand forecast
  - 2.2 Comparison of 8 different energy sources
  - 2.3 Evaluation results
  - 2.3 Rating and conclusion

### 1. Overview of the Master Plan Study 1.1 Power Development Plan

Item	Feb.2010	Nov.2010
(1) Demand forecast	Demand forecast used by this Study be fixed.	Demand forecast will be reconfirmed.
(2) Power Supply Plan	Prospective projects are identified.	Commissioning order and timing will be fixed.
(3) Transmission Plan	Collection and review of Base data are finished.	Transmission Network plan will be reviewed.

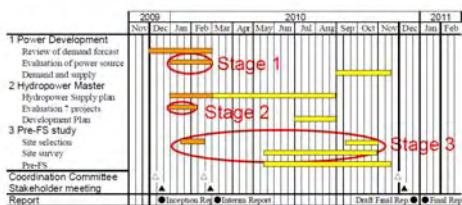
### 1. Overview of the Master Plan Study 1.2 Hydropower Master Plan

Item	Feb.2010	Nov.2010
(1) Demand forecast	Demand forecast is fixed.	Demand forecast will be reconfirmed.
(2) Evaluation Hydropower Projects	Prospective projects are identified.	Prospective projects will be reconfirmed.
(3) Hydropower Supply Plan	Commissioning order and timing is being studied.	Commissioning order and timing will be fixed.

### 1. Overview of the Master Plan Study 1.3 Pre-Feasibility Study

Item	Feb.2010	Nov.2010
(1) Selection of the project	Study site is selected.	-
(2) Survey planning	Survey planning is completed.	-
(3) Site survey	Not started yet	Site survey will be finished.
(4) Pre-Feasibility Study	Not started yet	Pre-FS will be finished.

### 1. Overview of the Master Plan Study 1.4 Project Schedule

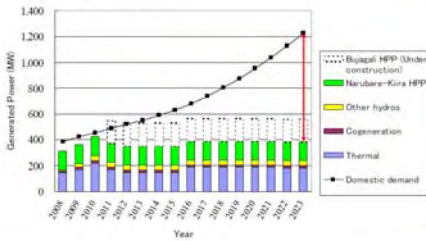


### 2. Result of Stage 1

- 2.1 Review of Demand forecast
- 2.2 Compared seven electric sources
- 2.2 Evaluation Method
- 2.3 Evaluation results
- 2.4 Rating and conclusion

2. Result of the stage 1  
2.1 Review of Demand forecast

Demand forecast (Basically result of GDP 2008-2023 is used)  
Study Period : 2008-2023

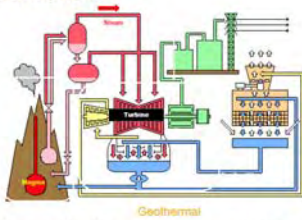


2. Result of Stage 1  
2.2 Compared seven electric sources  
Large Scale Hydro



Hydropower is power that is derived from the force of moving water, which may be harnessed for useful purposes.

2. Result of Stage 1  
2.2 Compared seven electric sources  
Geothermal



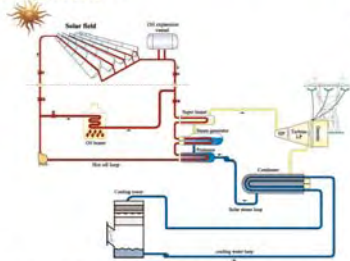
Geothermal is the power extracted from heat stored in the earth.

2. Result of Stage 1  
2.2 Compared seven electric sources  
Diesel Engine (Heavy Oil)



Diesel engine is the most popular type of reciprocating engine which drives an electrical generator.

2. Result of Stage 1  
2.2 Compared seven electric sources  
Solar thermal



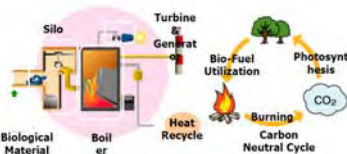
Solar power is the generation of electricity from sunlight.

2. Result of Stage 1  
2.2 Compared seven electric sources  
Wind Power



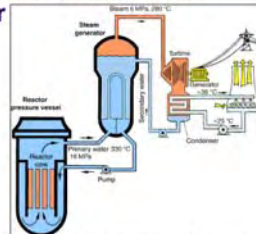
Wind power is the conversion of wind energy into a useful form of energy, such as using wind turbines to make electricity.

2. Result of Stage 1  
2.2 Compared seven electric sources  
Biomass



Biomass Cogeneration is the power that is producing thermal energy by burning biomass material with heat recycles system. Steam turbine or gas turbine type can be selected.

2. Result of Stage 1  
2.2 Compared seven electric sources  
Nuclear



Nuclear is the power that is derived from atomic energy. The heated steam by water reactor spin a steam turbine which either drives an electric generator.

2. Result of Stage 1  
2.2 Compared seven electric sources  
**Energy Import**

Energy will be imported from neighboring countries.



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2. Result of Stage 1  
**2.3 Evaluation Method**

- Multi Criteria Decision Analysis
  1. Rating for each items
  2. Convert rating into figure
  3. Give weight for each item
  4. Multiply rating figure and weight
  5. Summarize by options
  6. Change the weights
  7. Summarize again



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2. Result of Stage 1  
2.3 Evaluation results  
**Cost**

	Development cost(USD/kW)		Operation & Maintenance cost (USD/kW/year)		Unit cost of power generation (USD/MWh)	
Hydro	500-2000	C	4- 90	A	40- 80	A
Geothermal	-	C	-	C	27	A
Diesel Engine		A		C		E
Wind Power	1000- 1700	E	15- 60	A	35- 95	A
Biomass	1100- 5500	E	-	C	50- 130	C
Solar Thermal	3000- 5500	E	10- 50	A	150- 500	E
Nuclear+		E		E		A
Energy import		A		A		E



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2. Result of Stage 1  
2.3 Evaluation results  
**Existing potential (MW)**

	Existing potential	Rating
Hydro	2000	A
Geothermal	450	C
Diesel Engine (Heavy Oil)	500	C
Wind Power	Micro scale only	E
Biomass	1,650	B
Solar Thermal	200	D
Nuclear+	600 to 2000	B
Energy import	300	D



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2. Result of Stage 1  
2.3 Evaluation results  
**Technically Feasible Potential**

Type	Project Name	Installed Capacity (MW)	Present Status	Rating
Hydro	Karagara	330	Preliminary Study	A
	Ihinaha	130	Preliminary Study	
	Karuma	580	Under Feasibility Study	
	Oriang	390	-	
	Ayago	610	Preliminary Study	
	Kiba	290	-	
	Murchison	650	Preliminary Study	
	Sub	<b>2980</b>		
Geothermal	Muntnovsky	<b>50</b>	Potential Survey	C
Diesel	Mputa (extension)	<b>35 to 50</b>	Preliminary Study	D
Biomass	Kwada	33	Negotiation in progress	B
	Aldweh	50	Preliminary Study	
	Sub	<b>83</b>		
Solar	Sub	<b>50</b>		C <sup>1</sup>



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2. Result of Stage 1  
2.3 Evaluation results  
**Availability of Energy Source**

Energy Source	Supply Stability	Reserves	Rating
Hydro	B (long-term fluctuation)	A	B
Geothermal	A	A	A
Heavy Oil	A	D (25-50 year)	D
Biomass	C (long term/seasonal fluctuation)	C (depends on plantation management)	D
Solar-thermal	C (seasonal/daily fluctuation)	A	C
Nuclear	E (Unknown)	E (Unknown)	E
Energy Import	E(Unknown)	E(Unknown)	E



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**Session 2**



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**Table of contents**

1. Compared Projects
2. Method of Stage 2
3. Evaluation results
4. Rating and conclusion



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1. Compared Projects  
Compared 7 projects



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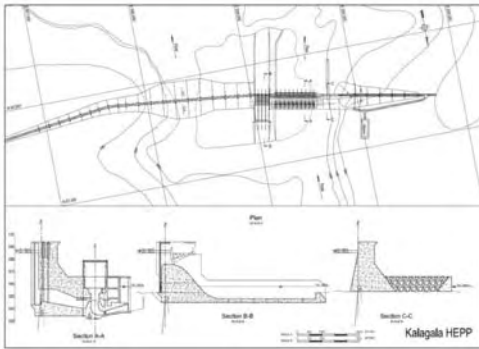
1. Compared Projects  
Kalagala



Installed Capacity	330MW
Type	Dam
Dam Height	45m
Water Length	-
Powerhouse	Surface

All Weather Road, Loose Surface  
Dry Weather Road  
Motorable Track  
Open Water  
Contour

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Kalagala HEPP

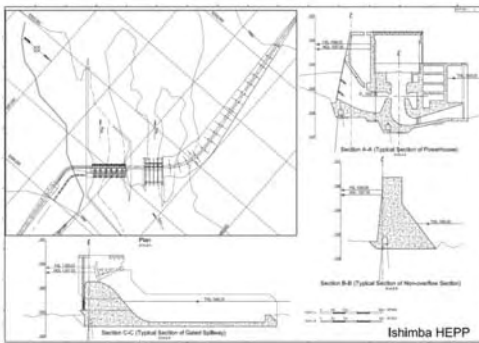
1. Compared Projects  
Isimba



Installed Capacity	138MW
Type	Dam
Dam Height	30m
Water Length	-
Powerhouse	Surface

Legend

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Isimba HEPP

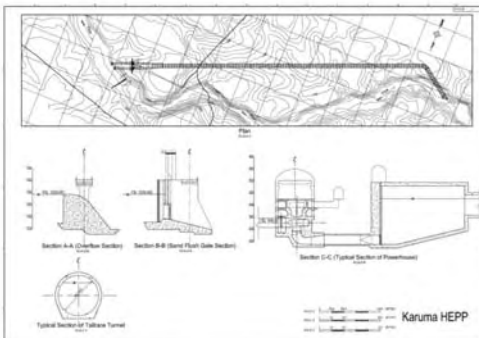
1. Compared Projects  
Karuma



Installed Capacity	587MW
Type	Run-of-River
Weir Height	10m
Water Length	12km
Powerhouse	Under-ground

Dry Weather Road  
Motorable Track  
Open Water  
Contour

30



Karuma HEPP

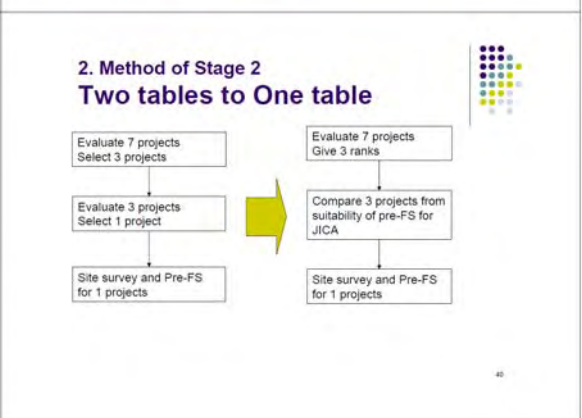
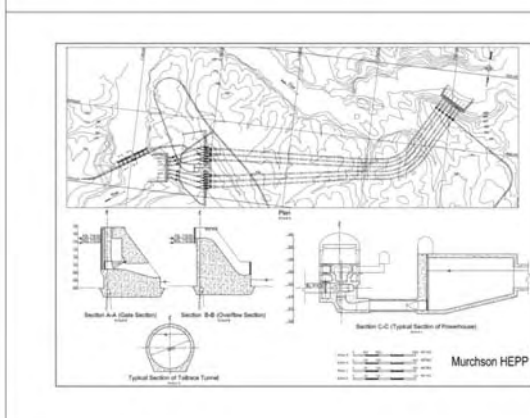
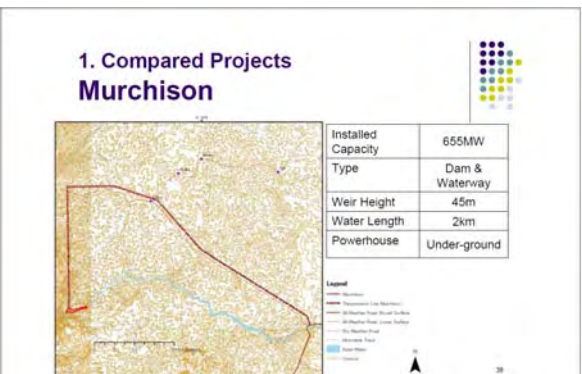
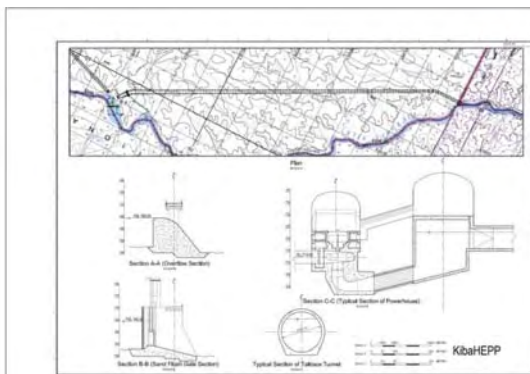
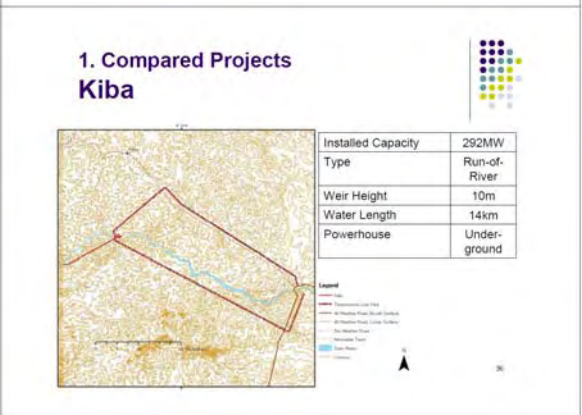
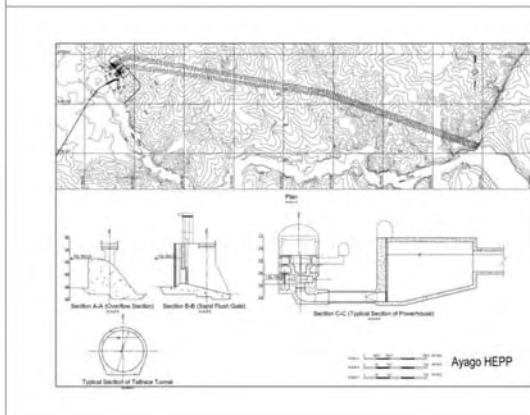
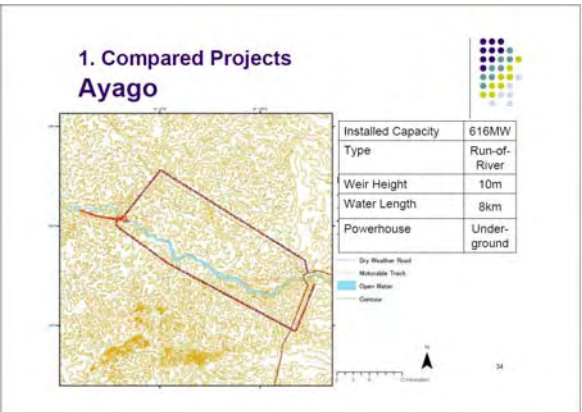
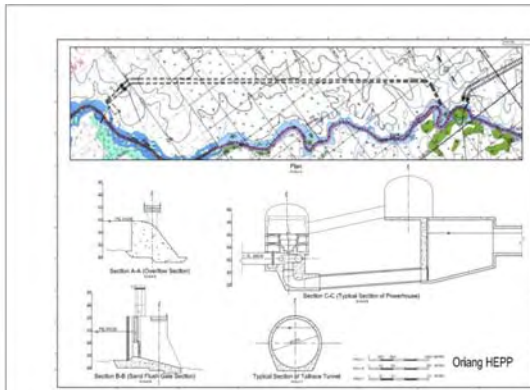
1. Compared Projects  
Oriang



Installed Capacity	392MW
Type	Run-of-River
Weir Height	10m
Water Length	12km
Powerhouse	Under-ground

Legend

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## 2. Method of Stage 2 Changed evaluation items

Evaluation Items	1st SHM		2nd SHM	Change		
	Long	Short				
Economic and technical	Cost	Operation & Maintenance cost	*	*	Converted to "Generators Cost"	
		Length of new access roads		*	Merged into Accessibility	
	Efficiency	Length of penstock		*	Changed into "Length of waterway"	
		Rock structure		*	Changed to "Geological Condition"	
		Lead time		*	Moved to "Development progress"	
		Loss of transmission		*	Added by JICA's Advisory Council	
	Development	Volume of tunnel stack		*	Changed to "Excavation Volume"	
		Time commencement	before	*	*	Converted to "Lead time"
		Planned Operation Date		*	Merged to "Lead time"	
		Commercial Operation Date		*	Merged to "Lead time"	
Environment	CO2 emission from the reservoir			*	Added by JICA	
	Number of resettlement	*	*	*	Converted into "Number of affected people"	
Social	Impact on current tourism		*	*	Added by UWA	
	Impact on Archeology		*	*	Merged into "Cultural Property"	

## 2. Method of Stage 2 MCDA method

- Picking up potential 7 projects
- Evaluating the 7 projects by economic, environmental, and social items
- Rating on each items from A to E for 7 projects
- Weighting on each items  
(Economic and technical : Environment ; Social = 34:33:33)
- Multiply weighting and rating points
- Summarizing by projects
- Sensitivity Analysis

## 2. Method of Stage 2 Weighting (Even Case)

Evaluation items	Weight		
Construction Cost (MUSD)	34	9	2
Generation Cost (cent/kWh)			7
Maximum Power (MW)		19	5
Construction time (year)			2
Head (m)			2
Distance to load center or existing grid(km)			2
Length of Waterway			1
Geological Condition			2
Excavation Volume			1
Construction material (availability)			1
Accessibility			2
Loss of transmission			1
Lead Time		6	5
Financial Negotiation and close			1

## 2. Method of Stage 2 Weighting (Even case)

Evaluation items	Weight	
Length of water recession (km)	33	5
Rate of recession (%)		3
Impact on Protected area*		7
Impact on wetland*		3
Impact on protected species*		7
Degradation of underground water		3
CO2 emission from the reservoir		5

## 2. Method of Stage 2 Weighting (Even case)

Evaluation items	Weight	
Land acquisition		4
Flooding area*		2
Number of affected people		4
Impact on ethnic minority and indigenous people		1
Impact on fish breeding and/or fishing		1
Impact on Agriculture		1
Impact on cultural property	33	2
Impact on tourism		6
Impact on current tourism		7
Impact on existing infrastructure		1
Impact on landscape		3
Human health hazard		1

## 3. Evaluation Results Construction Cost

	Construction Cost (MUSD)	Rating
Kalagala	638	A
Ishimba	601	A
Karuma	1,911	C
Oriang	1,696	C
Ayago	1,565	C
Kiba	2,190	D
Murchison	1,106	B

## 3. Evaluation Results Generation Cost

	Generation Cost (cent/kWh)	Rating
Kalagala	3.3	A
Ishimba	7.3	D
Karuma	4.2	B
Oriang	5.8	C
Ayago	3.3	A
Kiba	9.5	E
Murchison	4.4*	B

\*: Generation cost of Murchison is half of the capacity, because generation hour would be half day .

## 3. Evaluation Results Maximum Power

	Maximum Power (MW)	Rating
Kalagala	330	C
Ishimba	138	E
Karuma	587	B
Oriang	392	C
Ayago	616	A
Kiba	292	D
Murchison	655	A

### 3. Evaluation Results Construction time



	Construction time (year)	Rating
Kalagala	4	A
Ishimba	4	A
Karuma	5	B
Oriang	5	B
Ayago	5	B
Kiba	5	B
Murchison	4	A

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### 3. Evaluation Results Head



	Head (m)	Rating
Kalagala	28	E
Ishimba	13	E
Karuma	79	B
Oriang	53	C
Ayago	83	A
Kiba	40	D
Murchison	88	A

### 3. Evaluation Results Distance to load center or existing grid



	Distance to load center or existing grid (km)	Rating
Kalagala	28	B
Ishimba	47	D
Karuma	1	A
Oriang	34	C
Ayago	46	D
Kiba	56	D
Murchison	122	E

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### 3. Evaluation Results Length of Waterway



	Length (km)	Rating
Kalagala		A
Ishimba	0	A
Karuma	12	D
Oriang	12	D
Ayago	8	C
Kiba	14	E
Murchison	2	B

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### 3. Evaluation Results Volume of Excavation



	Excavation Volume (1000m <sup>3</sup> )	Rating
Kalagala	1003	B
Ishimba	824	A
Karuma	6,008	D
Oriang	5,424	C
Ayago	4,164	C
Kiba	7,152	E
Murchison	1,684	B

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### 3. Evaluation Results Construction material



	Concrete Volume (10 <sup>3</sup> m <sup>3</sup> )	Rating
Kalagala	356	A
Ishimba	560	A
Karuma	1,520	B
Oriang	1,262	B
Ayago	1,059	B
Kiba	1,794	C
Murchison	822	A

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### 3. Evaluation Results Transmission Loss (to Kampala)



	Voltage (kV)	Length (km)	Transmission Loss (%)	Rating
Ishimba	220	47	2.1	A
Kalagala	220	28	1.7	A
Karuma	-	0	2.3	A
Oriang	400	34	3.2	B
Ayago	400	46	2.8	A
Kiba	400	56	3.6	B
Murchison	400	122	3.7	B

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### 3. Evaluation Results Time before commencement



	Time before commencement (Survey, design, financing, bidding, Relocation etc.) (year)	Rating
Kalagala	6	C
Ishimba	6	C
Karuma	5	A
Oriang	5	A
Ayago	5	A
Kiba	5	A
Murchison	5	A

### 3. Evaluation Results Length of water recession

	Length of water recession (km)	Rating
Kalagala	0	A
Ishimba	0	A
Karuma	14.5	D
Oriang	13.4	D
Ayago	8.8	C
Kiba	16.7	E
Murchison	4.4	B

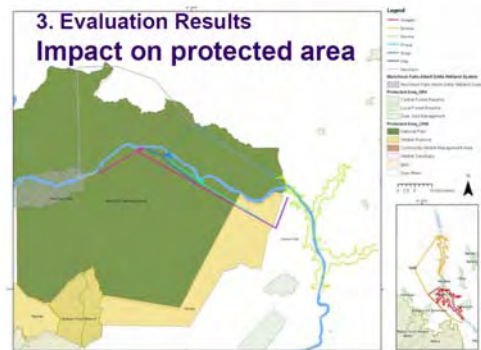
### 3. Evaluation Results Rate of recession

	Rate of recession (%)	Rating
Kalagala	0	A
Ishimba	0	A
Karuma	89	D
Oriang	89	D
Ayago	89	D
Kiba	89	D
Murchison	89	D

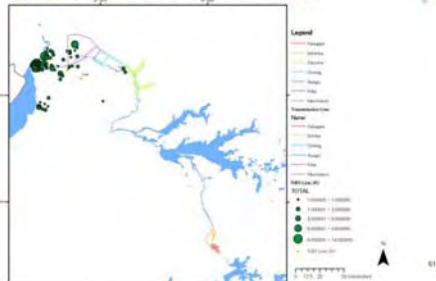
### 3. Evaluation Results Impact on protected species

Common names (Eng)	IUCN Red List status	Projects						
		Kalagala	Ishimba	Karuma	Oriang	Ayago	Kiba	Murchison
Chimpanzee	EN						X	X
Hippopotamus	VU			X	XX	XX	XX	XX
African Lion	VU			XX			XX	XX
Hyena	NT			X	X	X	X	X
African Elephant	NT			X	XX	XX	XX	XX
Leopard	NT			X			X	XX
Volcano Shrew	NT			XX			XX	XX
Ground Hornbill	LC			XX	X	XX	X	XX
Saddle-billed Stork	LC						X	X
Fish Eagle	LC							XX
Hartebeest	LC			XX	XX	XX	XX	XX

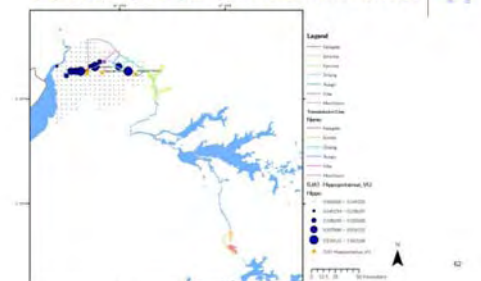
### 3. Evaluation Results Impact on protected area



### 3. Evaluation Results Distribution area of Lion



### 3. Evaluation Results Distribution area of Hipopotamus



### 3. Evaluation Results Impact on tourism

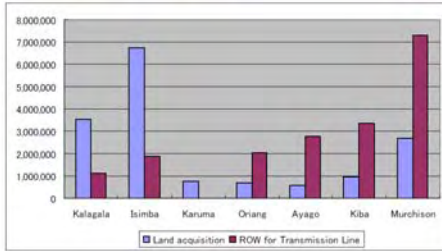
Evaluation Items	Nature observation	Sight seeing	Sports and relaxing	Rating
Kalagala	-	Itanda falls XXX	XX (Rafting)	E
Ishimba	-	-	X (Rafting)	B
Karuma	X	Karuma Falls XXX	-	C
Oriang	National Park XX	-	-	D
Ayago	National Park XX	-	-	D
Kiba	National Park XX	-	-	D
Murchison	National Park XXX	Murchison Falls XX	X (Fishing)	E

### 3. Evaluation Results CO2 emission from the reservoir

	Riverbed Area (km <sup>2</sup> )	CO <sub>2</sub> (t/day)	Rating
Kalagala	9.4	37.6	D
Isimba	11.8	47.2	E
Karuma	0.03	0.12	A
Oriang	0.03	0.12	A
Ayago	0.03	0.12	A
Kiba	0.03	0.12	A
Murchison	3.3	13.2	C



### 3. Evaluation Results Land Acquisition



### 3. Evaluation Results Inundated area

	Riverbed Area (km2)	Acquisition Area (km2)	Reservoir Area (km2)	
Kalagala	6.00	3.40	9.40	D
Isimba	5.20	6.60	11.80	E
Karuma	0.00	0.03	0.03	A
Oriang	0.00	0.03	0.03	A
Ayago	0.00	0.03	0.03	A
Kiba	0.00	0.03	0.03	A
Murchison	0.90	2.40	3.30	C

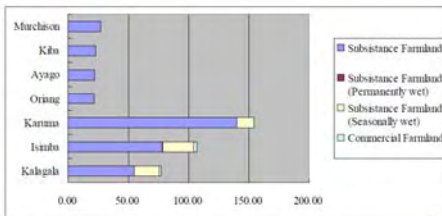
### 3. Evaluation Results Number of affected people

Evaluation items	Resettlement	Population Within 1km	Rating
Kalagala	165 household	36,145	D
Ishimba	26 household	49,744	E
Karuma	200 (people) Resettlement has been finished.	33,015	D
Oriang	0	4,854	A
Ayago	0	5,049	A
Kiba	0	5,434	A
Murchison	0	1,890	A

### 3. Evaluation Results Impact on ethnic groups

	Ethnic Groups	Affected by the project	Rating
Kalagala	Baoga, Bayala, Jopafibila, Basania, Bagwera, Isuu, Baganda, Bagira	Resettlement, Loss of farm land, Noise, Vibration, Dust	C
Isimba	Baoga, Jopafibila, Baganda, Bagira, It'wasa, Isuu, Bakonyi, Bayala, Lagbara, Basania, Bagwera	Resettlement, Loss of farm land, Noise, Vibration, Dust	C
Karuma	Ahohi, Isuu, Kuman, Bayayala, Baganga, Ahar, Chope, Bawidi, Langi, Kaka, Lagbara, Isuu, Babwera, Bagira, Basania, Bayawanda, Kurunganga, Madi, Bayara, It'wasa, Bahakura, Baganda, Kete-yaha	Resettlement, Loss of farm land, Noise, Vibration, Dust	D
Oriang	Ahohi, Isuu, Ahar, Chope, Langi, Lagbara, Isuu, Babwera	Housing might be affected	B
Ayago	Ahohi, Lagbara, Isuu, Chope, Langi, Isuu, Ahar, Babwera, Babwera	Housing might be affected	B
Kiba	Ahohi, Isuu, Chope, Langi, Isuu, Ahar, Babwera, Bayayala, Lagbara, Bakiga, Bahakura, Kaka, Babwera	Housing might be affected	B
Murchison	Ahohi, Madi, Bayara, Isuu, Langi, Ahar, Babwera, Bayayala, Isuu, Lagbara, Bakiga, Bahakura, Kaka, Basania, Babwera, Chope, Langi, Baganda	Housing might be affected	B

### 3. Evaluation Results Impact on agriculture



### 4. Rating and conclusion Economic

Evaluation items	Kalagala	Isimba	Karuma	Oriang	Ayago	Kiba	Murchison
Cost**	A	A	C	C	C	D	B
Construction Cost (MUSD)	A	D	B	C	A	E	B
Operation Cost (cent/kWh)	C	E	B	C	A	D	A
Effectiveness	A	A	B	B	B	B	A
Maximum Power (MW)	A	A	B	B	B	B	A
Construction time (year)	A	A	B	B	B	B	A
Head (m)	E	E	B	C	A	D	A
Distance to load center or existing grid(km)	B	D	A	C	D	D	E
Length of Waterway	A	A	D	D	C	E	B
Geological Condition	B	B	C	C	C	C	C
Excavation Volume	B	A	D	C	C	E	B
Construction material (availability)	A	A	B	B	B	C	A
Accessibility	A	A	A	B	C	D	B
Loss of transmission	A	A	A	B	A	B	B
Development program	D	D	A	C	B	C	C
Lead Time	D	D	A	C	B	C	C
Financial Negotiation and close	E	C	C	C	C	C	C

### 4. Rating and conclusion Environment

Evaluation items	Kalagala	Isimba	Karuma	Oriang	Ayago	Murchison
Length of water recession (km)	A	A	D	D	C	B
Rate of recession (%)	A	A	D	D	D	D
Impact on Protected area*	C	C	B	D	D	E
Impact on wetland*	A	A	C	A	A	A
Impact on protected species*	A	A	D	C	D	E
Degradation of underground water	A	A	D	D	C	A
CO2 emission from the reservoir	D	E	A	A	A	C

### 4. Rating and conclusion Social

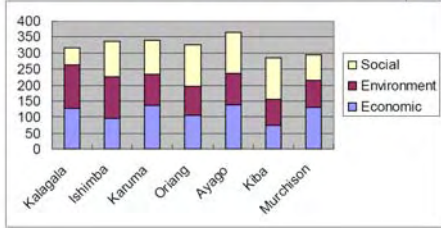
Evaluation items	Kalagala	Isimba	Karuma	Oriang	Ayago	Kiba	Murchison
Land acquisition	E	E	A	B	B	B	D
Flooding area*	D	E	A	A	A	A	C
Number of affected people	D	E	D	A	A	A	A
Impact on ethnic minority and indigenous people	C	C	D	B	B	B	B
Impact on fish breeding and/or fishing	A	A	B	A	A	A	A
Impact on Agriculture	C	D	D	A	A	A	A
Impact on cultural property	E	A	D	A	A	A	C
Impact on potential tourism	E	B	C	D	D	D	E
Impact on current tourism	E	A	B	B	B	B	E
Impact on existing infrastructure	C	C	D	A	A	A	B
Impact on landscape	E	A	D	C	C	C	E
Human health hazard	C	C	D	A	A	A	A



#### 4. Rating and conclusion General Rating

	Weighting		Projects							
	Economic and technical	Environment	Social	Katagala	Ishimba	Karuma	Oriang	Ayago	Kiba	Murchison
Even Case	34	33	33	B	A	A	B	A	C	C
Environmental Case	30	40	30	B	A	B	B	A	C	C
Social Case	30	30	40	C	B	B	B	A	C	C
Economic Case	40	30	30	B	B	A	B	A	C	C

**4. Rating and conclusion**  
**Total Scores (Even Case)**



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**Questions**



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**Session 3**



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**Pre-F/S Study**

- 1 Site Selection
- 2 Baseline
  - 2.1 Boring survey
  - 2.2 Topographic Survey
  - 2.3 Environmental survey



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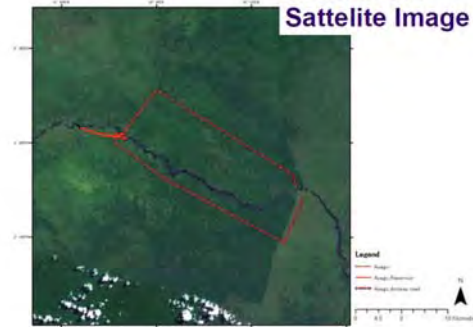
**1. Site selection**

- Pick up Rank A projects (Isimiba, Karuma, Ayago)
- Exclude started F/S projects (Karuma, Isimiba)
- Ayago is selected as pre-FS study by JICA

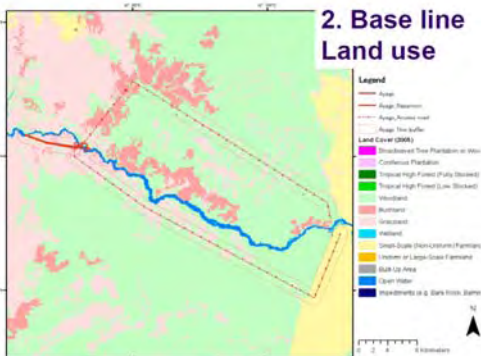


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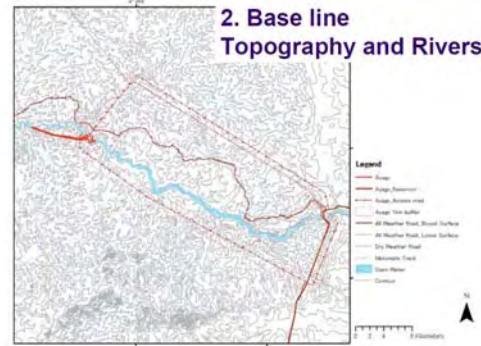
**2. Base line**  
**Sattelite Image**

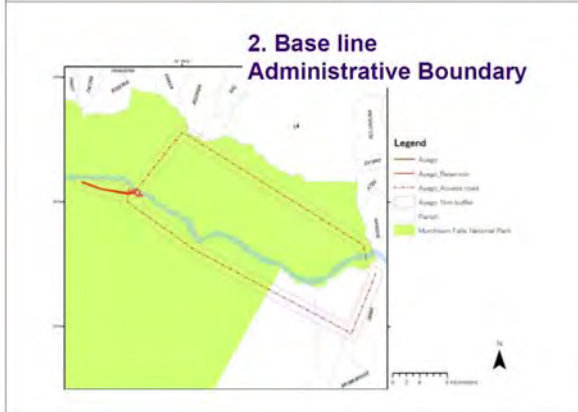
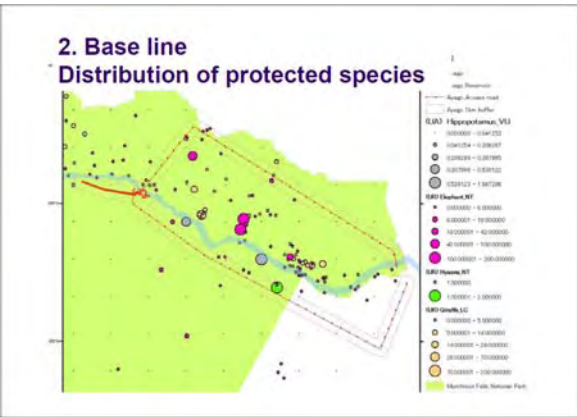
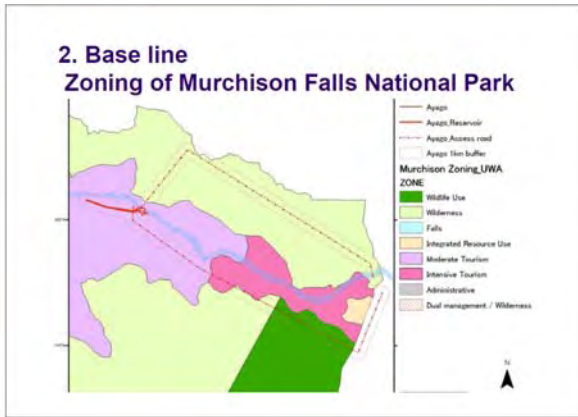


**2. Base line**  
**Land use**



**2. Base line**  
**Topography and Rivers**





### 2. Base line Population in the buffer area

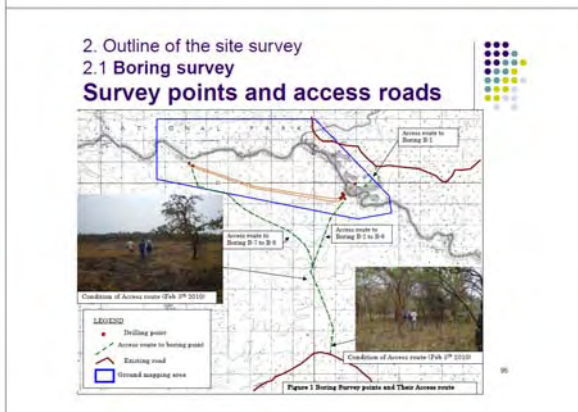
DISTRICT	COUNTY	SUBCOUNTY	PARISH	Parish Area (sqkm)	Population	1 km buffer area (sqkm)	Estimated population in the buffer area
AMURU	NWOYA	KOCH-GOMA	AGONGA	132.92	1090	1.09	8
MASINDI	KIBANDA	MUTUNDA	KAL	107.24	2640	0.68	16
			DIIMA	91.19	22564	20.31	5025
Total				331.35	26294	22.07	5049

### 2. Outline of the site survey 2.1 Boring survey Method

- Eight drill holes in the two locations
- The distances from the existing road are approximately 8 km and 12.5 km.
- The boring equipments, approximately 1.5 m wide, will be transported to the site in tow.
- Bush cutting might be required
- The diameter of the boreholes is approximately 60~80 mm

### 2. Outline of the site survey 2.1 Boring survey Method

- Core drilling: Diameter 60~80 mm.
- PVC screen pipes will be install boreholes
- Working space is approximately 5 m x 5 m
- Approximately 10~20 L/min of water is necessary for drilling
- Used water generally infiltrates ground



### 2. Outline of the survey 2.1 Boring survey Schedule

Expected Work Schedule

No	Investigation Items	Unit	Quantity	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Geological Investigation	km2	36									
1	Ground mapping	km2	36									
2	Aerial photo interpretation	km2	36									
3	Core drilling	m	130									
	Drills	m	200									
	Pneumation	m	50									
	Cores	m	200									
4	Laboratory test	LS	1									
5	Construction material survey	LS	1									
6	Reporting											

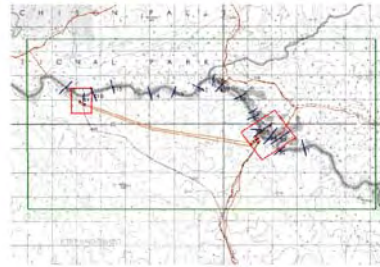
2. Outline of the site survey  
2.2 Topographic Survey  
**Survey items**

Items	Area	Quantity
i) Topographic mapping scale 1:10,000 (5m contour interval)	Whole project area covering access roads, intake weir site, reservoir area, powerstation site, outlet site and temporary construction structure site etc.	100km <sup>2</sup>
ii) Topographic mapping scale 1:1,000 (1m contour interval)	Main structures including intake weir, powerhouse etc.	3km <sup>2</sup>
iii) River cross-section survey	18 sections, 0.6km in average	10.8 km



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2. Outline of the site survey  
2.2 Topographic Survey  
**Survey area**



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2. Outline of the site survey  
2.2 Topographic Survey  
**Schedule of Topographic Survey**

Work Items	2010					
	May	Jun	Jul	Aug	Sep	Oct
- Ground control survey						
- Installation of benchmarks and control points						
- Aerial photography						
- Photogrammetric mapping at a scale of 1:10,000 and 1:1,000						
- River cross section survey						
- Drawing/reporting						
- Final products to be delivered						

Submissions until Sep 30, 2010  
 - 1:20,000 scale aerial photographs  
 - 1:6,000 scale aerial photographs  
 - 1:10,000 scale topographic maps  
 - 1:1,000 scale topographic maps



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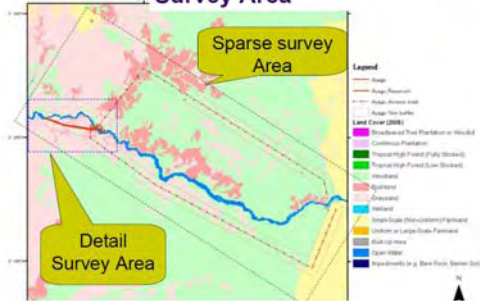
2. Outline of the site survey  
2.2 Topographic Survey  
**Environment Survey**

- 1) Period: 2010.05 to 2010.10
- 2) Survey Item:
  - i) Biological Survey  
Large and Medium Mammals, Birds, Insects, Reptile, Flora and Vegetation
  - ii) Social Survey  
Land use, Building and houses, Roads, Hunting and collecting, Cultural places of interest



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2. Outline of the site survey  
2.3 Environmental Survey  
**Survey Area**



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2. Outline of the site survey  
2.3 Environmental Survey  
**Schedule**

	May	Jun	Jul	Aug	Sep	Oct
<b>Biological Survey</b>						
Large and Medium Mammals						
Birds						
Insects						
Reptiles						
Flora						
Vegetation						
<b>Social Survey (Ongoing)</b>						
Land use						
Buildings and houses						
Roads						
Hunting and collecting						
Cultural interest places						
Water use						

Preparation  
 Site Survey  
 Data arrangement  
 Report Preparation



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Questions



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Thank you



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