

# Dam Inspection and Safety Guidance and Tools

*an NCEA capacity building course*

Tbilisi, Georgia  
6 - 13, November, 2015

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# Expert Trainer Team and Project

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A Project of the  
*Netherlands Commission of Environment Assessment (NCEA)* with  
the Ministry of Environment and Natural Resources Protection  
(MENRP), Georgia

Project Manager: Arend Kolhoff

# Objectives and Approach

1- International Requirements and setting the stage

2- What to look for?

Environmental, Health and Safety (EHS) aspects

# International Requirements and Practice



# Potential issues arising from Hydropower

**ECONOMIC  
ENVIRONMENT  
SOCIAL  
INSTITUTIONAL  
FINANCIAL**

# Sharing Development Benefits from Hydropower: an evolution in thinking....

**APPROACH**

**IMPACT ON LOCAL COMMUNITIES**

**Eminent Domain**

**Land acquisition  
Trickle-down Benefits**



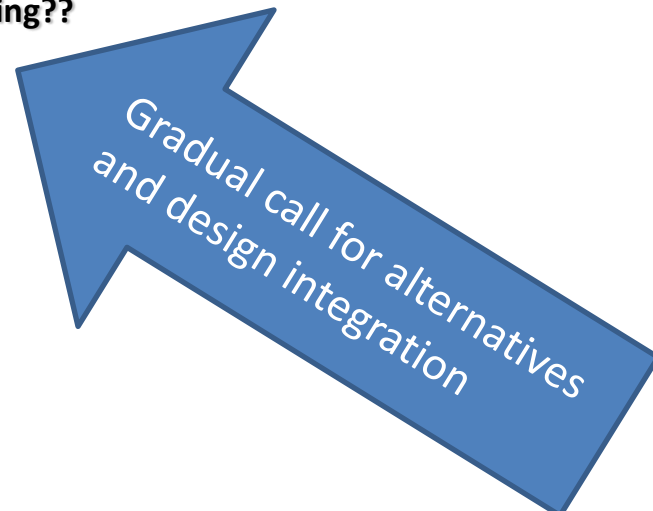
**Mitigation &  
Compensation**

**Negative impacts minimized at  
individual and community levels**

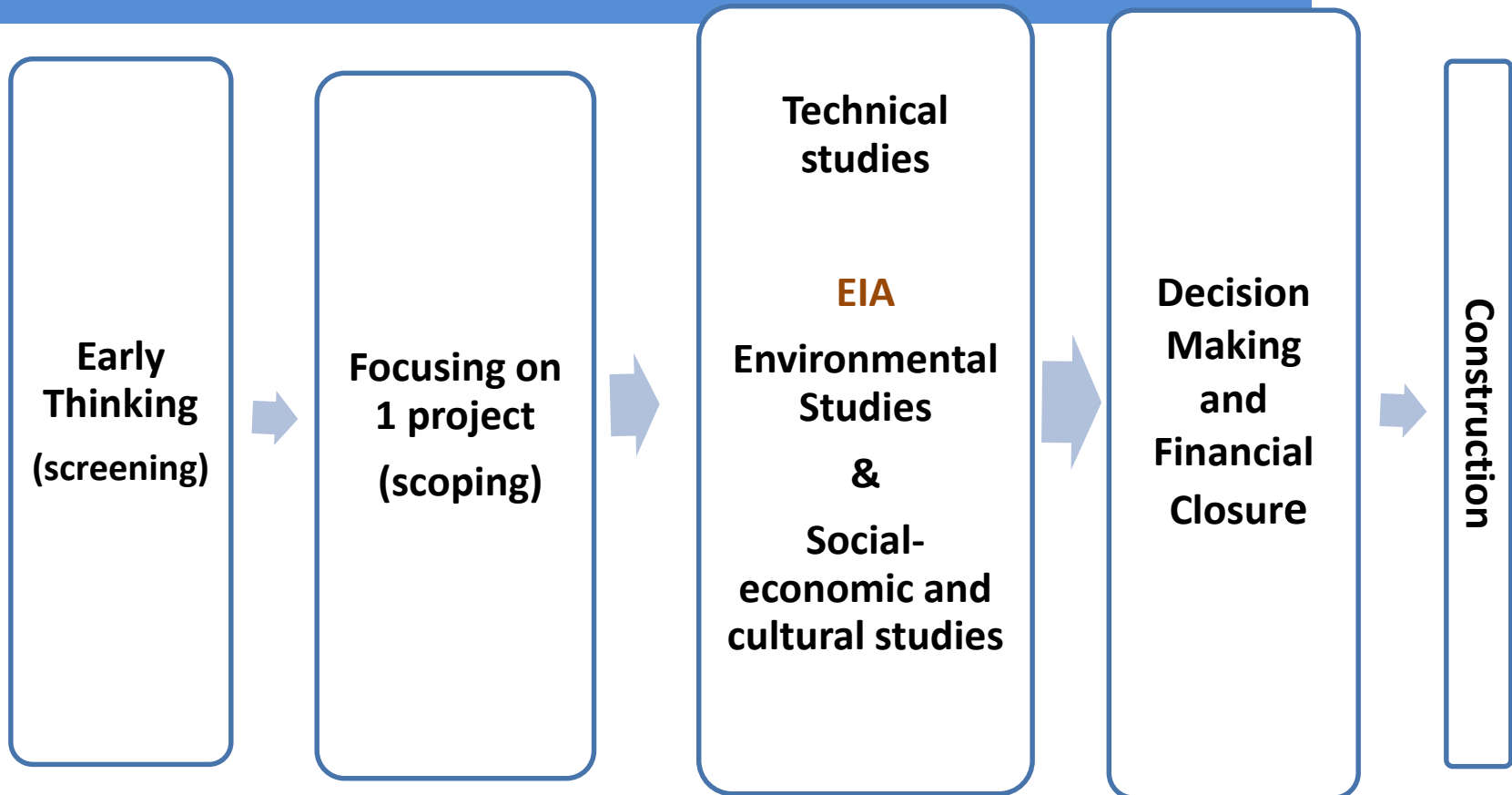


**Sustainable  
Development**

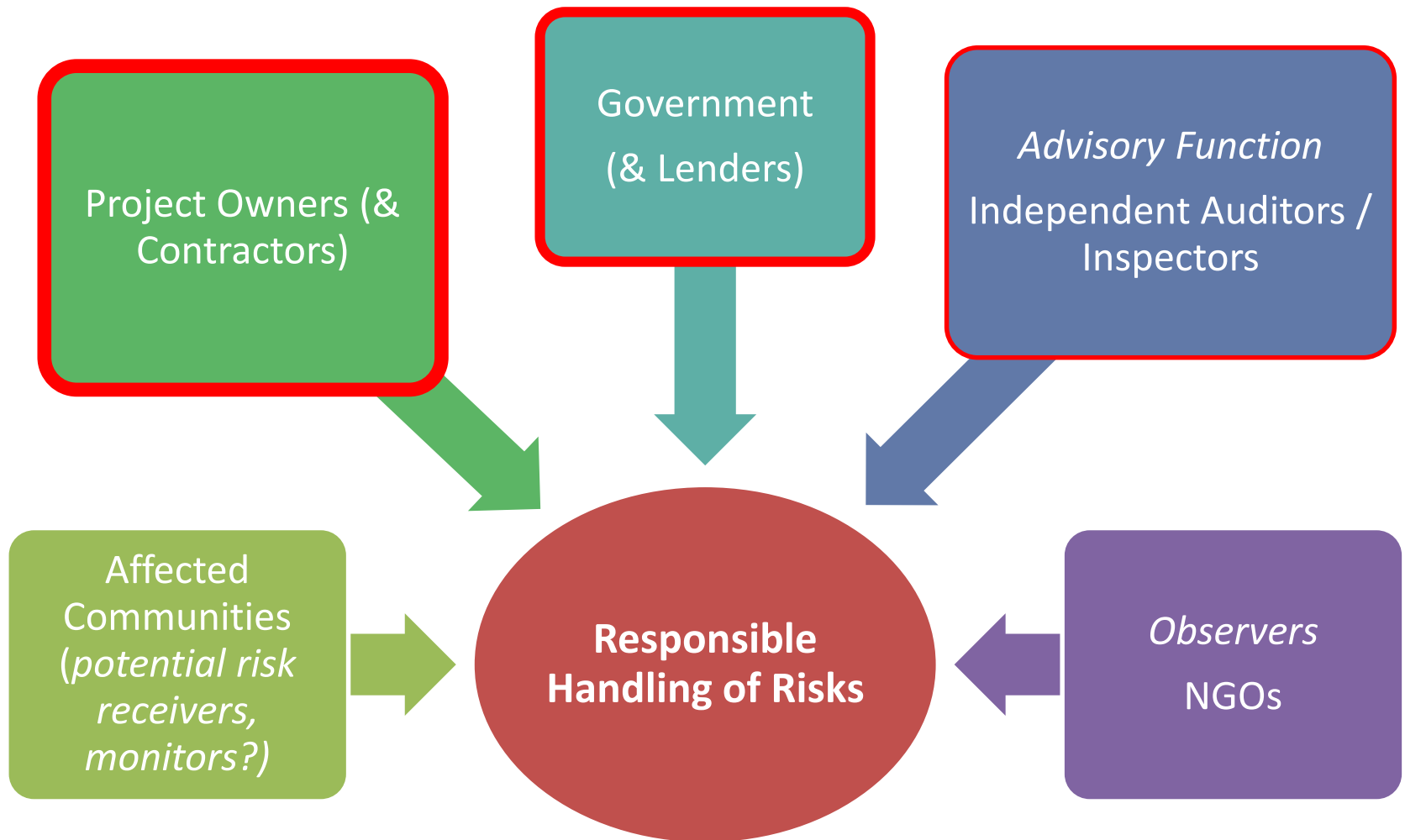
**Integrated project design  
Benefit Sharing??**



# Broad time-line for project development



# Hydropower Projects







**Requirements for the Developer**

**Communication and Information Provision has to be Integrated with the project cycle = all phases?**

**Perpetual stakeholder (directly affected) questions:**

**Information on how safe the dam is?  
& its associated activities? And surrounding areas?**

# Impact Area Defining

**Direct**

**Indirect**

**OR**

**Primary (1st. order/degree)**

**Secondary (2nd. order/degree)**

**Tertiary (3rd. order/degree)**

# Guidance Through Policies and Practice



# **International Institutions**

**International Benchmarks**

**Safeguard Policies**

**National Policy and Benchmarks**

# **International Institutions**

**World Bank Group**

**Regional Finance Institutions**

**Donor Country Institutions**

**Country Based Finance Institutions**



**Non-Government Organizations (NGOs)**  
**Community Based Organizations (CBOs)**



# International Finance Institutions (IFIs)

World Bank  
Safeguard Policy  
and Guidelines

- **Overall social objective of WB Safeguard Policies and Guidelines: project affected people *benefit* from large infrastructure projects - or at least are not disadvantaged**
- **Guidelines outline requirements**



# World Bank Safeguard Policies

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## Safeguard Policies

Home > Projects > Policies > Safeguard Policies [Email](#) [Print](#)

- Use of Country Systems
- Environmental Assessment
- Natural Habitats
- Forests
- Pest Management
- Physical Cultural Resources
- Involuntary Resettlement
- Indigenous Peoples
- Safety of Dams**
- International Waterways
- Disputed Areas

### Safeguard Policies

The World Bank's environmental and social safeguard policies are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for bank and borrower staffs in the identification, preparation, and implementation of programs and projects.

The effectiveness and development impact of projects and programs supported by the Bank has substantially increased as a result of attention to these policies.

Safeguard policies have often provided a platform for the participation of stakeholders in project design, and have been an important instrument for building ownership among local populations.

*Updated May 2, 2011*

#### Of Interest

- [Updating and Consolidation of the Environmental and Social Safeguard Policies \(August 2011\)](#)
- [World Bank Access to Information Policy](#)

# WB Safeguard Policies relevant for dam safety

The Bank's  
Operational Policy  
on Safety of Dams  
OP 4.37.....



# World Bank OP 4.37

TS/EXTPOLICIES/EXTOPMANUAL/0,,print:Y~isCURL:Y~contentMDK:20064653~menuPK:64701637-



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## Operational Manual

### OP 4.37 - Safety of Dams

These policies were prepared for use by World Bank staff and are not necessarily a complete treatment of the subject.

OP 4.37  
October, 2001

Note: OP/BP 4.37, *Safety of Dams* were revised on April 2013 to take into account the recommendations in "Investment Lending Reform: Modernizing and Consolidating Operational Policies and Procedures" (R2012-0204 [IDA/R2012-0248]), which were approved by the Executive Directors on October 25, 2012. As a result of these recommendations, OP/ BP 10.00, *Investment Project Financing*, have been revised, among other things, to incorporate OP/BP 13.05, *Supervision*, (which have consequently been retired). OP/BP 4.37 have consequently been updated to reflect these changes. Other Bank policies that may apply to projects that involve dams include the following: OP/ BP 4.01, *Environmental Assessment*; OP/ BP 4.04, *Natural Habitats*; OP/ BP 4.10, *Indigenous Peoples*; OP/ BP 4.11, *Physical Cultural Resources*; OP/ BP 4.12, *Involuntary Resettlement*; and OP/ BP 7.50, *Projects on International Waterways*.

Questions on dam safety should be addressed to the Safeguard Policies Helpdesk in OPCS ([Safeguards@worldbank.org](mailto:Safeguards@worldbank.org).)

Revised April 2013

1. For the life of any dam, the owner<sup>1</sup> is responsible for ensuring that appropriate measures are taken and sufficient resources provided for the safety of the dam, irrespective of its funding sources or construction status. Because there are serious consequences if a dam does not function properly or fails, the Bank<sup>2</sup> is concerned about the safety of new dams it finances and existing dams on which a Bank-financed project is directly dependent.

The background of the slide is a photograph of a stone wall. The wall is composed of large, rectangular, light-brown stone blocks. In the center-right of the wall, there is a circular, intricately carved stone medallion. The medallion features a central circular hole and is surrounded by complex, swirling floral or geometric patterns. The overall appearance is that of an ancient or historical building's exterior.

# **International Finance Corporation IFC**

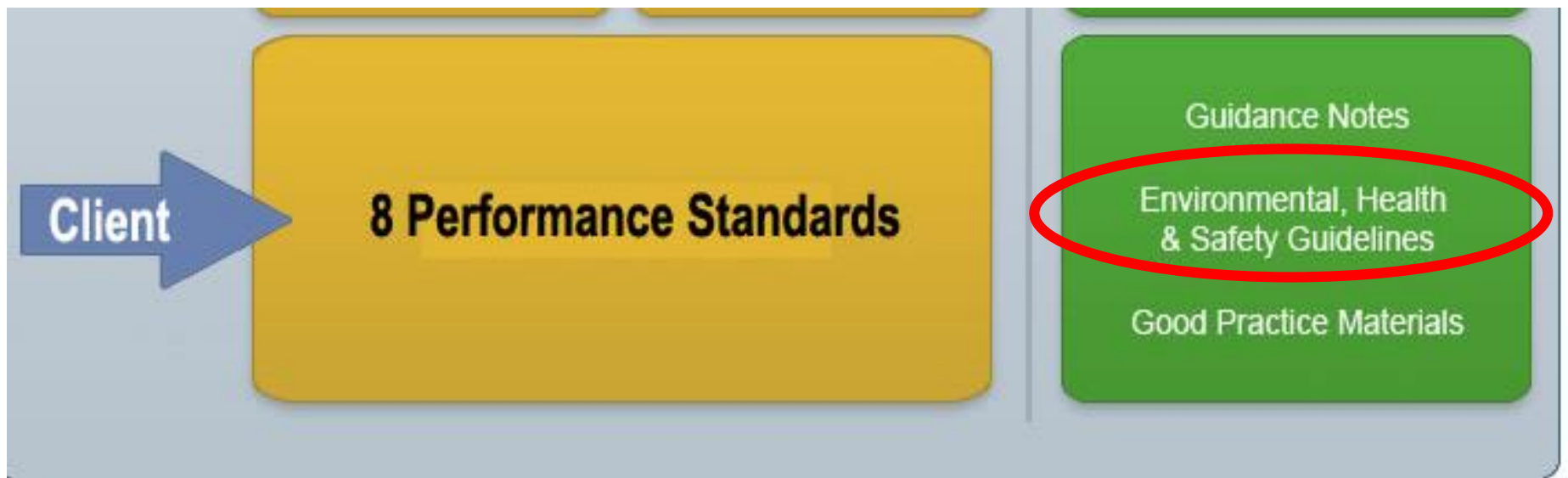
# IFC Sustainability Framework



# IFC Sustainability Framework

PERFORMANCE STANDARDS (PS)

➔ Guidance Notes (GN)



# IFC Performance Standards

2012



**PS1: Assessment and Management of Social and Environmental Risks and Impacts**



**PS2: Labor and Working Conditions**



**PS3: Resource Efficiency and Pollution Prevention**



**PS4: Community Health, Safety and Security**



**PS5: Land Acquisition and Involuntary Resettlement**



**PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**



**PS7: Indigenous Peoples**



**PS8: Cultural Heritage**

# Performance Standard 1

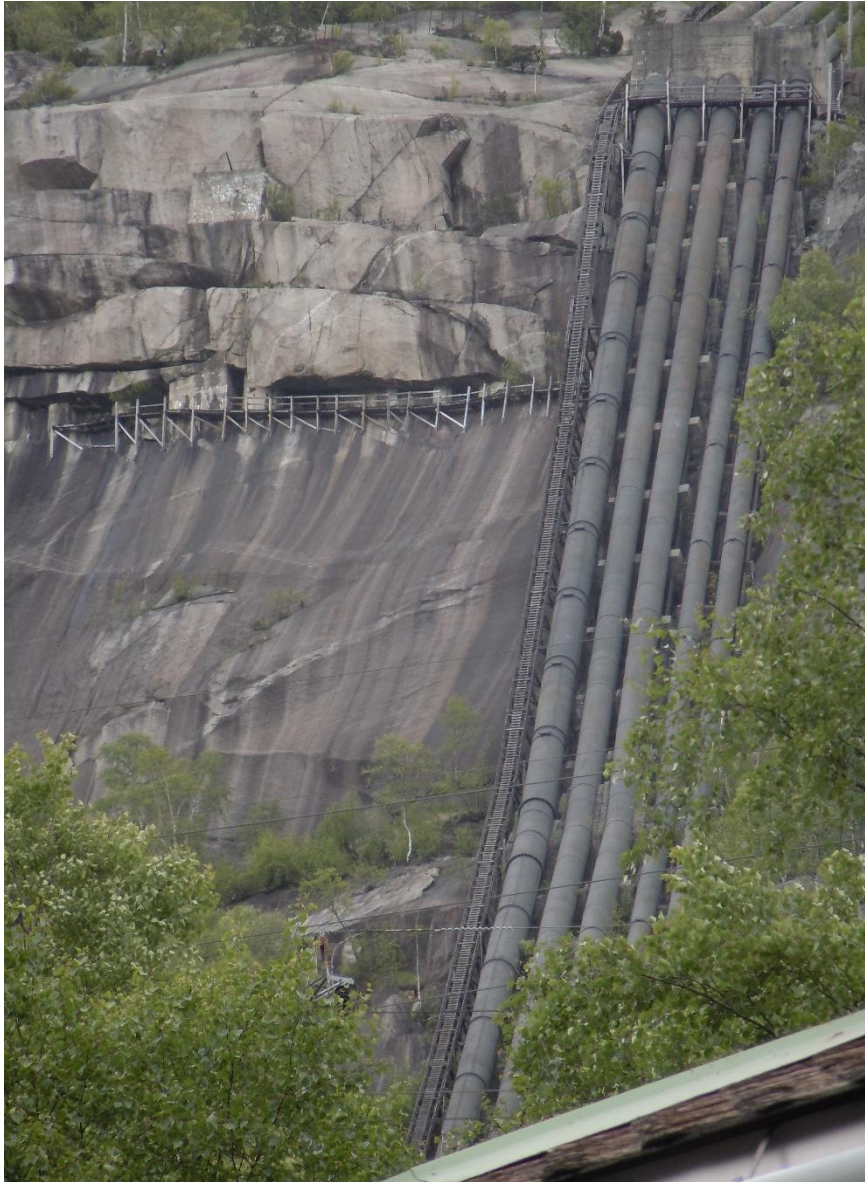
## Assessment and Management of Environmental and Social Risks and Impacts

January 1, 2012

### Introduction


1. Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders.<sup>1</sup> Drawing on the elements of the established business management process of “plan, do, check, and act,” the ESMS entails a methodological approach to managing environmental and social risks<sup>2</sup> and impacts<sup>3</sup> in a structured way on an ongoing basis. A good ESMS appropriate to the nature and scale of the project promotes sound and sustainable environmental and social performance, and can lead to improved financial, social, and environmental outcomes.





PS1:

ASSESSMENT AND  
MANAGEMENT OF  
SOCIAL AND  
ENVIRONMENTAL RISKS  
AND IMPACTS



**PS2:**

**LABOR AND  
WORKING  
CONDITIONS**

# PS2: LABOR AND WORKING CONDITIONS

Recognizes that the pursuit of economic growth through employment creation and income generation should be balanced with protection of basic rights for workers

Fair treatment, non-discrimination, equal opportunity

Good worker – management relationship

Comply with national employment and labor laws

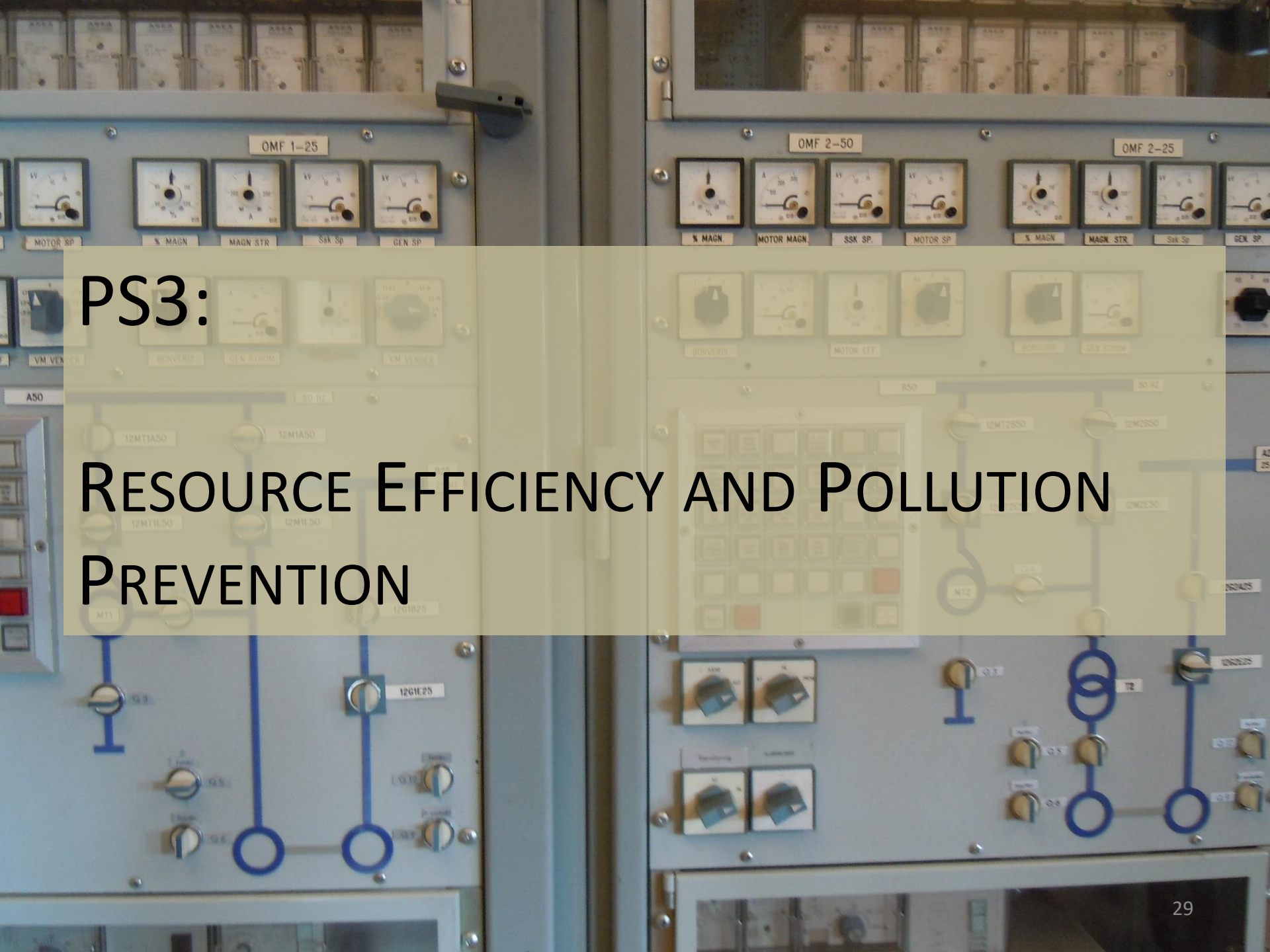
Protect workers, in particular vulnerable categories

Promote safety and health

Avoid use of forced labor or child labor

## PS2: LABOR AND WORKING CONDITIONS

- Understand the project:
  - Occupational Health and Safety (OHS) risks for the construction and operation:
    - task and risks (e.g. working near water, confined spaces)
    - training/ qualification needs
  - Workforce needed (e.g. local / migrant / foreigner)
    - Potential for tensions within workers and with communities
  - Labor Accommodation / worker camps (e.g. water, sanitation, medical facilities)
- Manage OHS E&S risks / avoid / prevent / emergency response:
  - Separate worker from risks
  - Appropriate Training and Equipment (PPE)
  - Emergency response



PS3:

# RESOURCE EFFICIENCY AND POLLUTION PREVENTION

# PS3: RESOURCE EFFICIENCY AND POLLUTION PREVENTION

Recognizes that increased industrial activity and urbanization often generate higher levels of air, water and land pollution, and that there are efficiency opportunities

Avoid, minimize, and reduce project-related pollution

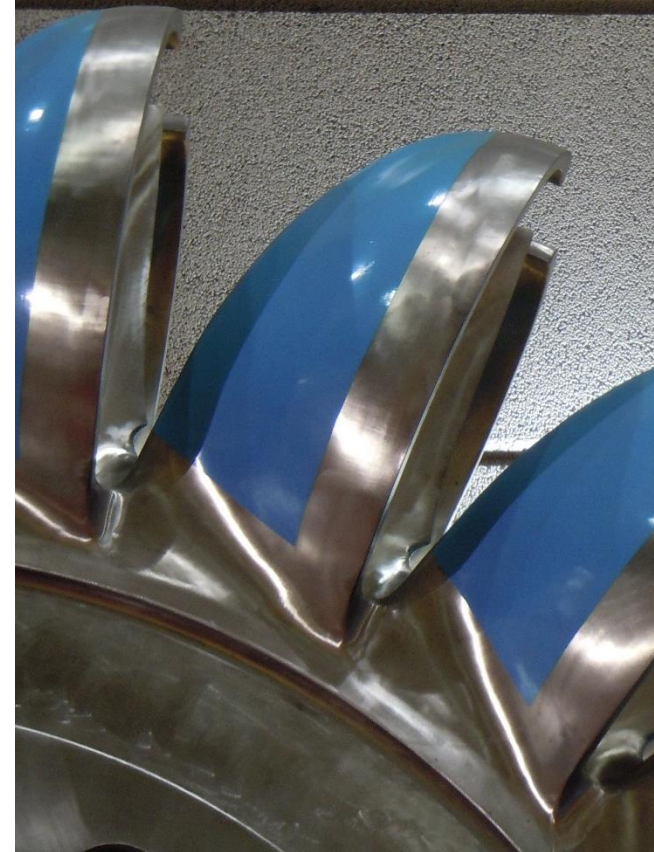
Energy efficiency and more sustainable use of resources, including energy and water

Reduced project-related Greenhouse Gas (GHG) emissions

# PS3: RESOURCE EFFICIENCY AND POLLUTION PREVENTION

## Understand the project

- Construction:
  - Tunnel waste waters
  - Handling and disposal of solid and hazardous materials
- Operations:
  - Reservoir water quality / emissions
  - Reduce availability of water resources downstream
  - Concentrate pollutants in de-water segments
  - Vulnerability to climate change



# PS4: COMMUNITY HEALTH, SAFETY AND SECURITY



EV 11



## PS4 – Community Health, Safety and Security

Recognizes that projects can bring benefits to communities, but can also increase potential exposure to risks and impacts from incidents, structural failures, and hazardous materials

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community
- To safeguard personnel and property in accordance with relevant human rights principles

## PS4: COMMUNITY HEALTH, SAFETY, AND SECURITY

- Understand the project
  - Dam / Structural Safety
    - Early warning systems
    - Emergency response
  - Security and guards
  - Flow reduction / modification
    - Water availability (human, animals)
    - Sanitation
    - Water transmitted diseases
    - Sudden flow fluctuations – downstream safety

# PS8: CULTURAL HERITAGE

Chance Finds and  
Plans to Handle finds

during excavations  
and slope/road works

*Chance Find Plan*



# PS5: LAND ACQUISITION AND INVOLUNTARY RESETTLEMENT

Discussion and indicators

# **STRENGTHENING OF CROSS-CUTTING THEMES**

A landscape photograph of a fjord with icebergs and snow-capped mountains. The scene is captured in a cool, monochromatic palette of blues, greys, and whites. The water is calm, reflecting the sky and the surrounding mountains. Numerous icebergs of various sizes are scattered across the water's surface. The mountains are rugged and covered in snow, with some peaks appearing more prominent than others. The overall atmosphere is serene and somewhat somber, reflecting the theme of climate change.

# CLIMATE CHANGE

8

# Climate Change

Climate change must be considered with, and not separate from, environment, social, and economic issues affecting human and natural systems.

Thus,

a balanced approach that addresses both climate and non-climate risks is required.

# Hydropower as "mitigation and adaptation strategy" towards Climate Change



**The threat of climate change is fuelling the development of large scale hydropower**



What type of  
climate  
impacts?



# CLIMATIC CHANGES

- Increase in dramatic weather patterns
- More falling as rain than snow

And--

- Increase in population
- Later settlements in areas downstream of WRS

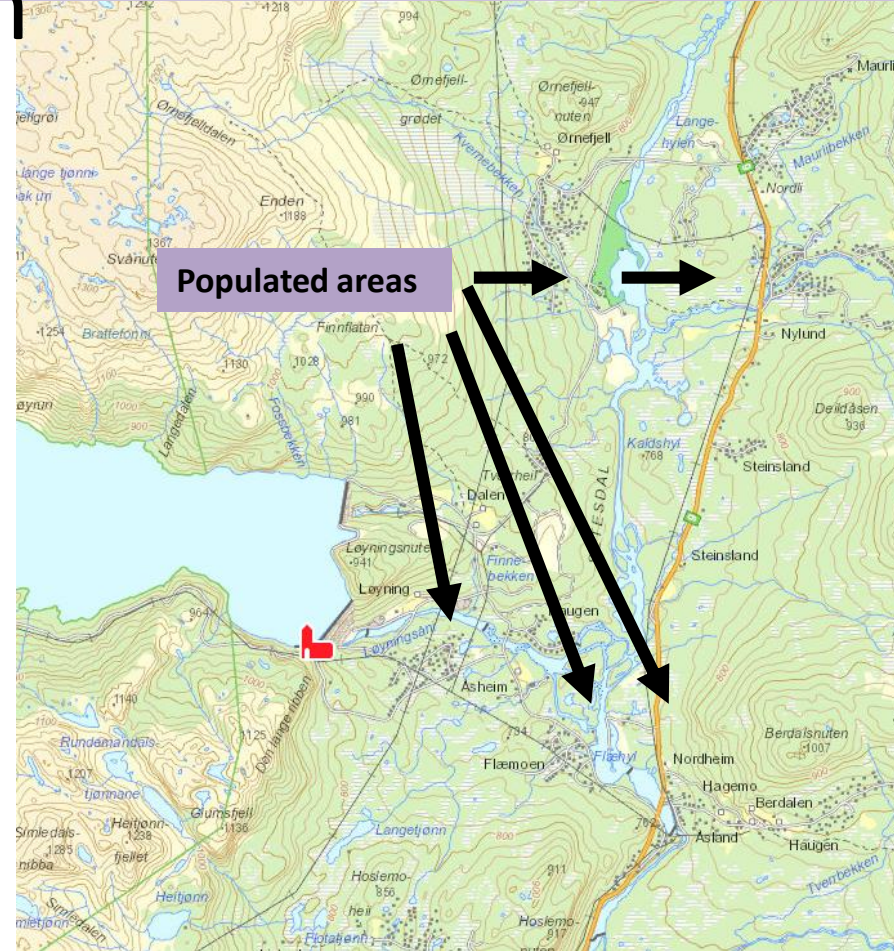
# CLIMATIC CHANGES

- A few CASES



One of the  
largest in  
Europe  
Vatnedals-  
dammmen

# Population development downstream of a dam







# Deteriorating structures – erosion, frost, etc





# Greenhouse Gas Emissions

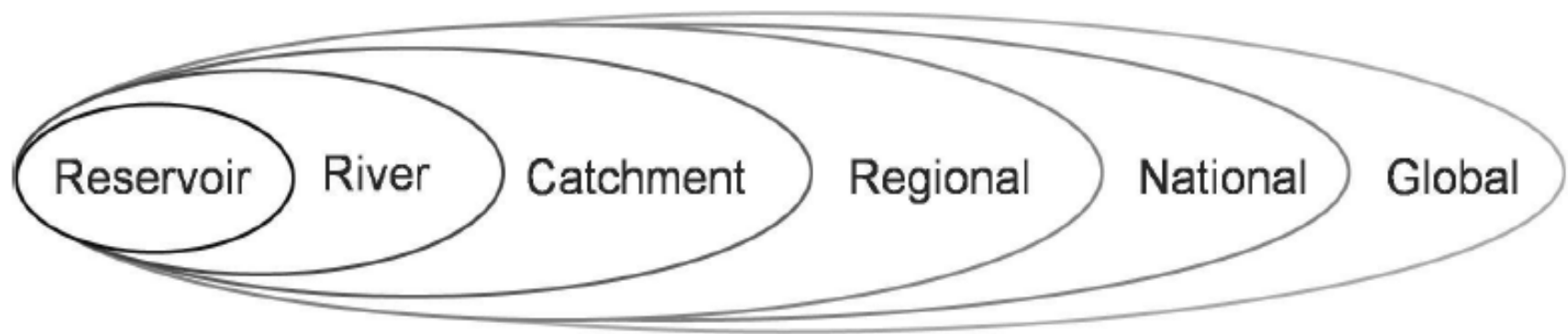
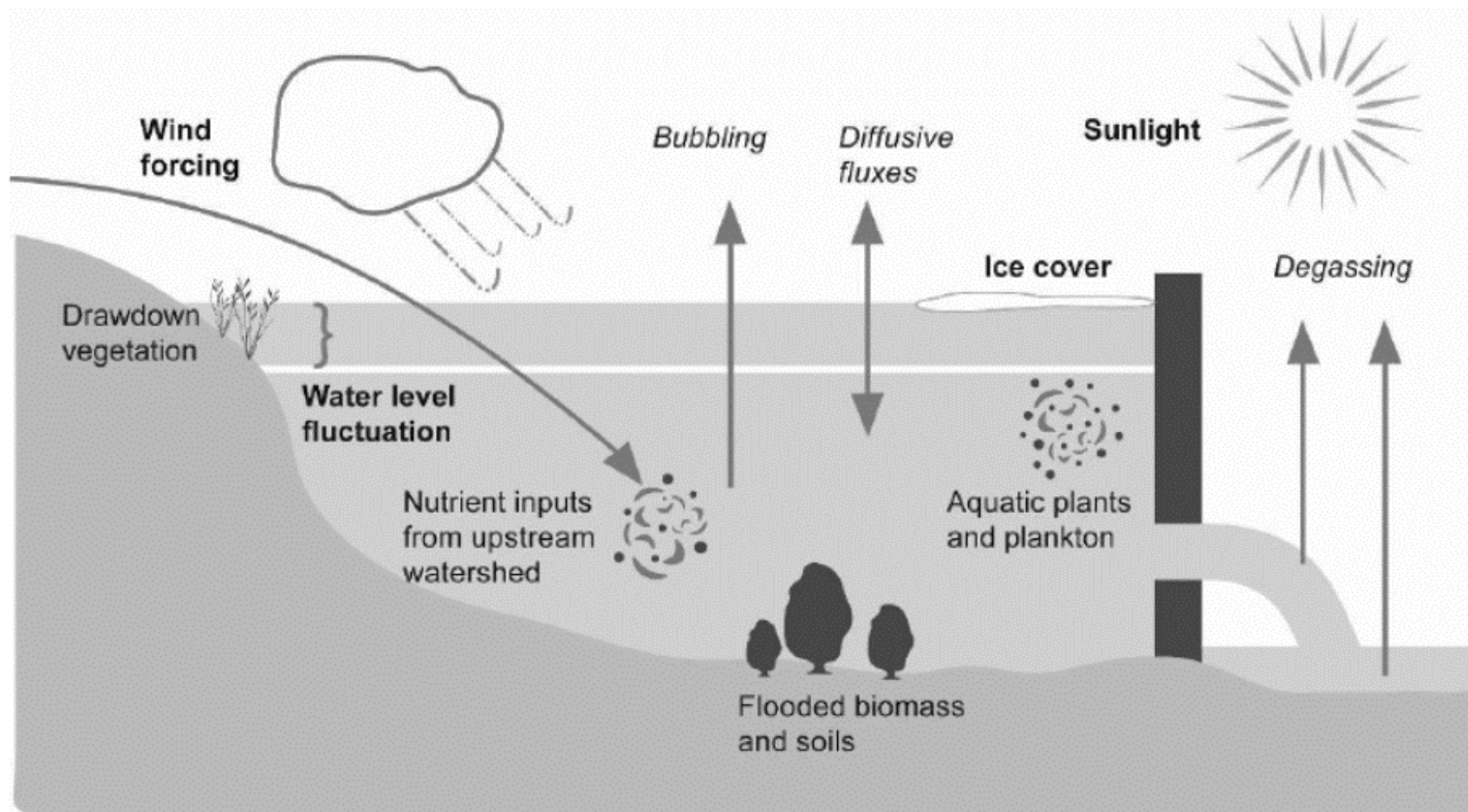


Figure 2. Sources of greenhouse gases, emission pathways and factors influencing reservoir emissions.



[Home](#) - [landslide report](#) - Tbilisi, Georgia:- a landslide dam-break flood killed 19 people

21 JUNE 2015

## Tbilisi, Georgia:- a landslide dam-break flood killed 19 people

Posted by [dr-dave](#)



### Tbilisi flood – 14th June 2015

A week ago, on Sunday 14th June, a flash flood ripped through a p  
[a very significant amount of damage:](#)



[Wikipedia](#)





### MOE: სტიქიის განვითარების გრაფიკა

 moegovge  
 Abonner 300

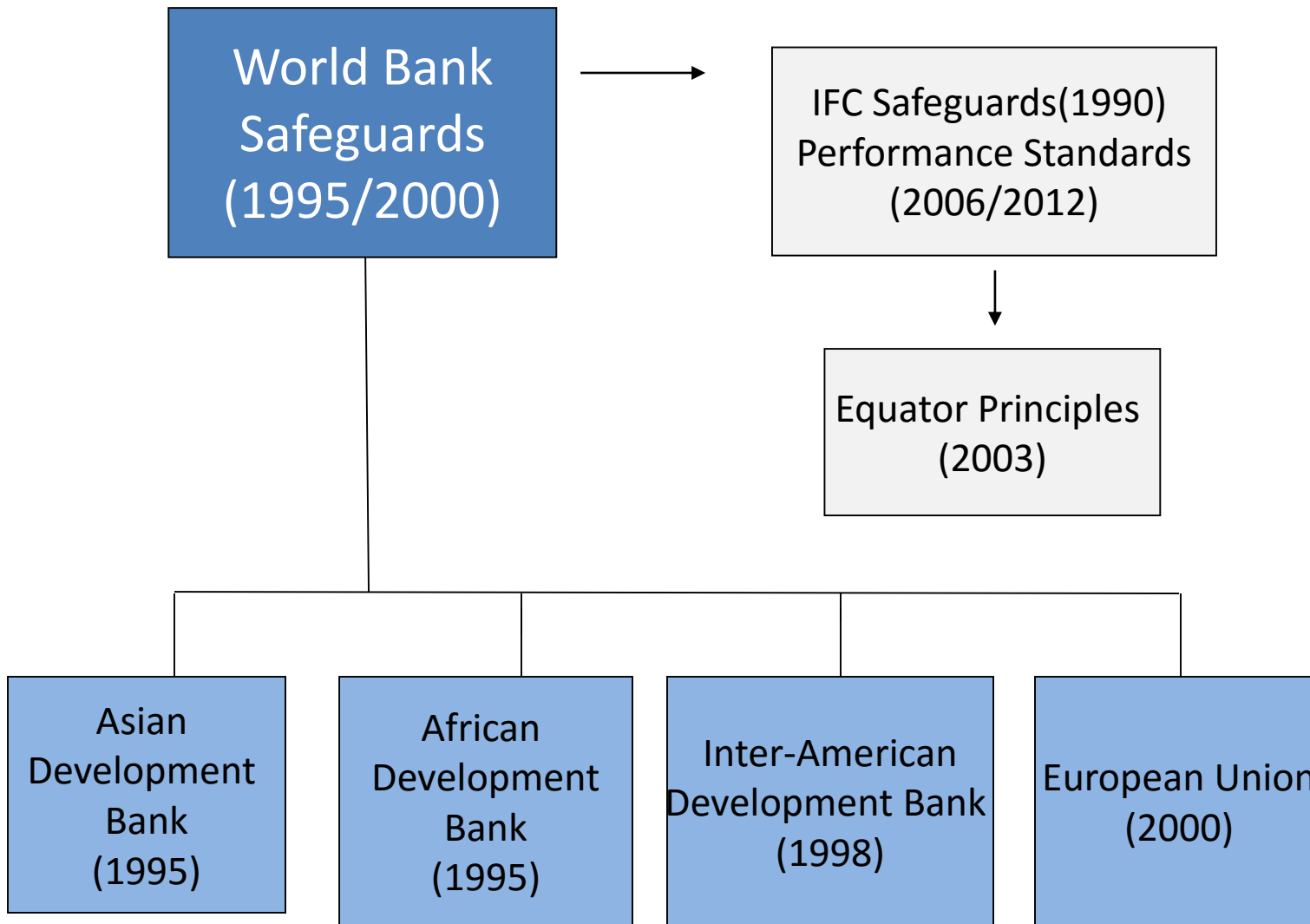
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Publisert 15. jun. 2015

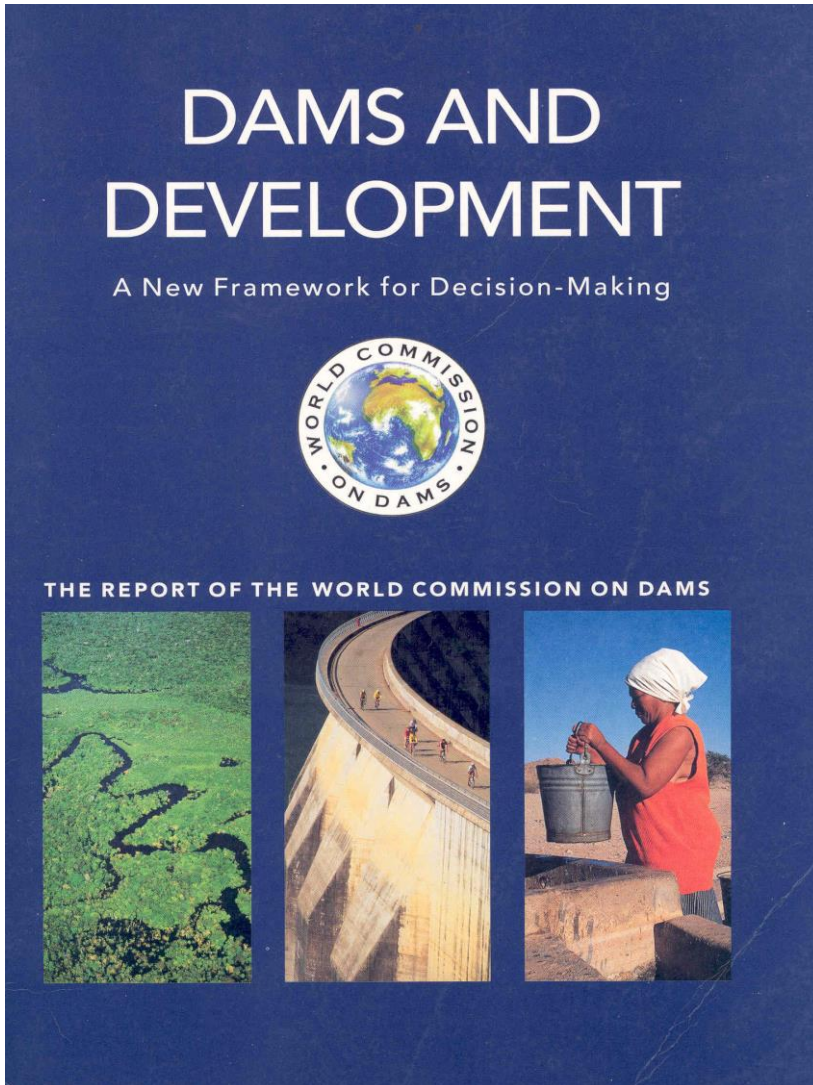
მდინარე ვერუს მარჯვენა ფერდობზე, სოფელ ახალდაბის მიმდებარე ტერიტორიასთან, წყნეთი-ნეთახის საავტომობილო გზაზე



**POLICIES ARE ALL BASICALLY SIMILAR**

# Other relevant views ...

## WCD (World Commission on Dams)



## WCD Report Background and Objectives

- The WCD was established to *review existing practice in planning, implementation and operation of large dams* and to make recommendations on improving the image and performance of these processes
- Due to the negative media coverage and criticism of hydropower in the media, *a proactive approach was to counter this situation* and to promote the benefits of hydropower
- A *serious attempt at reforming existing practices and a transparency in assessing mistakes of the past* and launching a program of reform within the industry



# The "Equator Principles"

A financial industry benchmark for:

- determining, assessing and managing social & environmental risk in project financing

- [www.equator-principles.com](http://www.equator-principles.com)



# International

Hydropower  
Sustainability  
Assessment Protocol


## Preparation Assessment Tool

November 2010



Draft issued after review and modification by the  
Hydropower Sustainability Assessment Forum

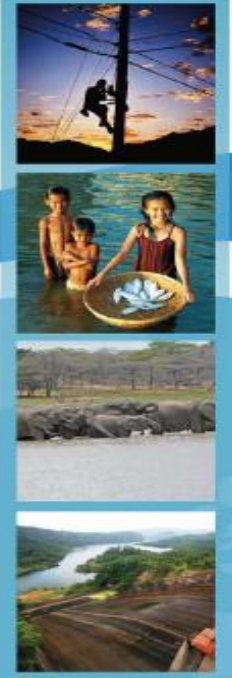
Published by the  
International Hydropower  
Association



**29 aspects**  
**4 sections**  
**7 attributes**

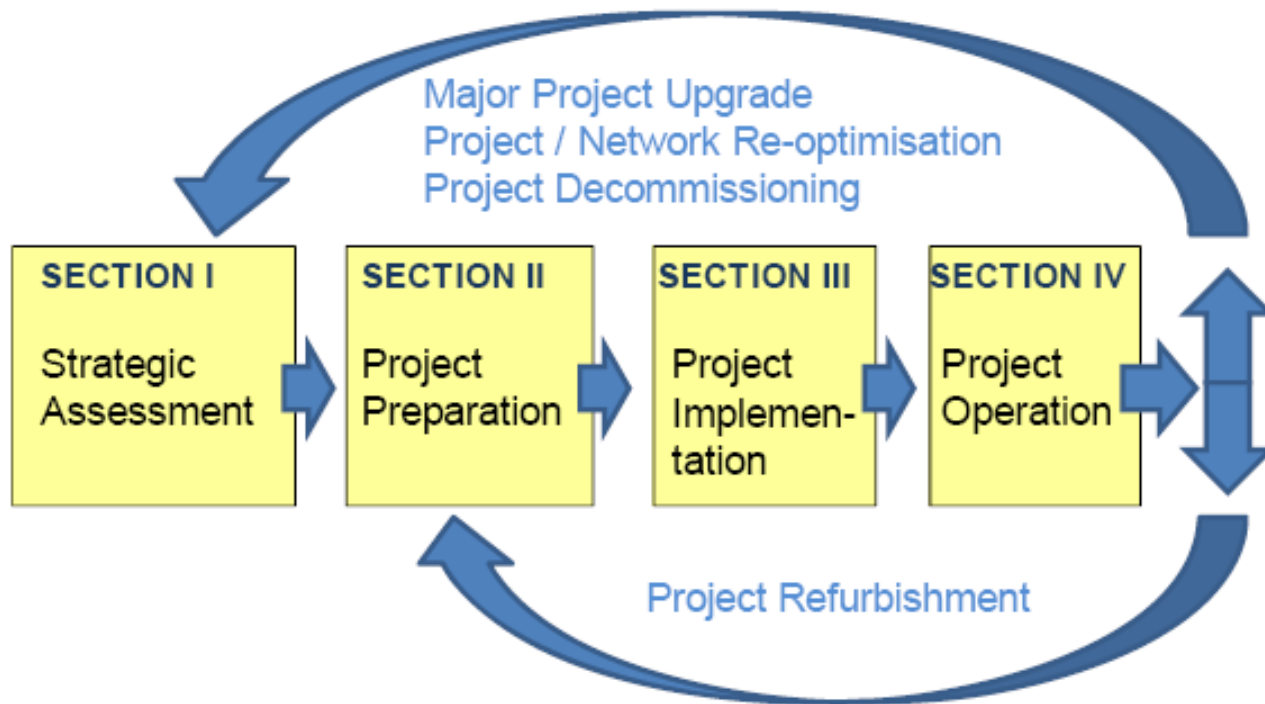
Draft  
Hydropower Sustainability  
Assessment Protocol

August 2009



Section II:  
Project Preparation

# Protocol sections and project cycle



*Figure 2. Protocol Sections and the Project Life Cycle*



**THANK YOU**