



RSAT
Rapid Basin-wide Hydropower
Sustainability Assessment Tool

Rapid Basin-wide Hydropower Sustainability Assessment Tool

SUMMARY 2013 EDITION

Joint Initiative



The **RSAT** is designed as an integrative tool to assess hydropower development in a basin wide context



MRCs, WWF and ADB have formed a partnership since 2006 to provide interested stakeholders in the Mekong region with information, knowledge and tools to better manage hydropower. The aim of the partnership is to ensure that the ecological functions of rivers, the natural resources they provide to other economic sectors and the livelihoods of people that depend on them are maintained acceptably and appropriately as hydropower resources are developed.

The RSAT was developed to assess hydropower in a basin wide context based on IWRM principles. It has been under development since 2010 including a series of trials and national and regional consultations in the Lower Mekong region including government, industry and civil society groups. As at 2014, dialogue and assessment has been facilitated using RSAT in nine Mekong hydropower sub-basins and development of the tool is ongoing.



Rapid Basin-wide Hydropower Sustainability Assessment Tool (RSAT)



This document provides a summary of the Rapid Basin-wide Hydropower Sustainability Assessment Tool (RSAT). The RSAT is a multi-stakeholder dialogue and assessment tool designed to consider hydropower sustainability issues in a river basin context. Placing hydropower in a basin wide context requires looking beyond individual projects to take

a broader integrated approach to planning and management. The application of tools such as the RSAT can assist to identify development strategies, institutional responses and management measures that can be deployed to optimise the benefits of hydropower development and reduce the risks. The RSAT includes a framework of topics and criteria and an assessment approach that helps to achieve this.

In a hydropower sub-basin there will be a number of public and private sector institutions, organisations and groups with interests, roles and responsibilities for the different aspects of development. Sustainable hydropower development depends on the capacity and performance of each of these key stakeholder groups and their level of collaboration and interaction with each other. The primary intent of the RSAT is therefore to bring these key stakeholder groups together and provide a common basis for dialogue and collaboration.

The RSAT is based on a set of core sustainability principles that underpin the framework of topics and criteria in the tool. This framework has been developed as a result of research into hydropower sustainability standards and guidelines internationally, international experience of integrated water resources planning (IWRM) and the experience of hydropower development in the Mekong region.

What are the core principles of the RSAT?

- Co-operation in international river basins
- Integrating river basin planning and hydropower regulatory and management frameworks
- Ensuring robust governance for sustainability at all levels
- Evidence based planning and decision making
- Using collaborative and multi-disciplinary approaches to options assessment, hydropower siting and design
- Consulting stakeholders and protecting rights and entitlements
- Equitably sharing costs and benefits of development
- Addressing poverty and food security in hydropower basins
- Maintaining basin wide ecosystem integrity

Who can use the RSAT?

- National government ministries and regulatory agencies in water, energy, environment, natural resources and social sectors
- Government power utilities
- Hydropower developers and operators
- Provincial and local government agencies and administrative bodies across different sectors;
- River basin organisations
- Representatives of affected communities and resource user groups
- Local groups in the sub-basin, e.g. water user group
- Transboundary and regional institutions
- NGOs
- Investors and funding organisations

The RSAT is as an easy to use tool suitable for people with either technical or non-technical backgrounds from the above groups.



Four criteria are used to analyse the RSAT topics and sub-topics

1. River Basin Planning and Management

Focuses on the IWRM-based principles and practices in river basin planning and management and the collection of basin wide baseline data to inform these processes. The aim is to consider the different aspects of hydropower in a river basin perspective.

2. Energy / power sector planning and regulation

Focuses on power sector planning, emphasizing hydropower planning and regulation.

3. Hydropower Projects

Focuses on the plans, studies and management actions of all hydropower developers and operators in the basin at all stages of the project cycle (project identification, selection, planning, design, construction and operation).

4. Regulatory and governance

Focuses on the regulatory and institutional framework for hydropower development and water resource management and enforcement at different levels from local to national.

RSAT Topics and Criteria

The RSAT provides a framework of 10 topics and 27 sub-topics for basin wide hydropower sustainability. A set of four criteria are used to analyse the RSAT topics and sub-topics and form the basis of the assessment.

Summary of RSAT Topics and Sub-Topics

TOPIC 1 Institutional capacity

- 1.1 Transboundary institutional capacity
- 1.2 National to local institutional capacity
- 1.3 Water and energy sector integrated planning

TOPIC 2 Options assessment, siting and design

- 2.1 Demonstrated need and options assessment
- 2.2 Siting and design for basin wide sustainable development

TOPIC 3 Economic contribution of hydropower

- 3.1 National economic and financial analysis
- 3.2 Transboundary economic analysis

TOPIC 4 Equitable sharing of hydropower costs and benefits

- 4.1 Transboundary benefit sharing
- 4.2 National to local benefit sharing
- 4.3 Financing ecosystem protection and other measures

TOPIC 5 Social issues and stakeholder consultation

- 5.1 Stakeholder identification and consultation
- 5.2 Assessment and management of basin wide social impacts
- 5.3 Food security and poverty alleviation
- 5.4 Indigenous peoples and ethnic minorities

TOPIC 6 Environmental management and ecosystem integrity

- 6.1 Assessment and management of basin wide environmental impacts
- 6.2 Biodiversity conservation and ecosystem integrity

TOPIC 7 Flows and reservoir management

- 7.1 Multiple water use optimisation and efficiency
- 7.2 Reservoir planning and management
- 7.3 Co-ordinated hydropower operations
- 7.4 Downstream and environmental flows
- 7.5 Flood and drought management

TOPIC 8 Erosion, sediment transport and geomorphological impacts

- 8.1 Sediment baseline and impact assessment
- 8.2 Management of impacts and sediment resources

TOPIC 9 Management of fisheries resources

- 9.1 Baseline and impact assessment
- 9.2 Management of impacts and fisheries resources

TOPIC 10 Dam and community safety

- 10.1 Dam safety
- 10.2 Community safety and emergency response



Why conduct an RSAT assessment?

The RSAT is a flexible tool that can be used to meet a number of different needs and objectives in a sub-basin with proposed or existing hydropower development or a mix of both. An RSAT assessment will help to identify gaps, risks and the key institutional responses and management strategies that can be adopted for sustainable development in a hydropower sub-basin.

An RSAT assessment can be conducted within organisations or as a multi-stakeholder assessment process that brings together groups with key responsibilities and interests in the sub-basin (e.g. developers, government agencies, river basin organisations). The objectives of the assessment will vary, depending on the development context and will be identified during the assessment establishment and preparation stage.

The RSAT includes a range of assessment methods to enable a flexible approach depending on the assessment objectives and the needs and capacity of the institutions involved in the assessment. The RSAT assessment methods are designed primarily for group work and are suitable for participants with both technical and non-technical backgrounds. When a multi-stakeholder group is conducting the assessment a facilitator will help to support the multi-stakeholder dialogue process.

RSAT Assessment Methods

- Multi-criteria gap analysis
- Issue prioritisation
- Action planning
- Institutional mapping

Depending on the objectives of the assessment and the methods used, outputs may include the identification of risks and opportunities, a series of recommended actions, a ranking of sustainability performance or a gap analysis report.

Some examples of objectives that can and have been used for RSAT assessments include:

- To identify gaps in data, regulatory frameworks, institutions and on-ground practices
- To inform studies to optimise development outcomes in the basin
- To assist water and energy planners to identify needs and opportunities for collaboration
- To identify the development risks, opportunities and priorities in the basin within a structured framework
- To inform the scope of cumulative and strategic impact assessment studies
- To inform the development of a watershed management strategy in a hydropower sub-basin
- To assist river basin organisations to identify priorities and develop action plans
- To monitor hydropower sustainability performance in the basin
- To conduct capacity building or training in hydropower sustainability
- To assess transboundary, national and provincial arrangements for hydropower development

Four stages of an RSAT assessment:

- **Establishment Stage**
Set objectives, identify stakeholders and data
- **Preparation Stage**
Collect data and prepare for the assessment using the RSAT Assessment Guide
- **Assessment Stage**
Conduct the RSAT dialogue and assessment process using methods to match the objectives [5 days]
- **Reporting Stage**
Prepare a report on findings
- **Follow up Stage**
Conduct follow up activities



Examples of how different stakeholders can use the RSAT





Guide to RSAT Topics and Criteria

The following sections provide a brief summary of each topic of the RSAT. Each topic summary includes the topic intent, a description of good practice principles and the key aspects that will be assessed.

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TOPIC 1

Institutional capacity

The intent is that there is adequate institutional capacity and co-ordination between water resource planning and management and hydropower development to enable delivery of balanced and equitable development outcomes in the sub-basin.

Sustainable hydropower development depends on the capacity and performance of a number of key stakeholder groups and their level of collaboration and interaction with each other. It is important that roles and responsibilities are clearly allocated within a legal and planning framework and that those agencies and authorities with responsibilities have adequate capacity and resources to implement plans and enforce regulations. The identification and resolution of conflict is another important aspect.

The assessment of this topic will focus primarily on the water and power sectors and the laws, regulations, policies, plans and the various institutions at different levels that have roles and responsibilities. The assessment will include a review of which laws are in place and how they are enforced within the frameworks that govern sustainable water resources and hydropower development.

Topic 1
includes three
sub-topics:

1.1 Transboundary Institutional Capacity

1.2 National Institutional Capacity

1.3 Water and Energy Sector Integrated Planning

Evidence to be reviewed under this topic will include agreements, regulatory frameworks, details of the various institutions with roles and responsibilities, compliance and monitoring reports



TOPIC 2

Options assessment, siting and design

The intent is that the need for hydropower projects and the services they provide can be demonstrated and that siting and design processes result in optimal development outcomes.



Analysis of the options and alternatives available for development of water and energy services is an important consideration to ensure an optimal balance between a number of competing interests. Siting and design must consider many technical considerations (e.g. topography, water availability, geology, road access, transmission constraints) and social and environmental considerations (e.g. population displacement, downstream livelihoods, loss of habitat, flow modifications). Siting and design within a government planning framework enables development optimisation more broadly at the basin level.

The assessment of this topic will focus on how the need for hydropower has been identified at the national or basin level and the work that has been done to analyse a range of development options and alternatives to determine which scenarios are optimal. At a more detailed level the topic then focuses on the processes that are in place to select sites for hydropower projects and consider how various impacts, needs and interests are addressed in the siting and design of projects and groups of projects, both existing and future.

Topic 2
includes two
sub-topics:

2.1 Demonstrated Need and Options Assessment

2.2 Siting and Design for Basin-wide Sustainable Development

Evidence to be reviewed will include hydropower feasibility studies, government hydropower and power development plans and options assessment studies, national water and energy development plans and policies.

TOPIC 3

Economic contribution of hydropower

The intent is that hydropower projects have the financial capacity to meet all costs over the life of project and that hydropower development contributes a net economic benefit to regional and national economies in the long term.

Hydropower projects, to be sustainable need to have the financial capacity to meet all costs over the life of the project, deliver revenue and maintain assets to the required performance standards. This includes the financial capacity to manage existing and emerging risks and fund social and environmental mitigation, compensation and off-set



measures. Hydropower projects should be planned, implemented and operated to achieve their intended purpose and make a positive contribution to economic development.

The assessment of this topic will focus on the processes for economic analysis of hydropower development and the contribution of hydropower to socio-economic development, including affordable and reliable electricity supply and water and energy services in the sub-basin. The capacity of projects to manage risk and fund social and environmental mitigation, compensation and off-set measures will also be considered.

Topic 3
includes two
sub-topics:

3.1 National economic and financial analysis

3.2 Transboundary economic analysis.

Evidence to be reviewed will include economic development plans, cost benefit analysis studies, annual corporate reports, publicly available financial reports, hydropower feasibility and impact assessment studies.

TOPIC 4

Equitable sharing of hydropower costs and benefits

The intent is that communities and jurisdictions where hydropower is located at all project stages are counted amongst the first to benefit from hydropower projects and not the last.

The intention of benefit sharing is to spread hydropower benefits to river basin residents and across the economy to help to catalyse broader based growth and support social equity policies. Benefit sharing also includes the allocation of funds to support river basin planning and environmental management measures as well as water shed and ecosystem protection measures to off-set hydropower impacts. Although various forms of hydropower benefit sharing have been implemented in the Mekong region in recent years, benefit sharing is a relatively new concept and discussion is currently underway in each MRC member country to identify suitable options for comprehensive benefit sharing. There is currently no agreed mechanism in place in the Lower Mekong countries to assess or implement transboundary benefit sharing for hydropower.

During the assessment of this topic the group will gain an understanding of the different types of benefit sharing, including sharing monetary benefits, non-monetary benefits and project services and optimising additional benefits. The assessment will look at the different benefit sharing measures and how they are applied in the basin at different levels.

Topic 4
includes three
sub-topics:

4.1 Transboundary Benefit Sharing

4.2 National to Local Benefit Sharing

4.3 Financing ecosystem protection and other measures

Evidence to be reviewed will include data and information relating to policies, regulations and mechanisms for benefit sharing and the various assessment studies and reports that are used to identify project beneficiaries.

TOPIC 5

Social issues and stakeholder consultation

The intent of this topic is that no people in the basin are worse off as a result of hydropower development



Development of electricity infrastructure is intended to benefit broader society and improve the quality of life of basin residents. For hydropower development, there is a need for socio-economic baseline studies at the river basin level to understand the current situation of people living in the basin and the key socio-economic activities and basin resources that support their livelihoods. Hydropower projects conduct social impact assessment studies to identify how projects will impact on people in the basin, both upstream and downstream of projects and also to assess how the basin population can benefit from hydropower development. People affected by hydropower need to be identified and consulted to ensure that their needs and interests can be addressed in planning and decision making processes at all stages of hydropower development.

The assessment of this topic will focus on the level of social development planning and monitoring in the basin and to what extent hydropower projects contribute to social development or create negative social impacts in the basin.

The assessment will include a review of the social baseline data that is available and how it is used to inform decision making and planning and the regulations, plans and strategies that are in place to address negative social impacts. A key aspect is how hydropower projects and river basin planning institutions in the basin identify stakeholders, communicate and consult with them at different project stages. The assessment will also focus on the relationship between hydropower, food security and poverty in the basin and how population displacement and impacts to indigenous communities are avoided, minimised and / or compensated.

Topic 5
includes four
sub-topics:

5.1 Stakeholder identification and consultation

5.2 Assessment and management of basin wide social impacts

5.3 Food security and poverty alleviation

5.4 Indigenous Peoples and Ethnic Minorities

Evidence to be reviewed will include social impact assessment studies, resettlement plans, social baseline data, national and provincial socio-economic development plans and hydropower social mitigation and compensation plans.



TOPIC 6

Environmental management and ecosystem integrity

The intent is that a basin-wide environmental baseline informs hydropower decision making and that hydropower is developed and managed in a way that maintains basin wide ecosystem integrity.

Hydropower projects fundamentally alter ecosystems through inundation, the regulation of water flow, effects on water quality, the creation of barriers to aquatic migration and modification of habitats. Basin-wide ecosystem integrity relies upon the protection of critical ecosystem functions from negative impacts where feasible and the maintenance of ecosystem connectivity as an integral part of hydropower planning and decision making. This could mean protecting certain tributaries from development or establishing protected areas in other parts of the basin to off-set the loss of values in the tributaries that are developed.

The assessment of this topic will focus on the basin wide water resource, environmental management and biodiversity conservation frameworks and the environmental impact assessment studies and management plans associated with hydropower projects. The assessment will include a review of the environmental baseline data that is available and how it is used to inform planning and decision making for hydropower. The policies, regulations and plans that are in place to protect basin ecosystems from negative impacts will also be reviewed.

Topic 6
includes two
sub-topics:

6.1 Assessment and management of basin wide environmental impacts

6.2 Biodiversity conservation and ecosystem integrity

Evidence to be reviewed includes environmental baseline studies, hydropower environmental impact assessment studies and management plans, institutions, regulations and policies relating to environmental protection and environmental monitoring reports.

TOPIC 7

Flows and reservoir management

The intent is that hydropower planning and management for inflows, reservoirs and downstream and environmental flows exists within an agreed water use framework to achieve multiple social, environmental and economic objectives.

Monitoring and managing the hydrological resource is essential to ensure reliable electricity generation and efficient use of the water resource for all water users in the basin. Hydropower projects alter natural flow regimes in the basin which can result in changes



to water quality, water temperature, the seasonal variation of flows and flood and drought cycles. People in the basin depend on certain flows to support their economic activities such as floodplain agriculture or fishing. When flows change, these production systems also change. Hydropower projects in a cascade or sharing a basin need to share data and optimise use of the water resource between upstream and downstream projects and in consultation with other water users in the basin.

The assessment of this topic will focus on how flows in the basin are understood and managed and the institutions, policies, regulations and plans that exist in the basin to govern the efficient use of water resources and equitable water allocation. The assessment will include a review of how hydropower projects assess and manage impacts to flow regimes at all project stages including analysis of inflows and outflow capacity, the management of hydropower reservoirs and downstream flow requirements. The shared use of water resources in a basin can cause conflicts between different water uses and the assessment will include consideration of the different mechanisms in place for water users to resolve conflicts.

Topic 7 includes five sub-topics:	7.1 Multiple water use optimisation and efficiency 7.2 Reservoir planning and management 7.3 Co-ordinated hydropower operations 7.4 Downstream and environmental flows. 7.5 Flood and drought management <i>Evidence to be reviewed will include hydrological studies, hydropower EIA and feasibility studies, environmental flow assessments, reservoir management plans, national and local institutions, plans, policies and regulations relating to water use and water allocation in the basin.</i>
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TOPIC 8

Erosion, sediment transport and geomorphological impacts

The intent is that erosion and sediment dynamics are understood at the basin level and hydropower impacts are identified and managed effectively to reduce risks and maximise reservoir life span, asset reliability and efficiency.

Sediment transport and deposition is an important issue for hydropower development in a river basin such as the Mekong. Dams and reservoirs can trap sediments being transported down the river and this may reduce the storage capacity and life span of a hydropower reservoir, create higher maintenance costs and therefore affect the financial viability of projects. When sediment is removed from a river system as a result of trapping or extraction, bank erosion can significantly increase in downstream river reaches and delta areas. There are technologies available to flush sediments through dams and they



require a detailed baseline understanding of sediments and careful planning and design to ensure their effectiveness.

This assessment of this topic will focus on scientific studies and the level of understanding of different sediment sources and characteristics and the processes that control erosion, sediment transport and deposition in the basin. The assessment will include a review of how hydropower projects have assessed impacts in EIA studies and the design and mitigation measures in place at all project stages to control erosion and the impacts resulting from disruption to sediment transport and deposition. The contribution of other land and water users in the basin to erosion, sedimentation and geomorphological impacts will also be considered as well as the basin wide management responses and collaboration required.

Topic 8
includes two
sub-topics:

8.1 Baseline and impact assessment

8.2 Management of impacts and sediment resources.

Evidence to be reviewed will include baseline scientific studies, hydropower EIA and EMP reports, information on basin wide land use practices relevant to the topic and the management measures, institutions, plans and policies in place to address impacts.

TOPIC 9

Management of fisheries resources

The intent of this topic is that hydropower is developed in a way that allows for the protection and further development of fisheries resources in a basin and that fishery dependent communities are not worse off as a result of hydropower.

Fisheries resources can be impacted by hydropower development in a number of ways including the blocking of important fish migration routes, change in flows and water quality and changes in critical habitats that can reduce the viability and size of the fishery. Hydropower development may aim to avoid and minimise negative impacts to the fishery or it may involve trade-off's to the fishery sector in which case alternative livelihoods and sources of nutrition for fish dependent communities need to be found. The potential for alternative fishery plans, including reservoir fisheries and aquaculture may be considered to off-set the negative impacts of hydropower on fisheries resources.

This assessment of this topic will focus on the level of scientific understanding of the fishery, the processes that support its productivity and the level of fisheries management and monitoring the basin. The assessment will include a review of hydropower EIA and management plan studies to see how fishery impacts are assessed and management responses are implemented for individual and groups of projects. The basin wide aspects of fishery management will also be reviewed to identify the institutions with roles and responsibilities relating to fisheries management and how the regulations, plans and management measures are enforced and implemented.

Topic 9
includes two
sub-topics:

9.1 Baseline and impact assessment

9.2 Management of impacts and fisheries resources.

Evidence to be reviewed will include; basin fish studies and baseline assessments of the environmental and social aspects of fisheries, hydropower EIA's and management plans, fisheries management plans, policies and regulations and the activities of the institutions with roles and responsibilities relating to fisheries.

TOPIC 10

Dam and community safety

The intent of this topic is that life, property and the environment are protected from the consequences of dam failure, dam operations and other hydropower related community safety risks across the basin



Dams require careful design, construction and operation to ensure the safety and integrity of structures that can have catastrophic consequences upon failure. In particular the application of standards and use of specialised and independent expertise is central to dam safety practices. Dam safety standards must be adhered to in the design of structures and the effects of projects in a cascade need to be considered. The construction of dams to design specification needs to be systematically checked and documented and a baseline for monitoring future changes established. Safety risks at all stages of the project cycle

must be monitored and appropriate action taken when issues arise. In addition to dam safety, community safety at different stages of the project cycle must also be considered. Sudden releases of water from hydropower projects for example may cause accidents or loss of life or property downstream if appropriate warning and notification systems and emergency response systems are not in place.

The assessment will focus on the dam safety system in place for hydropower projects in the basin and how projects co-ordinate with each other to manage basin wide safety risks. Emergency response planning to protect community safety relating to hydropower operations and associated infrastructure will also be assessed.

Topic 10
includes two
sub-topics:

10.1 Dam safety

10.2 Community safety and emergency response

Evidence to be reviewed will include dam safety reports and studies, standards and guidelines applied in the basin, regulations and policies and the activities of institutions with roles and responsibility relating to dam and community safety.



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RSAT

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Mekong River Basin

Economy

Society

Environment

Energy

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