

# JOINT PRIORITIES REPORT

*(DRAFT FOR DISCUSSION)*

*September 2024*

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**PREPARATION STUDY TO SUPPORT THE DESIGN  
OF A COMPREHENSIVE JOINT PROJECT IN THE  
SEKONG, SESAN AND SREPOK (3S) SUB-BASIN  
OF THE MEKONG RIVER**

*Prepared for: GIZ and MRC*

*Prepared by: ICEM*



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**Cover page photo** Beung Khat Ngong wetlands (Lao PDR)

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## ABBREVIATIONS

3S	Sekong, Sesan and Srepok river basins
ASEAN	Association of Southeast Asian Nations
BDS	Basin Development Strategy
BDA	Basin Diagnostic Analysis
BMZ	German Federal Ministry for Economic Cooperation and Development
CBD	Convention on Biological Diversity
EWS	Early Warning System
GCF	Green Climate Fund
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
IWRM	Integrated Water Resources Management
LMB	Lower Mekong Basin
MRC	Mekong River Commission
NBCA	National Biodiversity Conservation Area
NbS	Nature-based solutions
NMC	National Mekong Committee
NP	National Park
NTFP	Non-timber forest product
NWG	National Working Group
SDG	Sustainable Development Goal
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
WS	Wildlife Sanctuary

# 1 INTRODUCTION

## 1.1 3S Joint Project Context

In 2015/2016, the Mekong River Commission (MRC) and its Member Countries identified five joint projects under the MRC Basin Development Strategy (BDS) for the Lower Mekong Basin (LMB) (2016-2020), to help countries further promote the sustainable development of the Mekong Basin. For are being rolled out under the current MRC BDS (2021-2030) and the MRC Strategic Plan (2021-2025) – a cooperative plan to address national, cross-border and regional needs. Supported by MRC, these joint projects involve two or more countries with the aim of tackling transboundary issues and supporting governments in achieving the Sustainable Development Goals (SDGs). The joint projects complement actions and targets at the national level and will further improve national water resources development plans to (i) ensure long-term water and environmental security, and (ii) achieve ecologically sustainable development, as envisioned in the 1995 Mekong Agreement.<sup>1</sup>

Since 2018, GIZ has been supporting the implementation of the MRC Joint Projects as part of the "Transboundary Water Cooperation in the Lower Mekong Basin II" (TWC II) project, which proactively promotes regional integration and transboundary cooperation between the MRC member states.

With funding from the German Federal Ministry for Economic Cooperation and Development (BMZ), GIZ is now working with MRC to replicate the positive collaborative experiences of the *Joint Project on Flood and Drought Management for the 9C-9T sub-basin* shared by Cambodia and Thailand to the 3S river system. MRC and GIZ aim to do that through a *Joint Project for transboundary cooperation for sustainable water resource management in the Sekong, Sesan and Srepok (3S) river basins of the Mekong*.<sup>2</sup> In preparation for the 3S Joint Project a study has been conducted involving a Basin Diagnostic Assessment (BDA) leading to a BDA report, this report on joint priorities of the three 3S countries, and a 3S Basin Atlas which is the web-based repository of all the data gathered and analysis conducted.

The Joint Project preparatory study is facilitated through cross-border and cross-sectoral engagement, collaboration and validation, in coordination with the MRCS, the National Mekong Committees (NMCs) and relevant sectoral agencies in each country. The 3S Joint Project preparatory study builds on past and ongoing studies and projects of the project partners in the 3S region, and applies MRC's experience in the field of integrated water resource management (IWRM) and transboundary collaboration.

## 1.2 Overview of the 3S sub-basin

The Mekong River is one of the world's great rivers. It flows through six countries: China, Myanmar, Thailand, Lao PDR, Cambodia and Viet Nam and covers about 5,000 km from source to sea – from the Tibetan Plateau in China to the Mekong Delta. The entire basin, including the LMB, is one of the most biodiverse regions on the planet, with 1,148 fish species and over 20,000 species of plants, 1,200 bird species, 800 species of reptiles and amphibians, and 430 mammal species. Of the 65 million people living in the LMB, some 80% depend on the river and its rich natural resources for their livelihoods.

The Sekong, Sesan and Srepok rivers, referred to as the 3S river basin (or sub-basin of the Mekong River), are shared by three countries and constitute a significant part of the LMB. The basin – where all three rivers are transboundary – is one of the most important in the Mekong region for flood and drought resilience, sediment dynamics, fisheries, irrigation and aquaculture, natural resource-based livelihoods and biodiversity. The 3S river system comprises approximately 78,650 km<sup>2</sup> in Cambodia (33% of sub-basin area), Lao PDR (29%), and Viet Nam (38%). Combined, it provides over 20% of mean annual flow of the Mekong and almost 15% of its suspended sediment.<sup>3</sup> The source of the three rivers rests in the Central Highlands of Viet Nam. The Sekong flows through Lao PDR before joining with the Sesan and

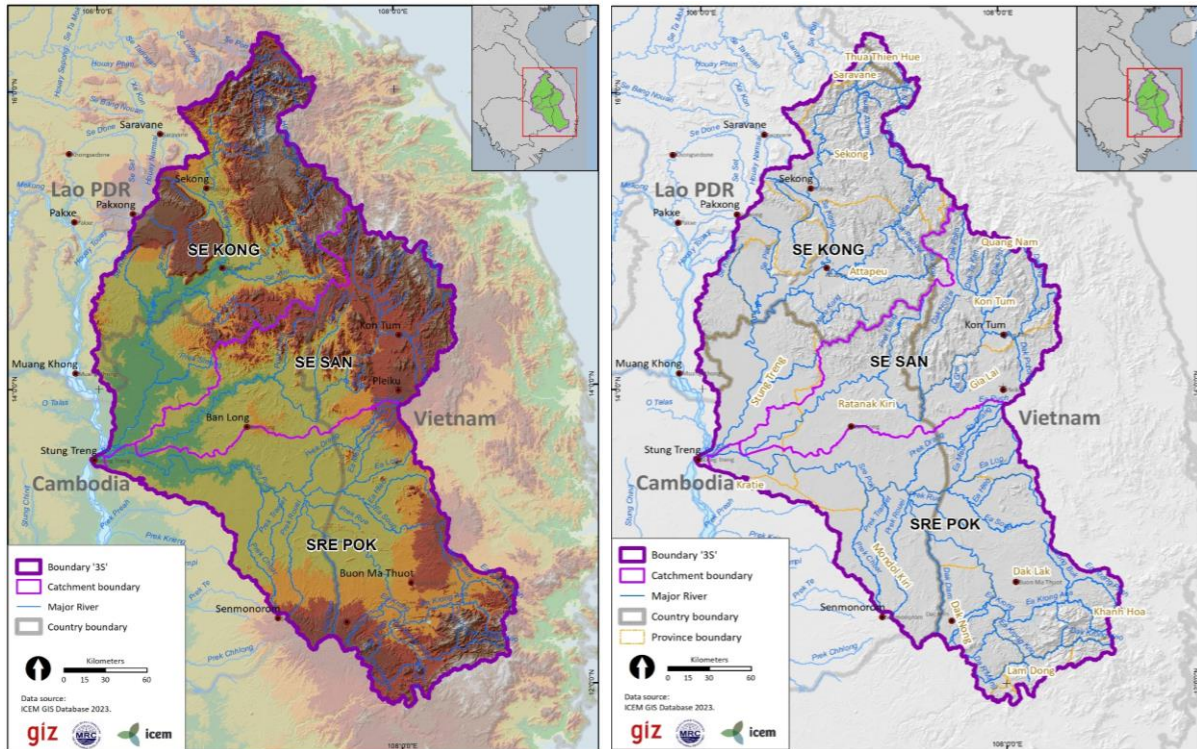
<sup>1</sup> Joint Projects are one cooperation within MRC's overarching strategy to address water resource challenges within the LMB

<sup>2</sup> In 2002, the MRC delineated sub-areas for the LMB to help with development planning and reporting. Numbers increase from upstream to downstream, while the letter denotes the country in which the sub-area falls. The 3S Basins are covered by sub-areas 7C (Cambodia), 7L (Lao PDR), and 7V (Viet Nam)

<sup>3</sup> Brunner et al., 2019

Srepok. The Sesan and Srepok rivers flow through Viet Nam to Cambodia. The three rivers join, forming the confluence with the mainstream of the Mekong River at Stung Treng, in Cambodia (Figure 1).

Figure 1: 3S Sub-Basin topography (L), and river network (R)



The sediment in the 3S provides nutrients vital to fisheries in the Tonle Sap and rice production and fisheries in the Mekong Delta of Cambodia and Viet Nam. The 3S is the Mekong’s most important river basin for migratory fish and sustains productive downstream fisheries. Yet, over half of the LMB fish catch is from long-range migrant species that are particularly susceptible to dams, dikes, and other barriers. Many of the fish in the 3S are migratory (65, 54 and 82 species in the Sekong, Sesan and Srepok respectively), travelling long distances to reach spawning and nursery grounds.<sup>4</sup>

Agriculture and fisheries are the main sources of income for communities living in the 3S, with high value cash crops grown alongside subsistence rice paddies. The most poverty-stricken areas comprise indigenous ethnic groups, located on marginal lands mainly in the high mountainous regions. The livelihoods of these ethnic groups are highly dependent on a mixture of traditional low productivity irrigated and rainfed agriculture, fisheries and forest products. In the 3S, it is the poorest ethnic minority groups and women who disproportionately pay the price for negative effects of economic development.

### 1.1.1 Sekong basin

The Sekong originates in central Viet Nam (comprising 3% of the basin) and flows into southeast Lao PDR – where 78% of its watershed is located – and then into northeast Cambodia (with 19% of the basin). The Sekong River basin is fundamental in overall maintenance of the Mekong hydrological system, for nature-based livelihoods, and for biodiversity and is facing current and imminent threats of increasing flood and drought and land degradation.

The Sekong is the least developed of the 3S in terms of population, agriculture, and hydropower. It is home to over 3.5 million people, highly dependent on the natural resources and ecosystem services. It has the largest proportion of ethnic minorities from over 20 ethnic groups, all relying on the surrounding forests, the fish and fertile lands for gathering and cultivating food. The river is renowned for a profound diversity of fish species, with over 300-350 species, many endemic and 64 migratory. The basin has many globally important areas for biodiversity, including a large freshwater wetland, Beung Kiat Ngong

<sup>4</sup> SWECO-Groner, 2006; Ziv et al, 2012

Ramsar site, found on the western border of the Sekong Basin in Lao PDR. In addition, the Xe Sap National protected area extending across the Central Annamite Mountains in the north of Lao PDR is a wet forest ecoregion, which hosts some of the world's highest concentrations of endemic species. In Cambodia, the North-East Corridor and Siem Pang protected areas, comprise an important network for wetland protection, biodiversity connectivity and flood and drought resilience.

### 1.1.2 Sesan basin

The Sesan River originates in the Central Highlands before flowing into northeast Cambodia, fed by two major tributaries that join above the Plei Krong Dam, near the town of Kon Tum in Viet Nam. The Dak Bla River flows to the west and is joined by the Krong Poko, which flows south. The topography of the Sesan represents a transition between the undulating upper Sekong, and the relatively flatter Srepok.

### 1.1.3 Srepok

The Srepok originates in the Central Highlands of Viet Nam before flowing into northeast Cambodia. The Srepok River is fed by several tributaries that travel from the highlands above Buon Ma Thuot in Viet Nam. These come together to form the Ea Krong River, joining with the Dak Dam River into the Srepok. The Srepok eventually converges with the Sesan and Sekong Rivers before discharging into the Mekong.

Much of the lower Srepok is relatively flat, with extensively valleys cultivated, particularly in Viet Nam. Forest cover in the Srepok is proportionally lower than the Sekong and Sesan, although the basin has the greatest number of protected areas within the 3S. In Cambodia these include Mondulkiri and Nsok protected forests, as well as Lomphat, Phnom Prich and Phnom Namlear wildlife sanctuaries. In Viet Nam there are seven nature reserves, as well as a cultural site at Yok Don and Ho Lak National Park.

## 1.3 Purpose, scope and objectives of the priorities report

This report presents the joint priorities for sustainable water resource management and climate change adaptation for the 3S sub-basin shared by Cambodia, Lao PDR and Viet Nam. The report aims to:

1. Build on the challenges identified in the BDA report to identify joint priorities for the 3S sub-basin for Cambodia, Lao PDR and Viet Nam
2. Define spatial scales of importance for priority setting, outlining key areas of joint focal actions for the next 5-10 years
3. Set a basis and possible direction for developing the future Joint Project between Cambodia, Lao PDR and Viet Nam on sustainable water resource management and climate change adaptation in the 3S sub-basin.

The joint priorities considered in this report are presented for the following scales:

1. 3S as a whole
2. The Sekong basin – shared between Cambodia, Lao PDR and Viet Nam
3. The Sesan basin – shared between Cambodia and Viet Nam
4. The Srepok basin – shared between Cambodia and Viet Nam
5. The 48 catchments of the 3S
6. Priority landscape areas in the 3S.

The main technical focus of the report is on options for overcoming water security and climate change challenges that are transboundary in nature. The cross-cutting issues of IWRM, climate change adaptation, biodiversity and ecosystems services conservation, poverty reduction, livelihoods enhancement and gender equity are integrated throughout the joint priorities. The priorities consider existing and future challenges faced by the 3S.

The report is intended for use and application by the MRC and government line agencies, in setting priorities for transboundary, national and sub-national scales within the 3S sub-basin. Also, it supports future international funding applications for the 3S sub-basin.

The report first identifies the approach to joint priority setting, followed by a section on each of the above scales. The target timeline for these priorities is for the next 5-10 years.

## 2 APPROACH TO SETTING JOINT PRIORITIES FOR THE 3S SUB-BASIN

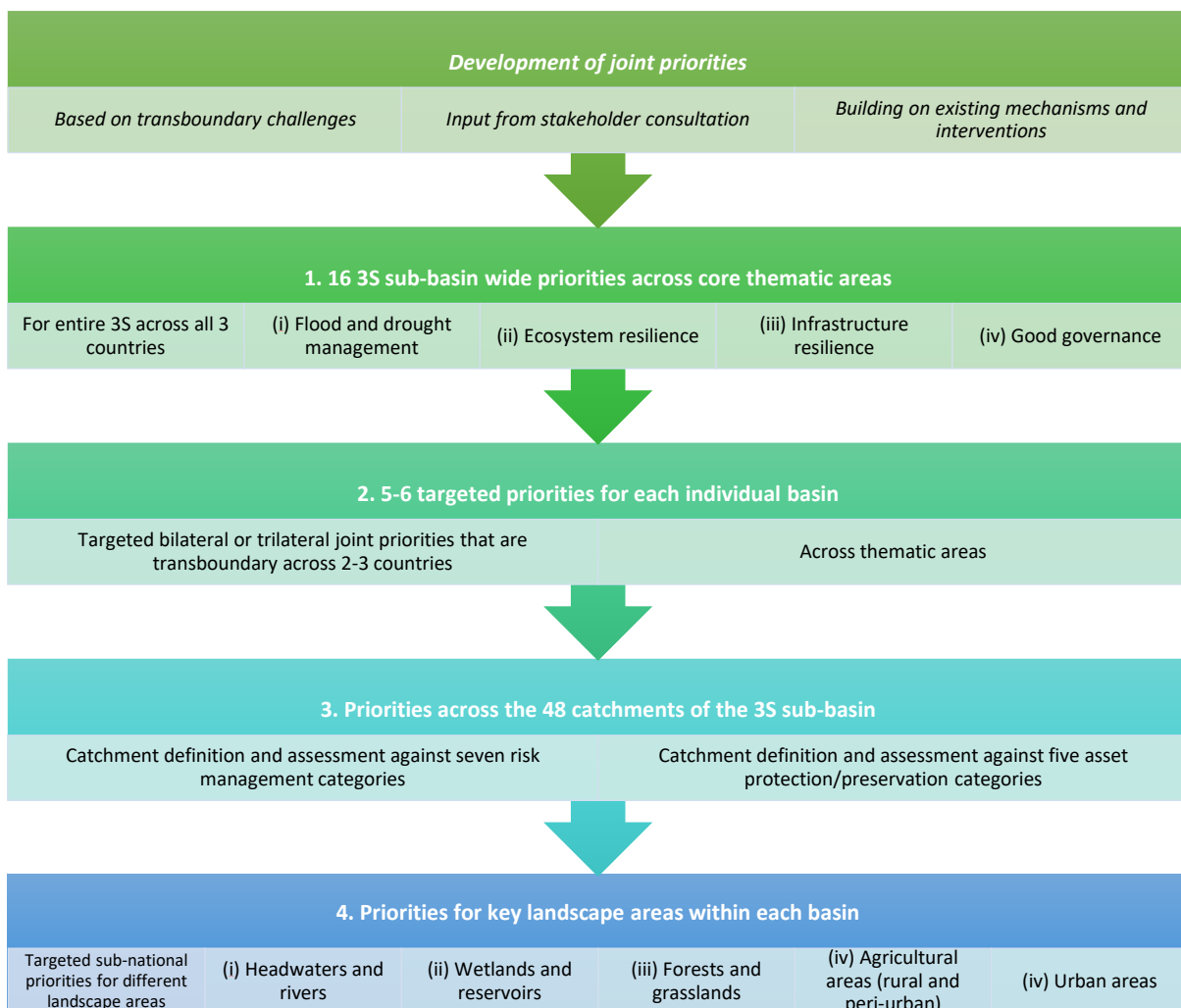
### 1.4 Identifying multi-scale priorities for the 3S sub-basin

For river basin planning and priority setting, it is important to consider different scales of governance (i.e. international, national and sub-national), stakeholders and spaces. The Joint Project development and consultation process has identified an approach to priority setting in the 3S, that considers actors, sectors, risks and assets across multiple scales. The following five levels of joint priority setting are identified as part of this report:

1. **3S sub-basin wide:** overarching, strategic transboundary priorities for the 3S sub-basin, involving all three countries
2. **Sekong, Sesan and Srepok basins specific:** targeted bilateral or trilateral joint priorities for each individual basin
3. **Catchment definition and assessment to identify priorities** against seven risk and five asset categories
4. **Priority landscapes in each basin (within priority catchments):** targeted sub-national priorities for different landscape areas, namely – (i) headwaters rivers and streams; (ii) wetlands and reservoirs; (iii) forests and grasslands; (iv) agricultural areas (rural/peri-urban); (v) urban areas
5. **Identifying specific locations within the target landscapes** which are candidate sites for future Joint Project investment.

Figure 2 presents an overview of the methodology that has been applied to reach these three levels of joint priority setting.

**Figure 2: Joint priorities development approach**



Several steps have been undertaken as part of the 3S Joint Project to identify priorities under the three levels. Specifically, the joint priority setting approach has been informed by several parallel processes, which have enabled the identification of priorities across the different governance and spatial scales.

The different steps that were applied to identify joint priorities within each of the category scales is outlined in the sections below.

## **2.1 International and national commitments – aligning priorities with commitments and obligations**

When setting joint priorities, it is important to consider the strategic commitments, obligations and directions at wider national and international level. In the case of Cambodia, Lao PDR and Viet Nam, this includes the following:

1. International agreements relating to sustainable water resources management, biodiversity conservation, and climate change adaptation, including the United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biological Diversity (CBD, (the United Nations Convention to Combat Desertification (UNCCD), the Convention on Wetlands of International Importance (the Ramsar Convention); and the ASEAN Charter (all countries are Association of Southeast Asian Nations – ASEAN – member states)
2. The MRC Basin Development Strategy for the Mekong River Basin 2021 – 2030, MRC Strategic Plan 2021 – 2025, and National Indicative Plans 2021-2025
3. The national strategic priorities for sustainable water resources management and climate change adaptation identified in key national policy documents in Cambodia, Lao PDR and Viet Nam.

These are considered and presented in more detail in the companion 3S BDA report.

## **2.2 3S wide scale – transboundary challenges identified in the Basin Diagnostic Analysis report**

The BDA presents an overview of the situation in the 3S sub-basin, including a review of the setting, characteristics, trends and drivers of change in the 3S across different environments and sectors.

A key step in the BDA process was the identification and alignment of environmental and social problems that are transboundary in nature, across the countries and basins of the 3S. Problems were identified based on discussions with line agencies, visits to areas within each basin, and via a review of secondary information and primary data collection.

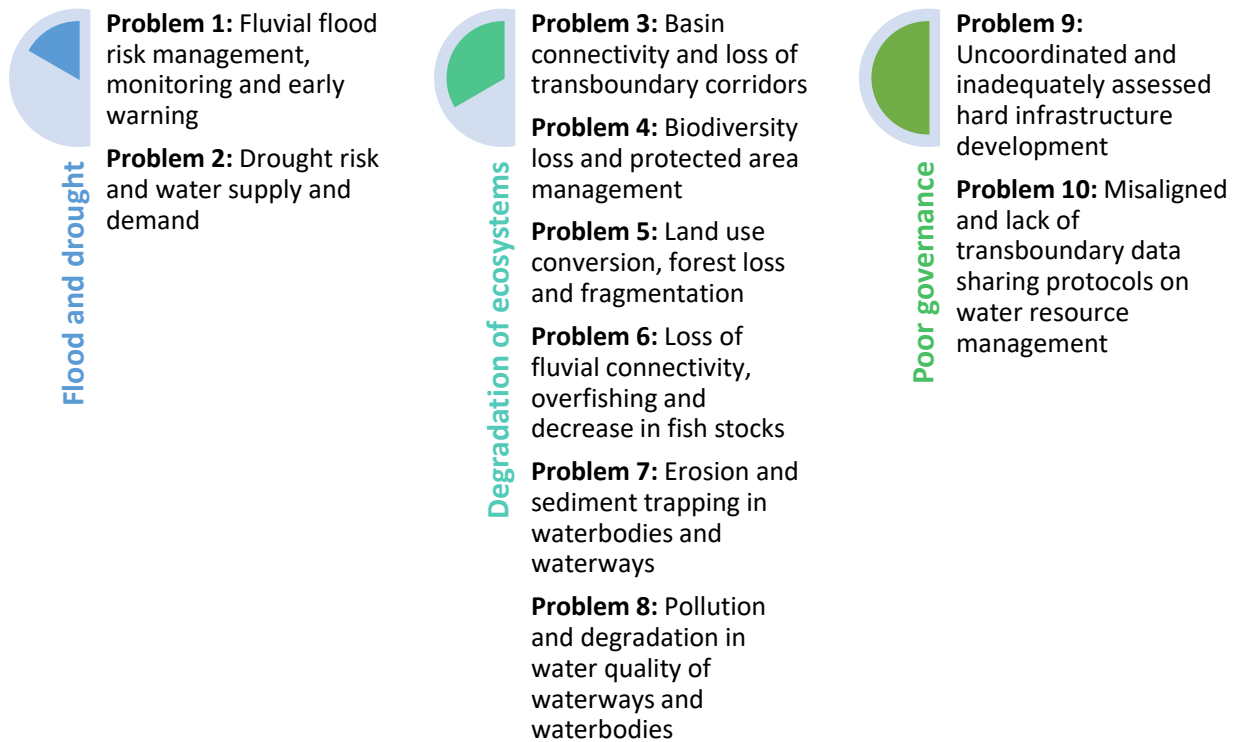
To be transboundary in the 3S, problems must affect two or more countries. Many transboundary challenges exist in the 3S sub-basin, however in situations of scarce resource, there is a need to prioritise and focus on the most pressing issues, to guide future planning and management decisions.

For the BDA study, transboundary challenges were grouped into three core categories – (i) flood and drought risk; (ii) degradation of ecosystems; and (iii) poor governance. These categories form the basis for the later 3S wide and basin specific priority setting outlined in the coming sections.

It should be noted that climate change and governance are cross-cutting themes that are integrated throughout all key 3S challenges, however certain governance issues require more targeted examination and collaboration.

In total, 10 key water resource, biodiversity and climate related challenges have been identified for the 3S sub-basin, which are presented in Figure 3.

Figure 3: Ten priority problems identified by 3S governments and stakeholders



### 2.3 Basin scale – aligning priorities with existing national and joint river basin master plans

Several priorities for the individual basins of the 3S have been identified by countries as part of their national or basin plans, and also previous transboundary projects that have established joint actions and timelines for implementation. A summary of these plans is provided in Figure 4.

Figure 4: Existing river basin plans in the 3S, their implementing countries, and operational timeline



#### 2.3.1 Joint Transboundary Action Plan in the Sesan and Srepok River Basin, 2019-2024

The purpose of the Joint Transboundary Action Plan was to set out management arrangements to support transboundary cooperation between Cambodian and Viet Nam to strengthen sustainable water resources management and development of the Sesan and Srepok basins. The arrangements were called the Joint Transboundary Cooperation Mechanism.

Under the Plan, targeted dialogue and information sharing processes were to be established to support a scientific and value-based approach to transboundary water resources management decision making. The Plan focused on strengthening existing transboundary processes at all levels of government to address the identified priority transboundary water sector issues.

The vision of the Plan is:

*By 2024, establish effective transboundary cooperation between the Governments of Cambodia and Viet Nam to support sustainable water resources management and development of the Sesan and Srepok River Basins and the Mekong Delta.*

The priority transboundary water sector issues identified for the Sesan and Srepok basins are set out in Annex 1. The Action Plan outlines goals, objectives and actions, lead actors, completion dates, and budget implications. Extensive national consultation was undertaken throughout the process to ensure the regional outcomes were connected to the needs of stakeholders that live and work within the two regions. The Plan runs for 5 years from 2019 until December 2024. To date, few of the identified actions have been implemented – yet they are as relevant today as they were when the Plan was prepared.

### **2.3.2 Sekong River Basin Management Plan, 2021-2025**

The Sekong River Basin Management Plan (2021-2025) guides development in the Sekong. It includes a review of problems and solutions, a scenario assessment and a five-year work plan, including detailed activities, budgets, and identification of responsible organizations and stakeholders. The Sekong river basin plan and its IWRM principles is a blueprint for the Department of Water Resource's work in the Sekong basin until end 2025.

The Sekong Basin Management Plan defines its vision as using and developing water resources in the Sekong Basin in an integrated manner to ensure sustainability in quantity and quality, along with protecting the environment, managing dams effectively, adapting to climate change and improving people's lives.

Priorities in the basin are grouped into five key programs – (1) mechanisms for management and participation in watershed management; (2) management of the use of water and water resources; (3) management of water information and water resources; (4) protection and restoration of water resources; and (5) reducing the impact of floods, droughts and climate change.

One of the main priorities identified in the basin is flooding, partly caused by the irregular operations of upstream dams located in Viet Nam (a transboundary issue). This plan identifies activities to establish the units for flood and drought monitoring but does not mention coordination with upstream and downstream countries to manage water.

### **2.3.3 Master Plan for the Sesan River Basin, 2021-2030**

The Sesan plan covering Viet Nam's part of the basin sets out the roles and responsibilities for each key actor in the Sesan. Different sections of the river/tributaries (their location and length) in the 3S are given different functions (e.g. water supply, hydropower, agriculture). Maximum volumes of groundwater and surface water that can be used monthly by 2030 are defined.

The capacities of each hydropower and irrigation reservoir and natural lakes in the Sesan is identified and exact minimum flow requirements are set for each river section. The plan also includes specific stipulations and targets, such as 50% of the minimum flow must be automatically monitored online, the remaining 50% is to be periodically monitored.

### **2.3.4 Master Plan for the Srepok River Basin, 2021-2030**

The overall objective of Viet Nam's Srepok Master Plan is to ensure water security, resource allocation and regulation, and to protect water resources in the basin. The plan highlights the need for interprovincial and international water management and for collaborative management of watershed forests, to maintain forest cover and aquatic resources. Minimum flow is defined, along with riverbank erosion control measures, sedimentation management, groundwater exploitation, and pollution.

## 2.4 3S wide and basin scale priorities – national consultation meetings

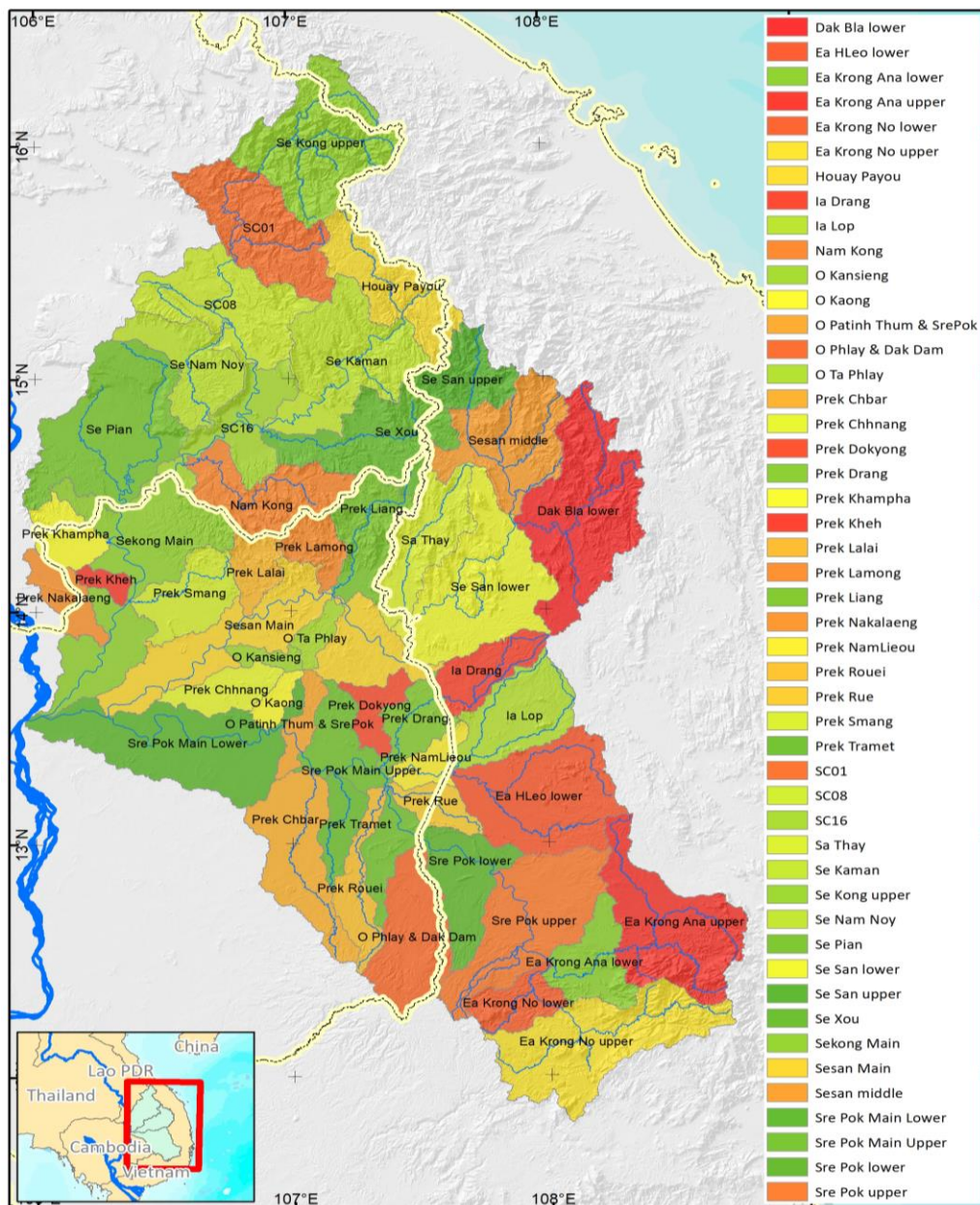
The Joint Project preparatory study has included several rounds of national consultative meetings between August 2023 and September 2024 – including two cross-sectoral national consultation meeting in each country, and a single joint 3S country meeting held in Hanoi. Each of these meetings provided input into the joint priority building process. The national stakeholder meeting recommendations that have contributed to the joint priority setting in this report are available upon request.

At the joint meeting held in Hanoi in August 2024, specific sessions were held over two days for mapping national and transboundary priorities in the 3S sub-basin. The delegations from each country identified top priorities for the 3S as a whole and for the individual basins. Those rich recommendations from the national and joint consultations have been integrated into the priority setting outlined in this report.

## 2.5 Catchment scale – spatial assessment against risks and assets

As part of the BDA, a catchment assessment was undertaken applying a multicriteria analysis to identify hotspot catchments, based on spatial analysis, remote sensing, and ground truthing. As outlined in the BDA report, an assessment of the 48 catchments was undertaken across key risk and asset categories (Figure 5).

Figure 5: The 48 catchments of the 3S sub-basin



Catchments have been assessed and ranked according to risks and rehabilitation needs. Seven composite indexes were developed for the catchment hotspot analysis, comprising several parameters. In addition to the hotspot parameters, five key composite indexes were defined for the asset analysis, comprising the parameters presented in Tables 5 and 6.

Applying the catchment assessment findings has enabled the identification of catchments of highest priority across the different categories (or thematic groups) for resilience building measures. This has been approached by two main areas:

1. Catchments under high pressures from development (human pressure), containing natural resources under increasing pressure/of increasing risk (biodiversity and forests), or at risk from thematic hazards (flood, drought, erosion, climatic), that require **risk management and resilience building interventions**; and
2. Catchments with a high proportion of natural and human assets – specifically ecosystem (of terrestrial and aquatic value) and socio-economic (of cultural and strategic infrastructure value) – that require **asset protection/preservation and resilience building interventions**.

Various parameters were used to calculate the level of priority for each catchment, across different thematic areas. Further information on this process is contained in the BDA report.

For risk management priorities, the seven risk classes include:

- *Flood risk* – average flood depth; flood area (historic)
- *Drought risk* – drought duration (historic)
- *Erosion risk* – potential soil erosion (RUSLE); erodability index (bedrock)
- *Biodiversity loss risk* – Protected areas; key biodiversity areas; degree of naturalness (2020); degree of naturalness loss (2002 - 2020)
- *Forest loss risk* – forest cover; forest loss
- *Climate risk* – Change in precipitation in dry season; change in precipitation in wet season; wettest month precipitation change; change in annual temperature (2050)
- *Human pressure* – population density; agricultural land; plantations; linear infrastructure; built-up areas.

For asset protection/preservation priorities, the five asset classes include:

- *Terrestrial biodiversity* – number of threatened species; native species richness
- *Aquatic biodiversity* – number of threatened species; native species richness
- *Fish species* – fish migration (with and without dam scenarios); endemic fish species
- *Socio-cultural characteristics and diversity* – Ethnic diversity; urban/rural ratio; population within 5km of river; cultural heritage, tourism and recreational sites
- *Strategic infrastructure value* – linear infrastructure; hydropower, irrigation and natural open water reservoirs.

The overall numbers of catchments requiring prioritisation across the 3S sub-basin across the different thematic areas is presented in Tables 1 and 2.

**Table 1: Catchment assessment scoring for each risk index**

Catchment risk management prioritisation category	Risk prioritisation classification				
	Very low	Low	Medium	High	Very high
<b>Flood and drought management</b>					
Flood management	13	8	15	8	4
Drought management	9	12	8	9	10
<b>Ecosystem resilience</b>					
Erosion control	18	10	12	5	3
Biodiversity protection and management	17	6	11	5	9
Forest protection and management	11	16	11	0	10
<b>Cross-cutting (good governance, climate change adaptation and infrastructure resilience)</b>					
Climate change adaptation	15	15	7	6	5
Human pressures	10	9	11	8	10

**Table 2: Catchment assessment scoring for each asset index**

Catchment asset protection/preservation prioritisation category	Asset prioritisation classification				
	Very low	Low	Medium	High	Very high
<b>Ecosystem resilience</b>					
Terrestrial biodiversity value	12	15	5	10	6
Aquatic biodiversity value	14	5	10	11	8
Fish species value	16	3	18	4	7
<b>Cross-cutting (good governance and infrastructure resilience)</b>					
Socio-cultural diversity	10	9	12	10	7
Strategic infrastructure value	16	6	10	10	6

## 2.6 Landscape scale – local consultation and field missions to priority hotspot locations

To support the basin and catchment specific priorities for the 3S sub-basin, field missions were undertaken to each of the three basins within the three project countries. Priority landscapes – which are identified later in this report and presented in more detail in the BDA – were visited, and consultations were held with provincial and local stakeholders. Discussions with local stakeholder facilitated an understanding of planned actions, proposed recommendations and future site-specific priorities for investment within each of the target landscapes.

The field missions informed priority areas to address the range of landscape types and problems identified in the BDA.

This approach moved the priority setting from the 3S sub-basin to basin scale, then for catchments and landscapes within them, down to specific sites to begin the process of defining context specific solutions. This initial development of networks of site-specific actions will need to be picked up and detailed in the planning and design stage for the future 3S Joint Project investments.

### 3 GUIDING PRINCIPLES FOR ESTABLISHING JOINT PRIORITIES

#### 3.1 The importance of taking a nature-based approach at the landscape level

A key theme that came out of consultations with governments and local stakeholders was the need to restore and protect ecosystems in the 3S sub-basin, taking a nature-based approach. Many of the decisions to date in the 3S have focused on siloed hard infrastructure developments, and priorities driven by economics alone.

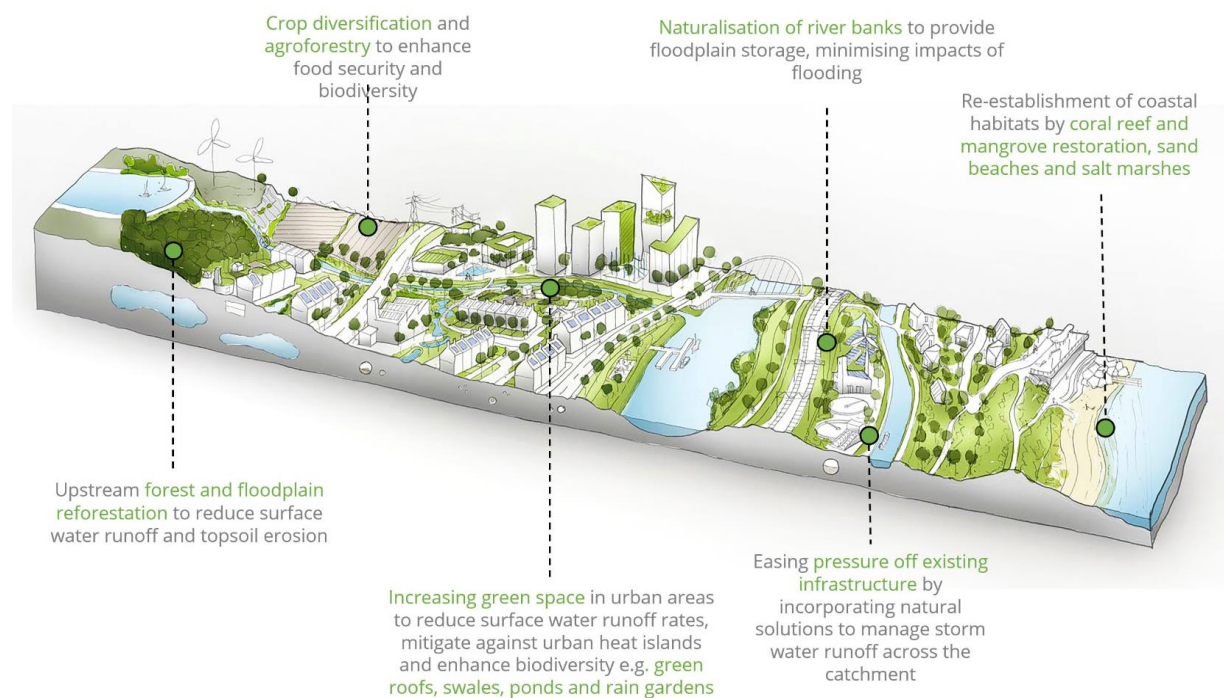
Nature based and hybrid solutions are a foundation for the restoration, protection and ecological sustainability of development in the 3S river basins. Nature-based solutions (NbS) use the services of healthy ecosystems to protect people, enhance infrastructure performance, reduce flood and drought risk, and safeguard resources and biodiversity.

NbS comprise the protection and restoration natural and semi-natural ecosystems, the sustainable management of modified areas or working lands (cropland or forestry land), and the creation of new ecosystems in and around urban areas or across wider natural or agricultural landscapes.<sup>5</sup>

NbS use a set of structural and non-structural interventions that protect, manage, restore, or create natural features. NbS measures should build on, restore and extend the fragments or corridors and networks of natural systems that remain in a landscape. If nature-based and hybrid solutions are present, then further NbS interventions should reinforce and enhance them on the understanding that it is the cumulative impact of an expanding network of nature-based measures that counts. No single NbS will achieve the wider outcomes needed for the protection of infrastructure, livelihoods and ecosystem services.

NbS need to be applied taking an ecosystem approach, with the aim of rehabilitating and conserving ecosystem structure and function, so that ecosystem services and biodiversity are enhanced. An example of an ecosystem approach to river basin planning and management is presented in Figure 6.

Figure 6: Example of an ecosystem approach to river basin planning and management<sup>6</sup>



<sup>5</sup> NbS is an umbrella concept covering green, blue-green, bioengineering and natural infrastructure as sub-categories although the terms are often used interchangeably. Hybrid measures combine NbS and elements of hard or grey infrastructure, or in existing well-developed landscapes such as urban centres.

<sup>6</sup> Image source: Infrastructure Pathways, N.D. Nature-based Solutions <https://infrastructure-pathways.org/use-case/nbs/>

Any NbS initiative must achieve win-win outcomes and adhere to several core principles. The 3S Joint Project should promote the following principles and approach throughout the planning, identification and development of NbS in the 3S sub-basin:

1. Prioritising (i) the protection of existing natural systems and NbS; (ii) the enhancement and restoration of degraded areas; and (iii) the creation of new NbS in networks across sites and landscape;
2. Building on existing natural landscapes and processes;
3. Strengthening natural processes using native species and assemblages seeking net gain in biodiversity; and
4. Involving the right stakeholders, which includes inclusive implementation arrangements and involving local communities – those that are most affected and key to NbS establishment and maintenance.

The future Joint project should adhere to those principles in its design. The project should be able to respond positively to the following three filters:

1. Does the project aim to restore, manage, or conserve one or more ecosystems/ecosystem services?
2. Is this done with the objective of addressing a societal challenge?
3. Does it bring biodiversity benefits and gains?

If the project can't answer any of those questions with a “yes” – then further design work is needed to enhance and refine its NbS contributions.

The 3S has a diverse range of landscapes and interconnected networks of biophysical conditions, from headwaters, rivers and streams; to wetlands and reservoirs; forests and grasslands; agricultural areas; and urban areas (Figure 7). Many of the priorities for the different landscape conditions are cross-cutting and should be considered as part of the ecosystem approach to river basin planning and management. The priorities set out in this report have been shaped with stakeholders at the national and local level, and informed by an assessment of landscape problems and assets. Typical priorities for each landscape area have been identified, applicable across different scales within an individual landscapes (as illustrated in Figure 6).

**Figure 7: The different landscape areas and associated typical priorities in the 3S sub-basin**



### 3.2 Ensuring good governance and integrated implementation arrangements

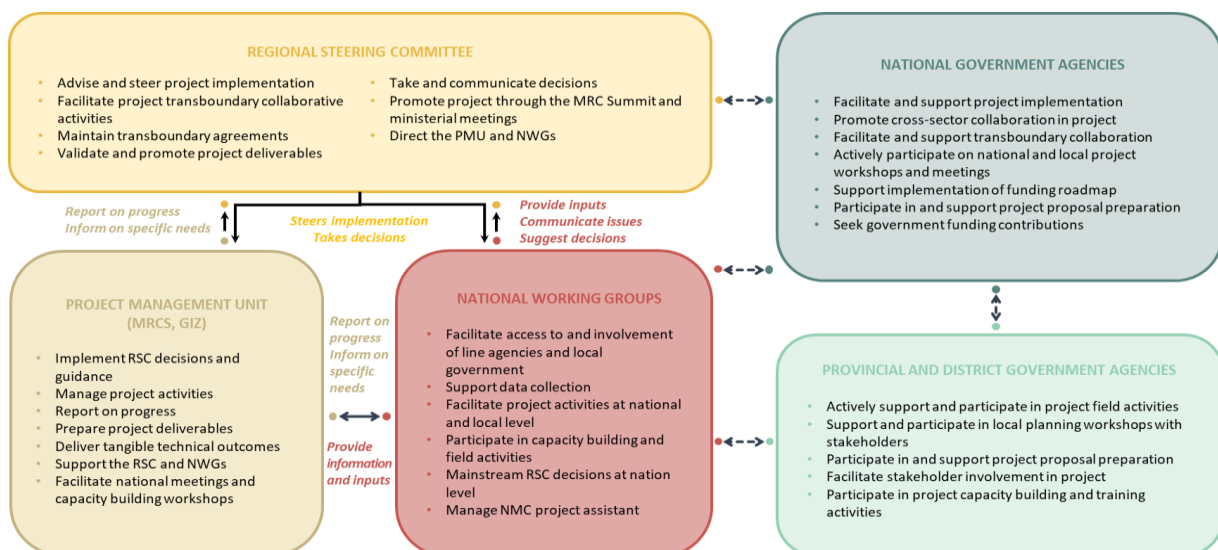
To date, there has been limited transboundary, cross-sectoral and multi-stakeholder engagement and priority setting for the entire 3S. Even basin specific transboundary engagement on river basin master plans has been minimal. That is the main impetus for launching a major 3S Joint Project to identify priority actions for implementation through multi-stakeholder consultation involving all three countries. Those actions need to be at multiple scales and cross-sectoral undertaken with national and provincial line agencies that have roles, responsibilities and jurisdiction within the 3S sub-basin.

At this preliminary stage for the basin diagnostic assessment, no specific stakeholder implementation arrangements are outlined for each joint priority. However, in future phases of the 3S Joint Project, detailed actioning planning and costing will need to be undertaken based on the overarching priorities identified here. Specific leading and supporting agencies – as well as impacted stakeholders – will need to be defined, and international, national and sub-national budget sources will need to be harnessed.

Future transboundary cooperation should consider the below scales of governance:

1. **Strategic policy decisions (regional and national level)** – highest level of government decision making, responsible for overseeing the development and implementation of policies
2. **Strategy, policy, planning and development (national and provincial level)** – mid-to-high level government bodies, responsible for identifying and prioritising issues at the national and sub-national level
3. **Technical advisory and support (national and provincial level)** – expert technical staff that support/inform planning and management decisions, and support the implementation of actions
4. **Sub-national level operations and management** – operational staff at provincial, district and commune level that oversee the day-to-day management of water and natural resources on the ground
5. **Local communities** – community groups and individuals on the ground that support, contribute to, and are impacted by, river basin planning and management decisions. Cooperation at this level should consider gender roles and vulnerable groups
6. **Other stakeholders** – Institutes, non-governmental organisations, development agencies, and private sector representatives that hold a vested interest, and undertake activities in the 3S sub-basin. These should be engaged as relevant during the Joint Project cooperation and implementation process.

Figure 8: Proposed 3S Joint Project implementation arrangements



On the ground, the Joint Project implementation will be achieved through an integrated and transboundary approach so that countries work together to address shared problems. Promoting gender equity and social inclusion across joint priorities and actions is a key consideration for the 3S.

## 4 PRIORITIES FOR THE 3S SUB-BASIN

The core objective for the countries of the 3S sub-basin is transboundary cooperation for sustainable water resource management and climate change adaptation. Priorities for the 3S Joint Project must therefore address that goal.

In total 16 joint priorities have been identified, which provide a foundation for detailed action planning as part of the project design process. These have been categorised into four overarching priority areas identified in the BDA report:

1. Flood and drought management
2. Ecosystem resilience
3. Sustainable infrastructure development
4. Good governance (cross-cutting).

Figure 9 presents an overview of the 3S joint priorities and corresponding actions. Table 3 then presents a detailed summary of (i) the joint priorities, (ii) their transboundary importance, and (iii) river basin planning and management actions for consideration in the next 5-10 years. These actions draw from and build on those identified in the BDA.

**Figure 9: Overarching joint priorities for the 3S sub-basin**



**Table 3: Joint priorities for the 3S sub-basin**

No	Joint priority	Transboundary importance/rationale	Possible example actions for consideration
<b>Flood and drought management</b>			
1	<b>Manage urban and rural flooding through nature-based and hybrid measures</b>	Nature plays a key role in building resilience to flood and drought risk. Consideration should be given to demonstrating pilot examples where a network of NbS measures can be established at strategic and/pr transboundary landscapes, to manage flood and drought (and which could be upscaled in the future)	<ul style="list-style-type: none"> <li>• Undertake hydrological and flood risk modelling and detailed climate change scenario and risk mapping for the entire 3S sub-basin</li> <li>• Develop relevant planning and management tools, including flood management frameworks, drought management frameworks, and urban spatial management planning frameworks</li> <li>• Develop an NbS framework for the 3S sub-basin, for different landscape types. Identify priority hotspots for urban and rural flood and drought risk and design a network of NbS measures for flood and drought management – or project concepts – for these priority demonstration landscapes. Implement NbS pilot projects at demonstration landscapes, in collaboration with local stakeholders (see basin priorities for initial priority locations)</li> </ul>
2	<b>Manage urban and rural drought through nature-based and hybrid measures</b>		
3	<b>Strengthen transboundary hydromet monitoring networks and early warning system (EWS)</b>	Flood and drought monitoring, forecasting and early warnings for the river basin are mainly dealt with at the national level, even though they are recognised as a transboundary issue. Mechanisms needed to improve the effectiveness of warnings and coordinated information sharing on flood and drought risk at the national and transboundary levels.	<ul style="list-style-type: none"> <li>• Expand the 3S hydrometeorology network, focusing on installing hydromet stations at strategic gaps relevant to transboundary flow, including border locations. Also look into option for drought monitoring networks. This should result in a comprehensive joint basin-wide monitoring and assessment of flow and water resource sharing mechanisms</li> <li>• Design and establish a transboundary EWS building on and linking existing national systems. The EWS should involve all elements of an integrated EWS, including (i) risk knowledge; (ii) monitoring and forecasting; (iii) dissemination and communication; (iv) preparedness and response. The EWS should be hosted separately on an MRC-based platform, ideally the 3S Basin Atlas. Strengthen communication mechanisms to reach those that are most vulnerable and in need of warning</li> </ul>
4	<b>Develop sustainable agricultural practices and water storage approaches</b>	Actions to build the resilience of agricultural systems to drought and improve their ecological practices must be grounded in sustainable water resources management and climate change adaptation. Sustainable agricultural water use, requires a transboundary ecosystem-based approach, deviating away from a focus on individual assets, towards connected and resilient groundwater and surface water systems, and a focus on the equitable sharing of water resources.	<ul style="list-style-type: none"> <li>• Develop a transboundary agricultural drought management plan for the 3S</li> <li>• Establishment of provincial centres and programmes to promote sustainable agricultural practices (including the application of NbS), working with local farmers to promote soil conservation techniques and more sustainable practices</li> <li>• Undertake a groundwater assessment for the 3S sub-basin, to understand existing pressures and capacities, and to inform more sustainable agricultural-related groundwater abstraction and monitoring</li> <li>• Strengthen policies and guidance on polluting agricultural activities (e.g. introducing bans on certain pesticides/herbicides) as well as their enforcement</li> <li>• Strengthen policies and guidance on sediment monitoring and management for irrigation reservoirs</li> <li>• Strengthen policies and guidance on ecosystem approaches to networks of irrigation reservoir management and operation. This should include a priority on maximising and building the resilience of existing infrastructure, as opposed to the development of new reservoirs</li> </ul>

Ecosystem resilience		
5	<b>Manage and restore forests and improve destructive land use planning</b>	<p>Land use planning in the 3S largely ignores the importance of protected natural areas. Consideration should be given to policies and mechanisms for the protection of existing forest areas, and the restoration of degraded forests, particularly in headwater areas and protected areas</p> <ul style="list-style-type: none"> <li>• 3S governments should improve and harmonise regulations on forest protection and forest-based land conversion. This should include 3S wide forest auditing, monitoring and effective enforcement of legislation</li> <li>• Detailed surveys should be undertaken across the 3S on forest types, cover, quality and importance. A further assessment should look into the key ecosystem services and non-timber forest products (NTFPs) relied on by local communities</li> <li>• Design and develop forest restoration and rehabilitation schemes, that promote the importance of forest protection, management and restoration, including the involvement of local communities</li> <li>• Foster and establish mechanisms and incentives for conservation of natural forests and compensation mechanisms for forest conservation/ecosystem services, including payment for ecosystem services and community-based carbon credits</li> </ul>
6	<b>Improve transboundary management for fisheries, riverine and wetland resilience</b>	<p>Aquatic ecosystems have not been prioritised in the 3S in recent decades. Mechanisms are needed to restore the health and function of fisheries, riverine and wetland environments. For aquatic ecosystems already impacted by dams, efforts should be made to reconnect upstream and downstream stretches wherever possible. For any proposed new developments on free-flowing rivers and tributaries, these must facilitate the passing of water, fish and sediment to downstream neighbours.</p> <ul style="list-style-type: none"> <li>• Extensive fish surveys and monitoring on species abundance, distribution, diversity, rarity and seasonal migration across 3S basins, including identification of priority reaches and portions of undammed rivers/tributaries. This should also include detailed surveys and assessment on livelihood dependency on fisheries, updated data on fish catch and income, and transboundary management implications in the 3S</li> <li>• Identify key river reaches and aquatic ecosystem areas to be protected from development. Develop basin specific programmes for fish conservation and habitat restoration and foster the preparation of fisheries community management plans</li> <li>• Establish joint studies on the impact of climate change on fish abundance, migration and diversity</li> <li>• Detailed assessment of effects of hydropower and irrigation dams on 3S wide fisheries and recommendations on possible solutions</li> <li>•</li> </ul>
7	<b>Establish transboundary terrestrial and fluvial ecological corridors</b>	<p>Actions are needed across all three basins to (i) protected existing pockets, corridors and ecosystems that remain intact, (ii) restore or allow the natural rehabilitation of former corridors and landscapes that have become cut off and isolated, and finally (iii) to create stepping stones and corridors between priority landscapes in order to expand and reconnect critical transboundary ecosystems</p> <ul style="list-style-type: none"> <li>• Jointly identify priority river and terrestrial corridors in the Sekong, Sesan Srepok (including based on the data and analysis outlined in the BDA e.g. Srepok WS and Yok Don NP). Concurrently, identify priority transboundary protected area landscapes and develop transboundary protected area management plans. Also improve and harmonise regulations on PA management and transboundary collaboration</li> <li>• Develop NbS and hybrid restoration and rehabilitation measures for priority corridors</li> <li>• Foster and establish mechanisms and incentives for the joint management of natural resources and fund transboundary projects to protect and restore ecological corridors</li> </ul>

8	<b>Improved protected area management and conservation measures</b>	<p>Actions in the 3S should aim to improve policies on biodiversity protection, with a focus on protected area and buffer zone management, and ensure the enforcement of such policies to prevent encroachment and biodiversity loss. Financial mechanisms and support from development partners should be leveraged to support protected area management and expansion, as well as species protection and reintroduction, with a focus on endangered species</p>	<ul style="list-style-type: none"> <li>• Detailed biodiversity and habitat baseline surveys, with a focus on protected areas</li> <li>• Develop joint protected area management plans and zoning plans where lacking. Based on these, establish biodiversity and protected area management schemes and projects, including projects to promote the importance of biodiversity conservation, including the involvement of local communities for community-based biodiversity and protected area management</li> <li>• Develop a common vision on biodiversity across the three 3S countries</li> <li>• Improve and harmonise regulations on protected area management and transboundary collaboration, and improve 3S wide protected area monitoring and effective enforcement of legislation</li> <li>• Foster and establish mechanisms and incentives for biodiversity conservation and compensation mechanisms for habitat protection/ecosystem services, including payment for ecosystem services and international donor funding</li> </ul>
<b>Sustainable infrastructure development</b>			
9	<b>Strengthen policies on dam releases and sediment management</b>	<p>The need for transboundary flow and sediment provision in the 3S is fundamental for the sustainability of the sub-basin and the LMB more widely. Mechanisms are needed to improve coordination on dam releases and ecological flows, as well as sediment dynamic practices to reduce reservoir sedimentation and improve sediment transfer downstream. Catchment protection and rehabilitation is an essential part of this.</p>	<ul style="list-style-type: none"> <li>• Detailed assessment of effects of hydropower generation and irrigations dams on the 3S wide hydrological regime (including flood risk maps, effects from hydropeaking, hydromorphological change) and sediment regime (sediment transport and trapping)</li> <li>• Develop a joint 3S dam release protocol guidance document and regulations on dam flushing (new dams) and retrofitting options for existing dams. Also develop 3S dam break risk scenarios and mitigation guidance document</li> <li>• Design and develop of reservoir and riverbank protection and rehabilitation measures (e.g. NbS). Establish projects to promote soil conservation techniques and practices to reduce sedimentation</li> <li>• Improve the control and restriction on numbers and location of sand mining operations Hold regional knowledge exchange workshop on dam releases and knowledge exchange field visits to HPPs</li> </ul>
10	<b>Improve the coordination, assessment and planning of infrastructure</b>	<p>Policies, protocols and guidelines are needed to insure the sustainable and coordinated development of hard infrastructure developments going forward in the 3S, supported by nature-based interventions to increase their resilience in the face of climate change. Transboundary assessments are needed where infrastructure developments will have impacts on upstream or downstream neighbours</p>	<ul style="list-style-type: none"> <li>• Increase the availability of baseline datasets/information in the 3S and build robust decision support systems to support the assessment of infrastructure developments</li> <li>• Build transparency and information sharing about large individual infrastructure developments (including transboundary impacts) and develop protocols and systems for impact monitoring</li> <li>• Promote the greater application of MRC Transboundary Environmental Impact Assessment Guidelines, ensuring the detailed assessment on the impacts of existing and planned infrastructure developments</li> <li>• Mechanisms to strengthen national agencies and institutions capacity for environmental control, oversight and monitoring and the independent review of infrastructure impacts (including the power to reject damaging proposals)</li> </ul>

			<ul style="list-style-type: none"> <li>• <i>Establish improved compensation mechanisms for communities and ecosystems affected by the impact of infrastructure developments</i></li> </ul>
<b>Governance (cross-cutting)</b>			
<b>11</b>	<b>Develop and implement a 3S River Vision and Basin Master Plans</b>	Whilst each country has its own national river basin plans, and attempts have been made at bilateral action plans, an overarching vision and objectives for the 3S need to be established with countries. From this, individual joint river basin plans can be developed	<ul style="list-style-type: none"> <li>• <i>Develop a 15-year transboundary vision for the 3S from 2025-2040 and hold multi-stakeholder and multi-sector consultation workshops with relevant stakeholders on the vision and objectives for the 3S and basin level master plans</i></li> <li>• <i>Design and implement joint masterplans for each 3S basin (or further existing ones), based on national and joint priorities, and once endorsed, establish joint river basin committees and working groups</i></li> </ul>
<b>12</b>	<b>Establish joint data sharing mechanisms and protocols</b>	Common information sharing protocols are lacking in the 3S, and should be established to streamline risk analysis, monitoring, forecasting and communication across countries. A key priority is establishing joint standards for environmental flow and monitoring of performance, common modelling and forecasting approaches, transparency in dam release information, and common locations for online public information (via the 3S Basin Atlas)	<ul style="list-style-type: none"> <li>• <i>Establish joint transboundary mechanisms for the sharing of water resources related information, covering technical and operational aspects, to support evidence-informed decision-making processes and to improve the sustainable management of the water resources</i></li> <li>• <i>Develop common protocols for data sharing and aligned systems for integrating such data. This should include building on the existing 3S Basin Atlas knowledge sharing tool</i></li> </ul>
<b>13</b>	<b>Exchange information and knowledge on sustainable IWRM and NbS</b>	Each country of the 3S has excellent good practice examples of sustainable water resource management and climate change adaptation interventions. However, mechanisms and measures on IWRM and climate change adaptation practices at the transboundary level are still relatively limited. The capacity of stakeholders involved in these mechanisms at different scales should be increased going forward. Lessons can also be learnt from the wider LMB	<ul style="list-style-type: none"> <li>• <i>Identify key stakeholders requiring capacity development (including vulnerable groups) and develop a 3S capacity building and training plan</i></li> <li>• <i>Plan capacity building workshops and training for different stakeholders, including national and provincial government agencies, local communities and the private sector</i></li> <li>• <i>Develop an upscaling and replication strategy for the 3S</i></li> <li>• <i>Establish an excellence hub for the 3S through the MRC and facilitate knowledge sharing workshops. Once proposed NbS measures are in place, this could include the undertaking joint field visits to demonstration landscapes (and also other landscapes in the LMB)</i></li> </ul>
<b>14</b>	<b>Build regional capacity and promote IWRM and adaptation practices</b>		

15	<b>Build stakeholder participation in river basin planning and management</b>	Inclusive governance for river basin planning and management in the 3S sub-basin is critical going forward Promoting gender equity and social inclusion within project activities and outputs will be a key part of this approach	<ul style="list-style-type: none"> <li>• Undertake detailed stakeholder mapping of multi-scale stakeholders and communities of most importance to the 3S sub-basin. Based on this, develop a stakeholder engagement framework for river basin planning in the 3S sub-basin</li> <li>• Engage relevant stakeholders, including vulnerable groups, in different components of river basin planning and management activities going forward</li> </ul>
16	<b>Identify international funding mechanisms</b>	Whilst national budget commitments are critical elements for the joint priorities and proposed interventions for the 3S sub-basin, support from international funding sources can complement this, focusing on sustainable water resource management and climate change adaptation activities	<ul style="list-style-type: none"> <li>• With support of the MRCS and GIZ, project implementers should identify possible international funding sources and mechanisms. Example donors may include the Global Environment Facility (GEF) and the Green Climate Fund (GCF). Workshops and consultations should be held with donors such as these</li> <li>• Develop joint funding proposals for priority funds in collaboration with national and local governments</li> </ul>

## 5 PRIORITIES FOR THE SEKONG BASIN

In the Sekong, priorities are focused on building ecosystem resilience, reversing historic ecosystem degradation trends, building transboundary assessment, monitoring and effective communication in operating the networks of infrastructure projects, and establishing and protecting connectivity in aquatic and terrestrial systems across the Sekong basin (Table 4).

**Table 4: Joint priorities for the Sekong basin**

No	Joint priority	Transboundary importance/rationale
1	<b>Develop a joint Sekong River Basin Masterplan</b> <i>(governance)</i>	A joint master plan should be developed collaboratively between Viet Nam, Lao PDR and Cambodia for the Sekong basin. This should identify a 5–10-year action plan, outlining roles and responsibilities of key actors, as well as budget costs and commitments
2	<b>Manage and restore forests, wetlands (including trapeangs) and peatlands</b> <i>(ecosystem resilience)</i>	A programme to protect and restore forests of strategic importance – especially in the middle Sekong in Lao PDR (around Sekong and Attapeu to the east and south of the Bolaven Plateau) and the lower Sekong basin in Cambodia (around the Siem Pang plains and down to Stung Treng) – should be established. This should work with different sectors to reduce encroachment and land use conversion. Key wetlands (and peatlands), such as Beung Khat Ngong Ramsar site (Lao PDR), and Trapeangs in Siem Pang WS (Cambodia), should also be a strategic focus of the programme
3	<b>Improve protected areas management develop joint protected area plans between Lao PDR and Cambodia</b> <i>(ecosystem resilience)</i>	Transboundary protected areas, such as Xe Pian National Biodiversity Conservation Area (NBCA) in Lao PDR with Siem Pang and Virachey Wildlife Sanctuary (WS) in Cambodia, and Dong Ampham NBCA in Lao PDR, should be prioritised for protected area management. Joint management plans and visions should be developed, involving all relevant stakeholders, and including protected area buffer zones
4	<b>Manage urban flood and rural flood risk and reduce bank erosion at key hotspots</b> <i>(flood and drought management, sustainable infrastructure development and ecosystem resilience)</i>	Urban flood and erosion management mechanisms and measures should focus on Sekong, Attapeu, Sanamxai and Siem Pang towns, who are currently dealing with transboundary water and climate challenges. Rural flood risk mechanisms and measures should focus on rural communities located along the Sekong and those in high elevated areas at risk from flash flooding.
5	<b>Strengthen transboundary hydromet networks, data sharing, flood and drought early warning and forecasting systems</b> <i>(governance)</i>	Hydropower development is increasing in the Sekong, from the A Luoi dam in the upper Sekong headwaters in Viet Nam, to the Sekong A dam under construction in Lao PDR near the border with Cambodia. With these new developments there is a need for improved hydromet monitoring and EWS design and implementation. Data will also need to be shared on flow and water resource implications across Cambodia, Lao PDR and Viet Nam
6	<b>Promotion of groundwater restoration and recharge</b> <i>(flood and drought management and ecosystem resilience)</i>	Groundwater is a key water source for stakeholders in the Sekong. There is however uncertainty regarding the security of groundwater resources in the face of increasing domestic, agricultural and industrial use. Assessments, policies and protocols should be established to foster sustainable abstraction practices and preserve groundwater quantity and quality

## 6 PRIORITIES FOR THE SESAN BASIN

Sustainable water resource management and climate change adaptation priorities in the Sesan are largely focused on creating enabling environments for improved transboundary water management, particularly regarding hydropower operations. In addition, priorities relate to flood and drought management and building ecosystem resilience (Table 5).

**Table 5: Joint priorities for the Sesan basin**

No	Joint priority	Possible actions
1	<b>Develop a joint Sesan River Basin Masterplan</b> ( <i>governance</i> )	A joint master plan should be developed collaboratively between Cambodia and Viet Nam for the Sesan basin. This should identify a 5–10-year action plan, outlining roles and responsibilities of key actors, as well as budget costs and commitments
2	<b>Manage and restore forests and wetlands across Cambodia and Viet Nam</b> ( <i>ecosystem resilience</i> )	A programme to protect and restore forests of strategic importance should be established – particularly in the middle Sesan at the border between the two countries, where the Chu Mom Ray (Viet Nam) and Virachey (Cambodia) protected area network is located. In the lower Sesan this should focus building ecological networks across the Ban Long agricultural landscapes, and protecting the Sesan river wetlands and riparian buffer zones down to Stung Treng. This should work with different sectors – in particular agriculture and hydropower stakeholders – to reduce encroachment and land use conversion
3	<b>Build rural flood and drought risk management approaches</b> ( <i>flood and drought management, ecosystem and sustainable infrastructure development</i> )	Rural flood risk mechanisms and measures should focus on rural communities located along the Sesan river, who are currently dealing with transboundary water and climate challenges. Rural drought risk mechanisms and measures should focus on priority agricultural landscapes with water resource challenges, including those in the Viet Nam portion of the basin (around Kon Tum, Plieku and Plei Doch) and in Cambodia around the Ban Lung agriculture area. This should also aim to restore ecosystem function.
4	<b>Strengthen transboundary hydromet networks, data sharing, flood and drought early warning and forecasting systems between upstream Viet Nam and downstream Cambodia</b> ( <i>governance</i> )	Hydropower development – including the Sesan cascade network in Viet Nam and the Lower Sesan 2 dam in Cambodia – are a key concern in the Sesan basin. There is a need for improved hydromet monitoring networks and EWS design and implementation
5	<b>Monitor, assess and improve water resource management and ecological flow and establish coordinated mechanisms and joint protocols for dam operation and releases, data management and exchange, and EWS</b> ( <i>governance</i> )	The upstream hydropower cascade in Viet Nam has variable implications on the downstream flow and water resources in Cambodia. Joint protocols should be established on minimum ecological flow regimes, assessing changes and reducing impacts on local communities and ecosystems. Data sharing mechanism also need to be strengthened on river flow and water resource implications across Cambodia and Viet Nam.

## 7 PRIORITIES FOR THE SREPOK BASIN

Priorities in the Srepok align largely with those of the Sesan basin, considering the similar institutional setting, and challenges they both face. Where the Srepok differs is its network of protected areas located. These protected areas provide important ecosystem services for the basin, as well as a critical transboundary ecological corridor of regional importance. Much of the forest and wetland management and restoration will likely occur in these areas (Table 6).

**Table 6: Joint priorities for the Srepok basin**

No	Joint priority	Possible actions
1	<b>Develop a joint Srepok River Basin Masterplan</b> ( <i>governance</i> )	A joint master plan should be developed collaboratively between Cambodia and Viet Nam for the Srepok basin. This should identify a 5–10-year action plan, outlining roles and responsibilities of key actors, as well as budget costs and commitments.
2	<b>Improve protected areas management develop joint protected area plans between Cambodia and Viet Nam</b> ( <i>ecosystem resilience</i> )	The transboundary protected area network of Yok Don National Park (NP) (Viet Nam), O’Yadao, Srepok, Lomphat, Phnom Prich and Phnom Nam Lyr WS, should be prioritised for protected area management. The Chu Yang Sin and Bi Dup Nui Ba headwater areas also provide critical water sources for the basin. Joint management plans and visions should be developed, involving all relevant stakeholders, and including protected area buffer zones. A programme to protect and restore forests of strategic importance should be established. Such an initiative should focus building ecological networks across the protected area networks.
3	<b>Develop sustainable and drought resilient agricultural practices and build water security</b> ( <i>flood and drought management and ecosystem resilience</i> )	The Srepok basin is a key region for food and natural resource production. Rural drought risk mechanisms and measures should focus on priority agricultural landscapes with water resource challenges, including those in the Viet Nam portion of the basin (around Buon Ma Thuot) and in Cambodia around Bu Dam and Lumphat. This should also aim to restore ecosystem function. Flood risk considerations should be given to agricultural strongholds, including Lumphat town in Cambodia.
4	<b>Strengthen transboundary hydromet networks, data sharing, flood and drought early warning and forecasting systems between upstream Viet Nam and downstream Cambodia</b> ( <i>governance</i> )	Hydropower development – especially the Srepok cascade network in Viet Nam – are a key concern in the Srepok basin. In addition, the planned development of new hydropower projects in Cambodia poses a threat to downstream assets. There is a need for improved hydromet monitoring networks and EWS design and implementation.
5	<b>Monitor, assess and improve water resource management and ecological flow and establish coordinated mechanisms and joint protocols for dam operation and releases, data management and exchange, and EWS</b> ( <i>governance</i> )	The upstream hydropower cascade in Viet Nam has variable implications on the downstream flow and water resources in Cambodia. Joint protocols should be established on minimum ecological flow regimes, assessing changes and reducing impacts on local communities and ecosystems. Data sharing mechanism also need to be strengthened on river flow and water resource implications across Cambodia and Viet Nam.

## 8 PRIORITIES FOR 3S CATCHMENTS

The following section highlights catchments that should be the focus of thematic joint priority setting activities in each basin for both (i) risk management and resilience building interventions; and (ii) asset protection/preservation and resilience building interventions.

Tables 7 to 9 demonstrate the key risk management priorities for Sekong, Sesan and Srepok catchments respectively.

**Table 7: Sekong catchments priority risk management interventions**

Sekong basin catchment	Risk management category						
	Flood risk management	Drought risk management	Erosion control	Biodiversity risk management	Forest risk management	Climate change adaptation	Human pressure and development safeguards
Houay Payou	Yellow	Green	Green	Green	Yellow	Green	Green
Nam Kong	Yellow	Green	Green	Yellow	Yellow	Yellow	Green
Prek Khampha	Green	Orange	Green	Red	Green	Green	Green
Prek Kheh	Green	Red	Green	Orange	Green	Red	Green
Prek Nakalaeng	Green	Red	Green	Orange	Green	Red	Green
Prek Smang	Green	Yellow	Green	Yellow	Green	Orange	Green
SC01	Orange	Yellow	Green	Green	Red	Green	Green
SC08	Orange	Orange	Yellow	Green	Red	Green	Orange
SC16	Yellow	Green	Orange	Green	Green	Green	Orange
Se Kaman	Red	Green	Orange	Yellow	Red	Green	Yellow
Se Kong upper	Orange	Orange	Green	Yellow	Yellow	Green	Green
Se Nam Noy	Yellow	Green	Orange	Yellow	Red	Green	Yellow
Se Pian	Yellow	Green	Green	Red	Red	Green	Yellow
Se Xou	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Green
Sekong Main	Orange	Yellow	Yellow	Yellow	Green	Orange	Green

**Table 8: Sesan catchments priority risk management interventions**

Sesan basin catchment	Risk management category						
	Flood risk management	Drought risk management	Erosion control	Biodiversity risk management	Forest risk management	Climate change adaptation	Human pressure and development safeguards
Dak Bla lower	Red	Green	Orange	Green	Green	Green	Red
O Kansieng	Green	Red	Yellow	Green	Yellow	Yellow	Orange
O Ta Phlay	Green	Yellow	Green	Green	Yellow	Red	Orange
Prek Chhnang	Green	Red	Green	Green	Yellow	Yellow	Yellow
Prek Lalai	Green	Green	Green	Red	Green	Orange	Green
Prek Lamong	Green	Green	Green	Red	Green	Red	Green
Prek Liang	Green	Green	Green	Red	Green	Orange	Green
Sa Thay	Orange	Orange	Green	Green	Red	Red	Yellow
Se San lower	Orange	Orange	Orange	Green	Green	Yellow	Red
Se San upper	Yellow	Green	Red	Green	Red	Green	Orange
Sesan Main	Orange	Orange	Green	Green	Yellow	Orange	Yellow
Sesan middle	Yellow	Green	Red	Green	Green	Green	Red

**Table 9: Srepok catchments priority risk management interventions**

Srepok basin catchment	Risk management category						
	Flood risk management	Drought risk management	Erosion control	Biodiversity risk management	Forest risk management	Climate change adaptation	Human pressure and development safeguards
Ea HLeo lower	Yellow	Orange	Green	Green	Green	Green	Red
Ea Krong Ana lower	Green	Orange	Yellow	Green	Green	Green	Red
Ea Krong Ana upper	Orange	Green	Yellow	Green	Green	Green	Red
Ea Krong No lower	Yellow	Yellow	Yellow	Green	Red	Green	Orange
Ea Krong No upper	Yellow	Green	Yellow	Green	Red	Yellow	Yellow
Ia Drang	Green	Orange	Red	Green	Green	Green	Red
Ia Lop	Green	Red	Yellow	Green	Green	Green	Red
O Kaong	Green	Red	Green	Green	Red	Yellow	Red
O Patinh Thum & SrePok	Yellow	Red	Green	Yellow	Yellow	Green	Orange
O Phlay & Dak Dam	Green	Green	Yellow	Orange	Green	Orange	Yellow
Prek Chbar	Green	Green	Green	Orange	Green	Green	Green
Prek Dokyong	Green	Red	Green	Green	Green	Green	Orange
Prek Drang	Green	Red	Green	Yellow	Yellow	Green	Green
Prek NamLieou	Yellow	Yellow	Green	Red	Green	Green	Green
Prek Rouei	Green	Green	Green	Yellow	Green	Green	Green
Prek Rue	Green	Green	Green	Red	Green	Green	Yellow
Prek Tramet	Green	Green	Green	Red	Green	Green	Green
Sre Pok lower	Yellow	Green	Green	Orange	Green	Green	Yellow
Sre Pok Main Lower	Red	Red	Yellow	Yellow	Yellow	Green	Yellow
Sre Pok Main Upper	Red	Yellow	Green	Red	Green	Green	Green
Sre Pok upper	Yellow	Yellow	Yellow	Green	Green	Green	Red

Table 10 demonstrates the catchments of highest priority for risk management interventions across the 3S, and which should be the focus for catchment scale river basin planning and management.

Table 11 demonstrates the catchments of highest priority for asset protection/preservation across the 3S, and which should be the focus for catchment scale river basin planning and management.

**Table 10: Highest priority catchments for risk management interventions under each thematic area**

Catchment prioritisation category	Sekong catchments of highest priority for risk management intervention (score of 4 or 5)	Sesan catchments of highest priority for risk management intervention (score of 4 or 5)	Srepok catchments of highest priority for risk management intervention (score of 4 or 5)
<b>Flood and drought management</b>			
<b>Flood risk management</b>	SC01 SC08 Se Kaman Se Kong upper Sekong Main	Dak Bla lower Sa Thay Se San lower Sesan Main	Ea Krong Ana upper Sre Pok Main Lower Sre Pok Main Upper
<b>Drought risk management</b>	Prek Khampha Prek Kheh Prek Nakalaeng SC08 Se Kong upper	O Kansiang Prek Chhnang Sa Thay Se San lower Sesan Main	Ea HLeo lower Ea Krong Ana lower Ia Drang Ia Lop O Kaong O Patinh Thum & SrePok Prek Dokyong Prek Drang Sre Pok Main Lower
<b>Ecosystem resilience</b>			
<b>Erosion control</b>	SC16 Se Kaman Se Nam Noy	Dak Bla lower Se San lower Se San upper Sesan middle	Ia Drang
<b>Biodiversity risk management</b>	Prek Khampha Prek Kheh Prek Nakalaeng Se Pian	Prek Lalai Prek Lamong Prek Liang	O Phlay & Dak Dam Prek Chbar Prek NamLieou Prek Rue Prek Tramet Sre Pok lower Sre Pok Main Upper
<b>Forest risk management</b>	SC01 SC08 Se Kaman Se Nam Noy Se Pian	Sa Thay Se San upper	Ea Krong No lower Ea Krong No upper O Kaong
<b>Cross-cutting (good governance, climate change adaptation and infrastructure resilience)</b>			
<b>Climate change adaptation</b>	Prek Kheh Prek Nakalaeng Prek Smang Sekong Main	O Ta Phlay Prek Lalai Prek Lamong Prek Liang Sa Thay Sesan Main	O Phlay & Dak Dam
<b>Human pressures</b>	SC08 SC16	Dak Bla lower O Kansiang O Ta Phlay Se San lower Se San upper Sesan middle	Ea HLeo lower Ea Krong Ana lower Ea Krong No lower Ia Drang Ia Lop O Kaong O Patinh Thum & SrePok Prek Dokyong Sre Pok upper

**Table 11: Highest priority catchments for asset protection under each thematic area**

Catchment prioritisation category	Sekong catchments of highest priority for asset protection/preservation (score of 4 or 5)	Sesan catchments of highest priority for asset protection/preservation (score of 4 or 5)	Srepok catchments of highest priority for asset protection/preservation (score of 4 or 5)
<b>Ecosystem resilience</b>			
<b>Terrestrial biodiversity value</b>	Houay Payou Nam Kong Prek Smang Se Kaman Se Kong upper	Dak Bla lower Prek Lalai Prek Lamong Prek Liang Sa Thay Se San upper Sesan middle	Ea Krong Ana upper Ea Krong No upper O Phlay & Dak Dam
<b>Aquatic biodiversity value</b>	Nam Kong Prek Khampha Prek Nakalaeng Prek Smang SC01 SC08 SC16 Se Kong upper Se Nam Noy Se Pian Se Xou Sekong Main	Prek Lamong Prek Liang Sesan Main	O Phlay & Dak Dam Prek Chbar Sre Pok Main Lower Sre Pok Main Upper
<b>Fish species value</b>	Prek Khampha Prek Nakalaeng Prek Kheh Prek Smang SC01 SC08 SC16 Se Nam Noy Se Pian Sekong Main	-	Sre Pok Main Lower
<b>Cross-cutting (good governance and infrastructure resilience)</b>			
<b>Socio-cultural diversity</b>	SC08 SC16 Se Kaman Se Xou Sekong Main	Dak Bla lower Se San lower Sesan Main Sesan middle	Ea HLeo lower Ea Krong Ana lower Ea Krong Ana upper Ea Krong No lower Ea Krong No upper O Phlay & Dak Dam Sre Pok Main Lower Sre Pok upper
<b>Strategic infrastructure value</b>	SC08 SC16 Se Kaman Se Nam Noy Se Xou	O Kansiang O Ta Phlay Se San lower Sesan Main Sesan middle	Ea HLeo lower Ea Krong Ana lower Ea Krong Ana upper Ia Lop Sre Pok Main Lower Sre Pok upper

## 9 PRIORITIES FOR KEY LANDSCAPES

A network of six or seven priority landscapes have been identified in each basin. The landscapes represent a diversity of ecosystems, settlements, infrastructure assets, and flood and drought resilience building needs within Cambodia, Lao PDR and Viet Nam. Some are linked directly to transboundary concerns which have been raised by countries – and all aim to demonstrate protection and restoration across a landscape with implications for transboundary processes and effects as presented in Figure 7, including headwaters and drainage corridors, rural landscapes, and urban areas.

In each landscape, a range of linked priorities for adaptation and resilience building measures has been identified. When actioned they will bring multiple benefits – including strengthening hard infrastructure resilience, restoring ecological integrity and connectivity, improving the management of water quality and supply, reducing flood and drought risk, securing the conservation of water resources, and the restoration of watersheds and degraded forests.

Priority challenges and interventions in target landscapes are outlined below for each basin, along with a map of their location. The table and map colour coding aligns with the dominant landscape category outlined in Figure 7.

During the detailed design of the 3S Joint Project, the long list of priority landscapes and their required actions should be reviewed and refined. Future phases of the 3S Joint Project will require detailed consultations, technical surveys and assessments, site visits, hydrological modelling, and exploration of of NbS/hybrid options, to identify which of the long list landscapes and site activities should be integrated into the project.

### 9.1 Sekong basin priority landscapes

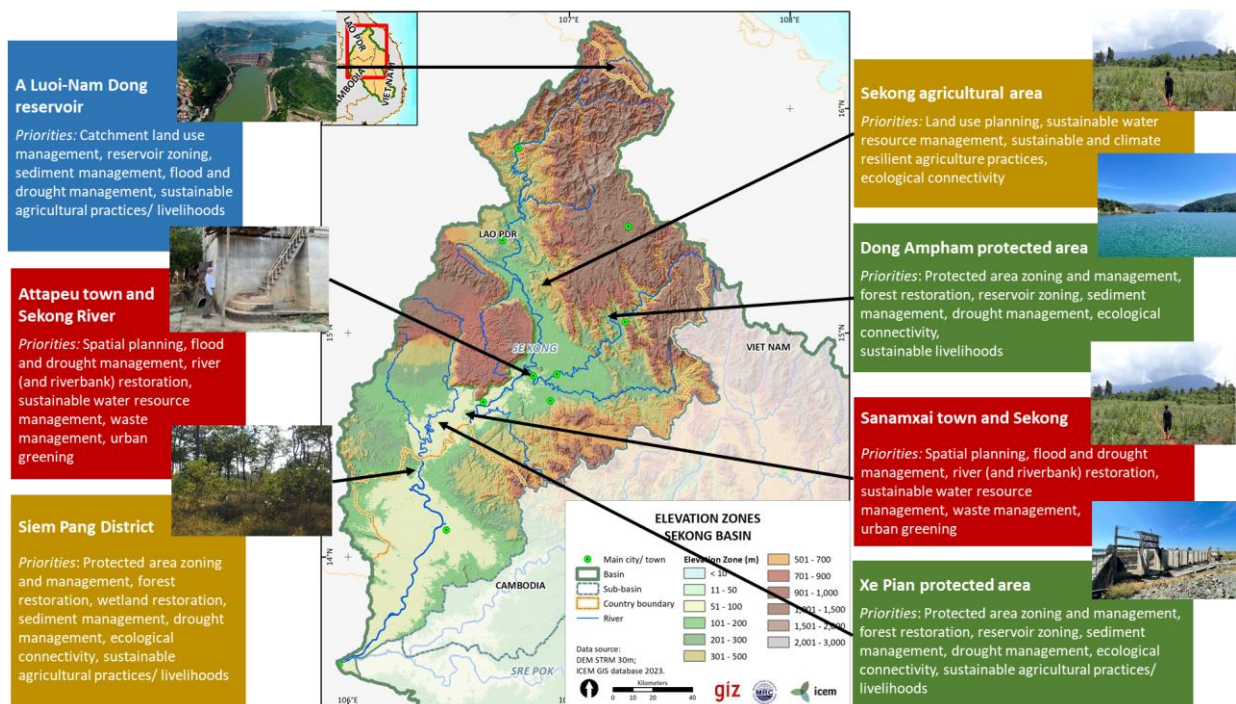
In the Sekong, seven priority landscapes have been identified as hotspot areas. Most of these landscapes are in Lao PDR, being the dominant country in the basin. All the landscapes identified have transboundary implications from upstream drivers and/or downstream impacts. The landscapes should not be treated in silos, but considered in an ecosystem and basin wide approach covering activities in the upper Sekong by Viet Nam, the upper, middle and lower Sekong by Lao PDR, and the lower Sekong in Cambodia. The main challenges and required interventions for each landscape is presented in Table 12 and Figure 10.

**Table 12: Possible interventions for priority landscapes in the Sekong basin**

No	Landscape	Priority challenges	Possible interventions	Country influence		
				VN	LAO	CAM
1	<b>Dong Ampham NBCA (protected area and hydropower)</b>	Protected area management and encroachment, transboundary interactions, hydropower pressures, loss of ecological connectivity	Protected area zoning and management, forest restoration, reservoir zoning, sediment management, drought management, ecological connectivity, sustainable livelihoods			
2	<b>A Luoi-Nam Dong dam</b>	Hydropower pressures, Sekong river, erosion and sedimentation, transboundary water extraction for agriculture	Catchment land use management, reservoir zoning, sediment management, flood and drought management, sustainable agricultural practices/ livelihoods			
3	<b>Attapeu town and Sekong river</b>	Attapeu town flood risk and EWS, Sekong river, adjacent, forest to agricultural transition, sand mining, bank erosion	Spatial planning, flood and drought management, river (and riverbank) restoration, sustainable water resource management, waste management, urban greening			
4	<b>Sanamxai town and Sekong river</b>	Sanamxai town flood risk, Sekong river, Attapeu Plain KBA, forest to	Spatial planning, flood and drought management, river (and riverbank) restoration, sustainable water			

		agricultural transition, sand mining, flood/water level monitoring	resource management, waste management, urban greening		
5	Xe Pian NBCA (protected area, agriculture and hydropower)	Protected area management and encroachment, hydropower pressures, Sekong river, transboundary interactions, wetland degradation, forest to agricultural transition, flood risk, drought risk	Protected area zoning and management, forest restoration, reservoir zoning, sediment management, drought management, ecological connectivity, sustainable agricultural practices/ livelihoods		
6	Siem Pang plains and Sekong river (protected area and agriculture)	Siem Pang town flood risk, Sekong river, forest to agricultural transition, protected area management and encroachment, drought risk, transboundary interactions	Protected area zoning and management, forest restoration, wetland restoration, sediment management, drought management, ecological connectivity, sustainable agricultural practices/ livelihoods		
7	Sekong agricultural area	Drought and water demand, erosion and sedimentation, forest to agricultural transition	Land use planning, sustainable water resource management, sustainable and climate resilient agriculture practices, ecological connectivity		

Figure 10: Location of Sekong basin landscapes and their corresponding priorities



## 9.2 Sesan basin priority landscapes

In the Sesan, six priority landscapes have been identified as hotspot areas, across riverine, agriculture and protected area landscape. Most of these landscapes are in Cambodia. Almost all the landscapes identified have direct transboundary implications from upstream drivers or downstream impacts. The main challenges and required interventions for each landscape is presented in Table 13 and Figure 11.

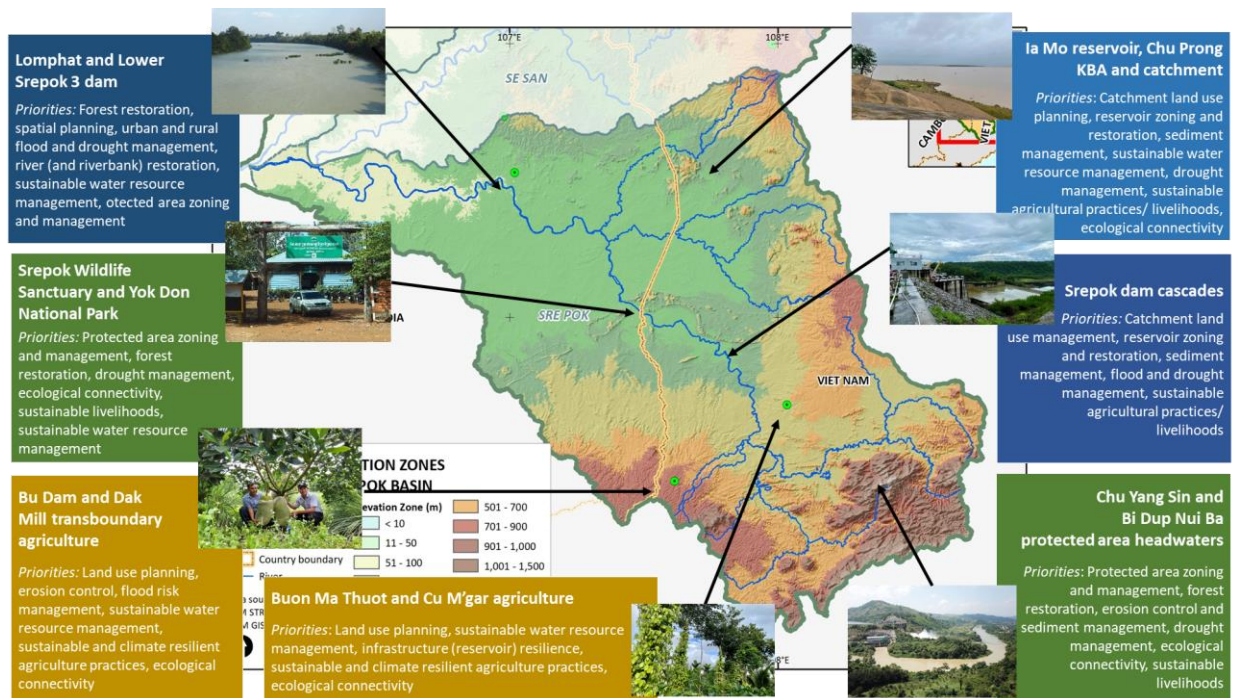
**Table 13: Possible interventions for priority landscapes in the Sesan basin**

No	Landscape	Priority challenges	Possible interventions	Country influence		
				VN	LAO	CAM
1	Sesan River, Tiem Kraom villages and surrounds	Rural flood risk, forest to agricultural transition	Forest restoration, spatial planning, flood and drought management, river (and riverbank) restoration, sustainable water resource management, waste management			
2	Sesan river and Sesan hydropower dam cascade	Hydropower development and EWS, drought and water demand, erosion and sedimentation, loss of ecological connectivity	Catchment land use management, reservoir zoning and restoration, sediment management, flood and drought management, sustainable agricultural practices/ livelihoods			
3	Plei Doch agricultural area	Sesan River, forest to agricultural transitions, community livelihoods, hydropower pressures	Land use planning, sustainable water resource management, sustainable and climate resilient agriculture practices, ecological connectivity			
4	Ban Lung agriculture area and along Sesan River	Sesan River, Srepok River, forest to agricultural transitions, community livelihoods, hydropower pressures	Land use planning, sustainable water resource management, sustainable and climate resilient agriculture practices, ecological connectivity			
5	Virachey National Park	Protected area management and encroachment, Sesan river, transboundary interactions, infrastructure pressures, loss of ecological connectivity	Protected area zoning and management, forest restoration, erosion control and sediment management, drought management, ecological connectivity, sustainable livelihoods			
6	Chu Mom Ray National Park	Protected area management and encroachment, transboundary interactions, infrastructure pressures, loss of ecological connectivity	Protected area zoning and management, forest restoration, reservoir zoning, sediment management, drought management, ecological connectivity, sustainable agricultural practices/ livelihoods			



5	<b>Bu Dam and Dak Mill plantations</b>	Protected area management and encroachment, forest to agricultural transitions, erosion and landslide risk, flash flooding, community livelihoods	Land use planning, erosion control, flood risk management, sustainable water resource management, sustainable and climate resilient agriculture practices, ecological connectivity			
6	<b>Srepok Wildlife Sanctuary and Yok Don National Park</b>	Srepok river, protected area management, transboundary interactions, hydropower pressures, forest to agricultural transition	Forest restoration, spatial planning, urban and rural flood and drought management, river (and riverbank) restoration, sustainable water resource management, ecological connectivity			
7	<b>Chu Yang Sin and Bi Dup Nui Ba protected area headwaters</b>	Protected area management and encroachment, infrastructure pressures, loss of ecological connectivity	Protected area zoning and management, forest restoration, erosion control and sediment management, drought management, ecological connectivity, sustainable livelihoods			

Figure 12: Location of Srepok basin landscapes and their corresponding priorities



## ANNEX 1 – SESAN AND SREPOK JOINT TRANSBOUNDARY ACTION PLAN PRIORITIES

Priority transboundary water sector issues for the 2S River Basins identified in the report.

Issues (The problem)	Outcome statements (Types of solutions/what needs to happen)
1. Monitoring and assessment of flow	<ul style="list-style-type: none"> <li>Establishment of basin-wide water resources monitoring and assessment procedures to support sustainable water resources management, including basin-wide scenario assessments to improve understanding of the potential impacts of current and future development on all water users (i.e. commercial, domestic, environment, cultural).</li> </ul>
2. Flood forecasting, flood control and flood warning mechanisms	<ul style="list-style-type: none"> <li>Strengthened basin-wide flood management, including better preparedness to detect and respond to threatening flood events in advance, and predict potential and emergency flooding events, and minimise social, and economic impacts.</li> <li>Establishment of a modern (using mobile technology), basin-wide flood warning system that can reach all rural people living in the region that are vulnerable to the impacts of flooding.</li> </ul>
3. Communication and coordination mechanisms on information/data sharing	<ul style="list-style-type: none"> <li>Establishment of a joint transboundary mechanisms for the sharing of water resources related information (and data), covering managerial, technical and operational aspects to support evidence-informed decision-making processes to improve sustainable management of the water resources</li> </ul>
4. Mitigation measures to address social and environmental impacts	<ul style="list-style-type: none"> <li>Identification of high priority aquatic ecosystems, water quality status, and the hydrological regime requirements to maintain healthy functioning aquatic ecosystems.</li> <li>Basin-wide allocation procedures that incorporate environmental flows to protect the health of high priority aquatic ecosystems</li> </ul>
5. Institutional and technical capacity to improve transboundary coordination and cooperation	<ul style="list-style-type: none"> <li>Strengthened sharing of technical information including meteorology, hydrology and ecology to support advancement of evidence-informed sustainable water resources management processes</li> </ul>
6. Stakeholder engagement and awareness on water resources management	<ul style="list-style-type: none"> <li>Active engagement and broad representation of a wide range of government and non-government stakeholders, including from Farmers Water Users Committees and women’s groups, to support decision-making process especially district and provincial government levels, but also lower levels.</li> </ul>



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