

Report on stakeholder mapping and needs assessment and establishment of a LISA working group for Battambang Municipality (D3.2/D3.4)

CLIMATE RISK ASSESSMENT FOR SUBNATIONAL ADAPTATION AND ESTABLISHMENT OF A LOCAL CLIMATE INFORMATION SYSTEM FOR CLIMATE CHANGE ADAPTATION (LISA)



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Prepared for: **United Nations and MoE**
Prepared by: **ICEM**



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ABBREVIATIONS

ADB	Asian Development Bank
CamDI	Cambodia Disaster Damage and Loss Information System
CAM-MeDiA	Cambodia Mekong Delta Digital Atlas
CEMIS	Cambodian Environmental Management Information System
CIS	Climate Information System
CMIP5	Coupled Model Intercomparison Project Phase 5
CSO	Civil Service Organization
DCC	Department of Climate Change
DCCDM	District Committee for Disaster Management
PDoE	Provincial Department of Environment
DRR	Disaster Risk Reduction
EWS1294	Early Warning System 1294
GCM	General Circulation Model
GCF	Green Climate Fund
GFCS	Global Framework for Climate Services
GHG	Greenhouse gas
GIZ	German Agency for International Cooperation
GDPS	General Department of Policy and Strategy
ICEM	International Centre for Environmental Management
IIED	International Institute for Environment and Development
LISA	Local Climate Information System for Climate Change Adaptation
MAFF	Ministry of Agriculture, Forestry and Fisheries
MEF	Ministry of Economy and Finance
MoE	Ministry of Environment
Mol	Ministry of Interior
MoP	Ministry of Planning
MoWA	Ministry of Women’s Affairs
MoWRAM	Ministry of Water Resources and Meteorology
MoPTC	Ministry of Post and Telecommunications
MRC CCAI	Mekong River Commission - Climate Change and Adaptation Initiative
MRC	Mekong River Commission
NASA	National Aeronautics and Space
NCDDS	National Committee for Sub-national Democratic Development Secretariat
NCDM	National Committee for Disaster Management

NCSD	National Council for Sustainable Development
NEX-GDDP	NASA Earth Exchange Global Daily Downscaled Projections
PCDM	Provincial Committee for Disaster Management
PDoWRAM	Provincial Department of Water Resources and Meteorology
PDPWT	Provincial Department of Public Work and Transportation
PDTC	Provincial Department of Post and Telecommunication
PDWA	Provincial Department of Women’s Affairs
PIN	People in Need
PRISM	Platform for Real-time Impact and Situation Monitoring
RCP	Representative Concentration Pathway
TA	Technical Assistance
UN-CTCN	United Nations Climate Technology Centre and Network
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WB	The World Bank
WMO	World Meteorological Organization

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1. INTRODUCTION

The United Nations Climate Technology Centre and Network (UN-CTCN) is funding the project *Climate Risk Assessment for Subnational Adaptation and Establishment of a Local Climate Information System for Climate Change Adaptation (LISA) in Cambodia*. This project addresses the development of a local climate information system for climate change adaptation (LISA) for a selected municipality in Cambodia: Battambang municipality. The project is managed by the Department of Climate Change (DCC) of the Ministry of Environment (MoE) and is being implemented by a team of consultants led by the International Centre for Environmental Management (ICEM).

A mission to Phnom Penh and Battambang was conducted from 9 to 17 January 2023 for the purposes of stakeholder mapping, assessment of stakeholder needs on the LISA platform, and the establishment of a LISA stakeholder working group. In addition, the mission initiated the climate change risk assessment and development of the web-based LISA platform for Battambang municipality.

The specific objectives of the mission were to:

1. Establish a stakeholder working group with key sub-national and national government agencies to support the risk assessment and LISA application development;
2. Agree with the stakeholder working group on the key objectives, scope, users and functionalities of the LISA platform;
3. Collect data for the climate change risk assessment and the LISA platform; and
4. Ensure gender is addressed across all activities.

The mission contributed to the following activities within the LISA project, with details of each activity as detailed in the TA Response Plan:

- **Activity 3.2:** Mapping of potential stakeholders in the selected municipality and surveying their needs
- **Activity 3.3:** Climate change risk assessment at the selected municipality
- **Activity 3.4:** Organization of the stakeholder working group

The above conducted activities contributed to the following outputs:

- **D3.2:** Report on the mapping of potential stakeholders at the selected municipality and a survey of their needs
- **D3.3:** Report on the climate change risk assessment at the selected municipality
- **D3.4:** Detailed description of the stakeholder working group, with name and contact details of the members, respective institutions, and gender.

Section 2 of the report describes the mapping of key stakeholders who will be the main users (primary beneficiaries) of the LISA platform. Section 3 presents details of the meetings to assess stakeholder needs, and section 4 summarizes the outcomes of the needs assessment (deliverable 3.2). The list of identified focal points at national and subnational levels is presented in sections 4.4 and 4.5 (deliverable 3.4). The final section outlines key immediate next steps for the project.



2. MAPPING OF KEY STAKEHOLDERS FOR USING CLIMATE INFORMATION IN CAMBODIA

The project report – *Review of the climate information systems in Cambodia* (deliverable 2.2), provides a review of key climate information systems in Cambodia and mapping of those organizations involved at national level and their engagement with the CIS are summarized below.

Building on the initial consultations at project commencement (see *Joint Report on D2.1/D3.1 Stakeholder Consultation*), subsequent face-to-face consultations at the national level during the January 2023 project team mission confirmed which national agencies should be represented on the national stakeholder working group of the project (see section 4.4). The following agencies participated in consultations during the January mission: DCC/MoE, MoWA, NCDD, NCDM, and MoPTC.

The selection of Battambang Municipality as the site for LISA was recommended for selection based on the initial consultations with DCC/MoE, NCDD, NCDM, and MoWA. This decision was subsequently strengthened through the scientific analysis conducted by ICEM, as presented to the MoE's General Directorate of Policy and Strategy on 20 September 2022 (see *Joint Report on D2.1/D3.1 Stakeholder Consultation*). Subsequent consultations in Battambang in January 2023 highlighted the subnational agencies that should have representation on the LISA subnational stakeholder working group (see section 4.5).

2.1. National Council for Sustainable Development

The National Council for Sustainable Development (NCSD) is responsible for the integration of sustainable development in the country's policies, strategies and programmes and for compliance with its international obligations. The NCSD comprises 36 ministries/agencies and 25 provincial/capital governors. Climate change issues are addressed by the Ministry of Environment (MOE)'s Department of Climate Change (DCC), which include ensuring the government meets its commitments to the United Nations Framework Convention on Climate Change and for implementing climate change initiatives (such as the UN-CTCN LISA project). Under the NCSD, key climate change initiatives have been articulated in the Cambodian Climate Change Strategic Plan 2014-2023, the Sectoral Climate Change Action Plans and the Climate Change Financing Framework.¹

2.2. National Committee for Disaster Management

Disaster management is coordinated through the National Disaster Management Board (NCDM). NCDM and MoWRAM are tasked with the overall coordination of the response to flood and drought events and for improving resilience to disasters. MoWRAM is responsible for forecasting and early warning, and works with NCDM at the province and district level to issue warnings and manage emergency response. A key role of NCDM is to establish links between disaster risk reduction and climate change adaptation through the formulation and implementation of the Strategic Plan on Climate Change for the Disaster Management.

The NCDM has subnational organizations at all levels of government, including at the province, district and municipality. Every province has a disaster management committee chaired by the Provincial Governor. The provincial governor chairs the PCDM and the district governor and the commune heads also chair the district and commune committees. The Municipal and District Disaster Committees manage disasters, collect information about disasters in their administrative areas and report at higher levels.

¹ <https://ncsd.moe.gov.kh/ncsd/about-ncsd>

2.3. Ministry of Water Resources and Meteorology

The role of MoWRAM is to implement legislation on the management of water resources and to coordinate with ministries at the national level and departments at the subnational level on the subject. At the national level, there are two main technical departments in MoWRAM involved in the management and generation of climate information and forecasting including: (i) the Department of Hydrology and River Works, and (ii) the Department of Meteorology. Flood forecasting is the responsibility of the Department of Hydrology and River Works, while the Department of Meteorology conducts forecasting activities, including early warning.

2.4. National Committee for Sub-national Democratic Development Secretariat

The National Committee of the Sub-National Secretariat for Democratic Development (NCDDS) coordinates the budgetary disbursements of the government, including the Common Fund/Sangkat and the District Fund, and other projects of development partners implemented as part of the CNDDS. The NCDDS coordinates and implements several climate change projects including the Local Governance and Climate Change Project, which is a demonstration project with potential to be scaled up in other provinces. NCDDS seeks to integrate climate resilience into its local development projects, however, there is limited capacity in subnational authorities.

The Green Climate Fund (GCF) has designated NCDDS as the nationally certified body for Cambodia, and as such, NCDDS has access to GCF funding directly for the implementation of GCF-funded projects at the national and subnational levels.

2.5. Overview of existing climate information systems

An overview of existing climate information systems in Cambodia is informative as to the roles and responsibilities of national and subnational organizations.

2.5.1. Early Warning System 1294

The Early Warning System (EWS) 1294 provides vulnerable populations at risk from environmental hazards with early warning information. The non-governmental organization People in Need created the free mobile phone service EWS 1294 with the assistance of a number of partners, including the **NCDM**, the Ministry of Post and Telecommunications, international organizations, civil society organizations, the private sector, and local communities. EWS1294 is currently active across all of Cambodia's provinces.

2.5.2. Platform for Real-time Impact and Situation Monitoring

The *Platform for Real-time Impact and Situation Monitoring* (PRISM) is based on an open source web-based monitoring tool that is designed to provide information on the potential risk of climate hazards to local communities. The PRISM software was initially developed in 2016 and was upgraded in 2020 by the World Food Programme.² PRISM integrates a variety of data including satellite imagery and ground sensor measurements, and supports **NCDM** in collecting and sharing information for emergency response to disasters.³ PRISM also offers the potential to integrate with Kobo Toolbox, an open-source tool that can be used for field data collection using mobile devices.⁴

2.5.3. Cambodia Disaster Loss and Damage Information System

The open-source DesInventar program, which is used to create disaster management information systems that include inventories of disasters and associated loss and damage, serves as the foundation

² <https://innovation.wfp.org/project/prism>

³ <https://docs.wfp.org/api/documents/WFP-0000120144/download/>

⁴ KoboToolbox can facilitate real-time data collection in the field, which can then be overlaid and displayed on hazard information and other data layers in the PRISM platform to inform disaster response.

for the Cambodia Disaster Loss and Damage Information System (CamDI).^{5,6}

With the assistance of the United Nations Development Programme, the tool, which is hosted by the United Nations Office for Disaster Risk Reduction, has been widely adopted throughout the world in a large number of countries (UNDP).⁷

The CamDI was created by **NCDM** with assistance from UNDP in terms of both technical and financial resources, and it was formally introduced in July 2014.

2.5.4. Cambodia Climate Change Data Portal

The **NCDD** created a Data Portal to enhance access to data, including information on the vulnerability, climate funding, and mitigation projects, to address the lack of knowledge for mainstreaming climate change at sectoral and subnational levels.⁸

Data on vulnerability to climate hazards, institutional readiness, knowledge, attitude, and behaviors on climate change, families affected by climate hazards, climate financing, and greenhouse gas emissions are provided in the Data Portal as maps, charts, and tables.

2.5.5. Cambodia Mekong Delta Digital Atlas

The goal of the Cambodia Mekong Delta Digital Atlas (CAM-MeDiA) is to increase knowledge of the potential effects that climate change may have on physical infrastructure, agricultural production, and ecosystems.⁹ The World Bank-funded TA Cambodia Mekong Delta Digital Atlas was created by ICEM as an open-source web-based geospatial tool. The Atlas offers a current knowledge base to assist national and subnational government officials in making decisions regarding planning in the Cambodia Mekong Delta and fostering changes to more environmentally friendly livelihoods in light of climate change.

Climate change forecasts, floods, droughts, land use/cover, forests, agriculture, irrigated regions, cropping patterns, water resources, water infrastructure, and fisheries are just a few of the data layers that are available in CAM-MeDiA. To give useful information for sustainability planning in the Cambodian Mekong Delta, the map viewer allows the overlay of several information layers. A series of case studies were prepared to demonstrate how CAM-MeDiA can address the mandates of MoWRAM, MAFF and MoE.

2.5.6. Cambodia Climate Change Toolbox

Climate change forecasts for Cambodia are provided via the open-source information portal - The Cambodia Climate Change Toolbox.¹⁰ As a component of the Asian Development Bank-funded project - TA-8179 CAM Mainstreaming Climate Resilience into Development Planning - which was implemented by ICEM, it was created in partnership with the Department of Geospatial Information Services and the Department of Climate Change of the MoE.

2.6. Identification of key stakeholders

By the time the mission to Cambodia ended in January 2023, significant stakeholders representing interests at the national and subnational (Battambang municipality and province) levels had been identified after lengthy consultations with government institutions. Sections 4.4 and 4.5 present more details about the participating institutions, focal point names, positions, and telephone contact numbers. Figure 1 highlights the steps adopted to map key stakeholders.

⁵ www.desinventar.net

⁶ <https://www.desinventar.net/whatisdesinventar.html>

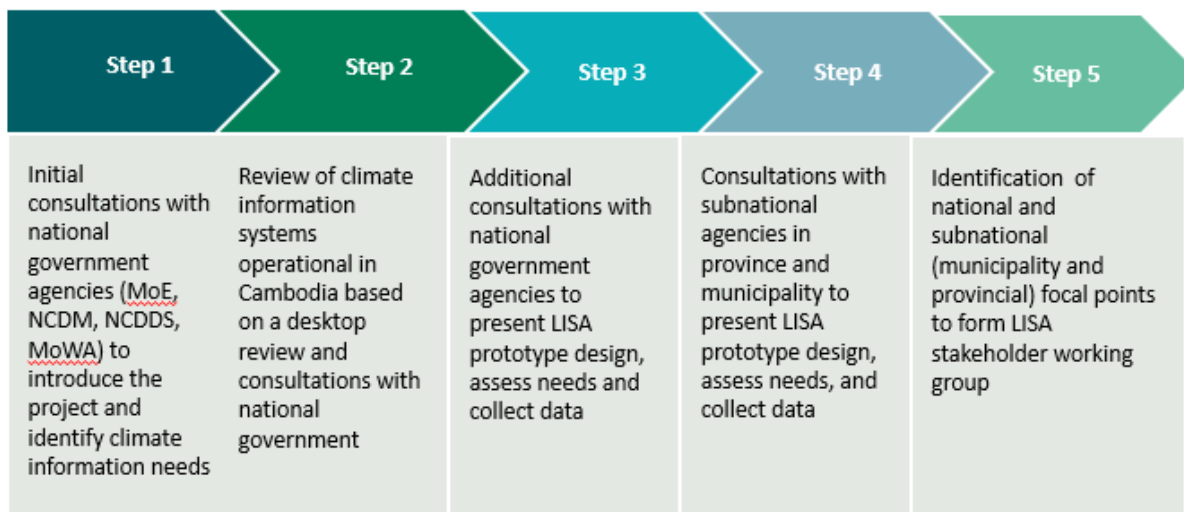
⁷ <https://www.desinventar.net/DesInventar/>

⁸ <https://ncsd.moe.gov.kh/dcc/data-portal>

⁹ <https://dss.icem.com.au/camatlas/>

¹⁰ <https://dss.icem.com.au/CambodiaDSS/>

Figure 1. Key steps to establishing the LISA national and subnational stakeholder working group



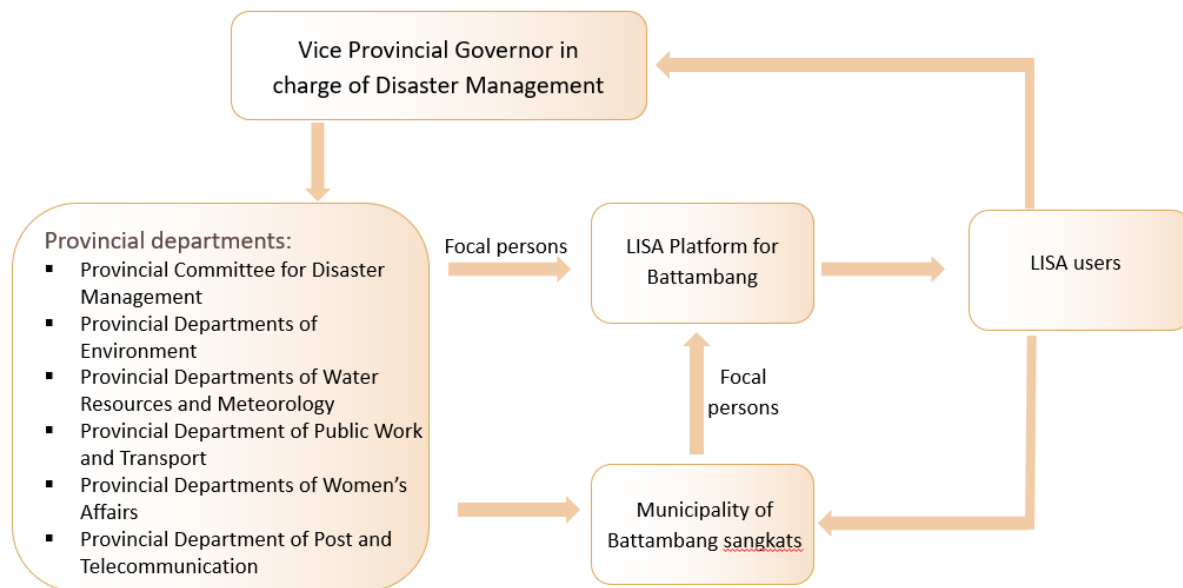
2.7. Mapping of subnational stakeholders

Key stakeholders communicate and participate on the LISA platform at two different subnational levels. Provincial stakeholders are at the first level, and municipalities are at the second level. The Vice Provincial Governor in charge of disaster management, the Provincial Committee of Disaster Management (PCDM), the Provincial Department of Environment (DPoE), the Provincial Department of Public Work and Transportation (PDPWT), the Provincial Department of Water Resource and Meteorology (PDWRAM), the Provincial Department of Womens Affair (PDWA), and the Provincial Department of Post and Telecommunication (PDTC) are among the major stakeholders **at the provincial level.**

Stakeholders **at the municipal level** include the vice governor of Battambang municipality, important municipal offices, and sangkats under the municipality. The PCDM has been chosen as the primary focal point for coordinating the relevant provincial departments, while the Office of Public Works of Battambang municipality has been chosen as the primary focal point for the LISA platform. Inputs, statistics, information, and comments will be exchanged between various parties to develop the LISA platform for Battambang municipality.

The stakeholder groups at the provincial and municipal levels are shown in Figure 2, along with the interaction between users of the LISA platform and stakeholders.

Figure 2. Mapping of subnational stakeholders



2.8. Organization of the stakeholder working group

The LISA project has formed stakeholder working groups at both the national and sub-national levels. Working groups at the national level will help provide direction, strategic policies, technical support, and general coordination for the subnational implementation of LISA. Focal points from MoE, NCDDS, NCDM, MoWA, MoWRAM, and MoPTC form the national working group. The national stakeholder working group's roles and duties include: participating in meetings regarding LISA; (ii) reviewing and commenting on the draft LISA application; and (iii) offering technical support and feedback, including data, information, and policy concerns.

Members of the subnational working group come from the concerned provincial departments as mentioned in section 3.2 above. This subnational working group is crucial to the operation of the LISA platform in Battambang municipality. The sub-national working group's roles and responsibilities include: giving feedback as needed from the area concerned for the LISA platform; (ii) assisting with the functioning of the LISA platform; and (iii) participating in periodic working group meetings.

The working group has been created by identifying one contact person from each institution as indicated above. To coordinate this working group, focal persons at provincial and municipal levels have been identified. Mr. Kham Samraeb from PCDM has been appointed as a focal point at the provincial level to coordinate with involved provincial departments. Mr. Song Seung, Chief of the Office of Technical Infrastructure was appointed as a focal point for the municipality.

3. ASSESSMENT OF STAKEHOLDER NEEDS FOR THE LISA PLATFORM

Bilateral and multi-stakeholder meetings to assess stakeholder needs for the LISA platform were held with the following Government representatives, during the January 2023 mission:

- Department of Climate Change, Ministry of Environment;
- National government representatives from the Ministry of Environment (MoE), National Committee for Sub-National Democratic Development (NCDDS), National Committee for Disaster Management (NCDM), Ministry of Women Affairs (MoWA), and Ministry of Post and Telecommunications (MoPT);
- Subnational government representatives from the Provincial Administration, Provincial Committee for Disaster Management (PCDM), Provincial Department of Environment (PDoE), Provincial Department of Women Affairs (PDoWA), Provincial Department of Transport and Telecommunications (PDoPTC), and the Battambang Cross-Sectoral Integration Division, provincial investment and planning division.

3.1. Meeting with Department of Climate Change

Table 1: Meeting with Department of Climate change: date, time, venue and participants

Date and time	Venue	Participants	LISA team
9 January 2023 Time: 2 - 4pm	DCC office	1) Dr. Mao Hak, Director of the Department of Climate Change 2) Ms. Din Phearun, Officer 3) Mr. Visal, Adaptation Officer 4) Mr. Sem Savuth, Knowledge Management Officer	1. Dr. Richard Cooper 2. Mr. Miguel Coulier 3. Dr. Lay Chanthy, 4. Mr. Pham Tran Minh 5. Ms. Tous Sophorn 6. Mr. Joe Ogden 7. Mr. Eng Senghak

3.1.1. Presentations

Dr Mao Hak, Director of the Department of Climate Change at MoE, welcomed the LISA Project team and opened the meeting. Dr. Richard Cooper, Project Manager, provided an update on the progress of the LISA Project (Annex 2), including addressing the following aspects:

- Project summary and introduction to TA Team Members;
- Project overview and key deliverables;
- Progress to date;
- Selection of municipality;
- UN LISA team mission;
- Immediate next steps.

Dr. Richard Cooper continued with a presentation on the initial concept for the LISA platform (see PowerPoint in Annex 2), addressing the following aspects:

- Initial set of recommendations for LISA;
- Purpose of LISA;
- Anticipated end-users;
- Initial LISA design for Battambang Municipality;
- Using LISA for planning: Case examples; and

- LISA platform management.

3.1.2. Discussion

Dr Mao Hak stated that MoE fully supports the LISA project. He encouraged the team to urgently make progress with the project. He requested ICEM to draft a letter of agreement between MoE and ICEM to facilitate quicker implementation. For future activities, he also suggested using the name "ICEM" to coordinate with relevant stakeholders, as ICEM has a good reputation. He requested that ICEM communicate directly with stakeholders and ensure high-quality letter invitations using the Khmer language.

Dr Mao Hak reconfirmed MoE’s agreement with the municipality selection. He suggested that the project should double-check with MoE’s data department to see if the data used for the LISA platform is consistent with other platforms developed under MoE. Dr. Mao Hak noted that it is very important that information used in the LISA platform is cross-checked with official Government data to ensure its consistency with Government policies and strategies (for example on forest cover).

He recommended that the LISA project team contact the People In Need (PIN) organization to learn about their activities, including their development of an online platform and to obtain data.

Regarding the LISA platform, he commented that people use online systems because they are more accessible. The LISA platform should focus on reaching local or commune-level users and should reflect on the needs of those users. If the LISA platform system is developed, operational and working well, we can use this model for other provinces and municipalities. Larger projects will also become more interested in this type of platform if we can show them success.

Dr Mao Hak assigned Mr. Sum Cheat to work on the project on behalf of MoE and apologized as he was busy with other meetings. It was noted that Mr. Senghak will join the mission to Battambang to help coordinate and contact relevant stakeholders. MOE will follow up on the request to meet the Director General.

Dr. Richard Cooper expressed appreciation for the valuable comments and confirmed that the project is now expediting all reporting and activities and will meet the project deadline at the end of June 2023.

Figure 3: Photos of the meeting with DCC



3.2. National Stakeholder Consultation Meeting

Table 2: National Stakeholder Consultation meeting: date, time, venue and participants

Date and time	Venue	Participant	LISA team
10 Jan 2023 Time: 8:30-13:00	Himawari Hotel	Refer to the participant list in Annex 3	Dr. Richard Cooper Mr. Miguel Coulier Dr. Lay Chanthy, Mr. Pham Tran Minh Ms. Tous Sophorn Mr. Joe Ogden. Mr. Eng Senghak

Participants were briefed on the key objectives and agenda of the LISA project mission to Cambodia:

- (i) Establishment of a stakeholder working group with key subnational and national government agencies to support the risk assessment and LISA application development;
- (ii) Agree with the stakeholder working group on the key objectives, scope, users, and functionalities of the LISA platform;
- (iii) Collect data for the climate change risk assessment and integration into the LISA platform;
- (iv) Ensure gender is addressed across all activities.

Figure 4: Photos of the national stakeholder consultation meeting



3.2.1. Presentations

Several presentations were delivered (see Annex 2):

3.2.1.1. Presentation 1: An overview of the project and progress to date

Dr. Richard Cooper provided an overview of the key outcomes of previous consultations with the relevant stakeholders, including the selection of Battambang Municipality and the purpose of establishing a working group for LISA platform development. In addition, he also presented ICEM's previous and ongoing work in Battambang province and discussed data needs for the climate risk assessment and LISA platform.

The strong case for selecting Battambang was presented:

1. Battambang is the municipality preferred by three of the key stakeholders (NCDDS, NCDM, and MoWA);
2. The municipality is considerably affected by several climate-related hazards (including riverine flood, pluvial flood, cyclones, and drought);
3. The municipality is strongly committed to addressing climate change;
4. There is good availability of data;
5. Among the 26 municipalities reviewed, Battambang scored highly in an assessment of poverty rate, urbanization, population count and wet season rainfall change.
6. There are ongoing ICEM projects in the region from which the LISA project can benefit, including projects funded by WB, ADB, and GIZ/MRC.

3.2.1.2. Presentation 2: Overview of climate information systems in Cambodia

Dr. Lay Chanthy, the LISA project's climate change expert, provided an overview of the climate information systems that are presently operational in Cambodia. The *Review of Climate Information Systems in Cambodia* report (LISA project deliverable 2.2) focuses on reviewing the current status and operation of climate information systems (CISs) in Cambodia with key findings as follows:

- **Early Warning System 1294:** EWS1294 developed by PIN with the support of NCDM, MoPTC, and PCDMs, EWS 1294 is operational in all provinces in Cambodia. Users can register with EWS1294 by calling the number 1294 and can then receive audio warning messages along with safety instructions issued by NCDM when there is an emergency, such as an imminent flood or storm. The system was established to provide data input from river level sensors as well as data from hydrometeorological stations managed by MOWRAM and the MRC. However, one of the main challenges for EWS1294 has been with ensuring the operation and maintenance of the sensors. Another key challenge has been to increase its reach: although the number of subscribers has steadily increased over the years, the system is still far from reaching the entire population at risk.
- **PRISM (Platform for Real-time Impact and Situation Monitoring):** PRISM is a web-based platform that provides information on the potential risk of multiple types of hazards in communities. Data inputs come from various sources, including satellites and other remote sensing sources, and EWS 1294 sensors which provide real-time monitoring of river water levels. The outputs of PRISM are accessible at <https://www.prism-kh.info>.
- **Cambodia Disaster Loss and Damage Information System (CamDI):** CAMDI was established by the NCDM with technical and financial support from UNDP. The CamDi system was launched for official use in July 2014. CamDI is used to collate data that are collected for eight types of hazards: flood, drought, lightning, storm, pest outbreak, epidemic, riverbank collapse, and fire, and the information on disaster loss and damage data in CamDI is presented in tables, charts, and maps. Data and analysis products of CamDI are reported on the CamDI website at <http://www.camdi.ncmd.gov.kh>. Though the platform contains a wide variety of data, the user interface may not be so intuitive for public users and there is limited information on sectoral damages.
Climate Change Data Portal: The data inputs come from multiple sources, including government databases and development partners. Outputs are presented in tables, charts, and maps. The website can be accessed at <https://ncsd.moe.gov.kh/dcc/data-portal>.
- **MRC Data and Information Service Portal:** The 'Data Portal' is a web-based portal to provide data and products generated by the MRC.¹¹ The MRC plays an important role in data collection and analysis related to water resources in the Lower Mekong Basin covering hydrology, sediments, water quality, fisheries, ecological health, climate change, flood and drought. MRC provides weekly flood and drought forecasts and has an online interactive climate change atlas. The portal's data inputs relate to water resources in the Lower Mekong Basin. In Cambodia, MRC manages 17 automated telemetry stations and near real-time hydro-meteorological stations, and the outputs are presented in various formats, including charts, diagrams, and maps. MRC's interactive climate change atlas visualizes the spatial distribution of historical averages and future climate projections. The atlas allows users to investigate various climate parameters, such as rainfall and mean temperature and view various future scenarios.
- **Cambodia Mekong Delta Digital Atlas:** The Atlas of CAM-MeDiA provides a contemporary knowledge base to support the decision-making of national and subnational government officials responsible for planning in the Cambodia Mekong Delta and for promoting transitions to more sustainable livelihoods in the context of climate change. The inputs to CAM-MeDiA are multi-sector data sets sourced from the Royal Government of Cambodia as well as from other organizations. The outputs of CAM-MeDiA are a series of data and information layers presented in an interactive map viewer.

¹¹ <https://portal.mrcmekong.org/home>

- **Cambodia Climate Change Toolbox:** The Toolbox provides future projections of climate parameters in Cambodia that can be used at country, provincial, district, and local levels. The Toolbox was developed in collaboration with MOE's Geospatial and Information Services and Climate Change departments as part of the *TA-8179 CAM, Mainstreaming Climate Resilience into Development Planning project*, funded by ADB and implemented by ICEM. The toolbox incorporates two main sources of data: the Mekong River Commission's Climate Change and Adaptation Initiative (MRC CCAI) and NASA Earth Exchange Global Daily Downscaled Projections (NEX-GDDP). The outputs of the toolbox are presented in the form of maps, graphs, and tables.

3.2.1.3. Presentation 3: Sharing of best practices internationally

Miguel Coulier, Climate Change Risk Assessment Expert, provided an overview of best practices for handling climate information in other countries. The team conducted a review of 12 cities and their approaches and tools for developing climate information systems (CIS) for the sharing of climate data and climate information services.

Three case studies were presented, with the following key learnings from the review:

- **Case study 1: United Kingdom – London**
 - There is no single integrated CIS, but various tools
 - Climate information products in the form of maps are available through an ArcGIS platform at <https://gisportal.london.gov.uk/portal/apps/webappviewer/index.html>
 - Vulnerability information is also available at climatejust.org.uk.
 - There is considerable explanatory information available on the meaning of climate hazards, climate change, and vulnerability parameters.
- **Case study 2: Netherlands - Amsterdam**
 - There is no single integrated CIS, but various tools
 - Multi-sectoral focus
 - Knowledge portal for all available policies, tools, and relevant publications at <https://klimaatadaptatienederland.nl/en/>
 - Several climate information products in the form of maps are available, with lots of data layers
 - National level atlas at <https://www.klimaat-effectatlas.nl/en/>
 - City level: Amsterdam: <https://maps.amsterdam.nl/klimaatadaptatie/?LANG=en>
- **Case study 3: Nepal - Pokhara**
 - One integrated CIS platform
 - Focused on CIS for climate-resilient road and drainage asset management. Contains a database of road assets, including information on the level of maintenance
 - Mainly climate information products in the form of interactive maps, with overlays possible for hazards, climate and infrastructure data
 - No information is included on adaptation options.

At the end of the presentation, Mr. Coulier shared key learnings to inform the development of the LISA platform as follows:

- A single integrated platform with interactive functionalities;

- A CIS should have a clear objective with targeted information products to be developed for specific hazards and be focused on specific sectors most impacted and key for socio-economic development;
- A CIS should integrate analyses on, for example, exposure, vulnerability, and capacity;
- Downscaled climate data is very valuable but often not available;
- Hazard and exposure data should be provided. Participatory data collection is a way to address this limitation;
- An inventory of existing or potential adaptation measures makes the climate information actionable;
- To develop the CIS, the establishment of an adaptation working group (e.g., urban planners, health practitioners, water planners, and DRR practitioners) and a climate scientist expert group should be considered;
- Capacity to manage the system is key, with regular capacity building for municipal staff required; and
- Data needs regular updating (e.g., to address the development of new infrastructure).

3.2.1.4. Presentation 4: Initial LISA platform concept

Dr. Cooper presented the LISA platform conceptual design, with the following **initial set of recommendations for LISA:**

- Aim to develop an end-to-end LISA where feasible (i.e., from the provision of climate data to proposed adaptation options).
- Develop a scientific expert group on climate to tailor climate services to each sector.
- Develop an expert climate change adaptation group to advise on adaptation measures for each key sector.
- Provide capacity building for municipal staff (LISA users, LISA platform management)
- LISA design features in summary:
 - A knowledge base to support climate adaptation planning
 - An interactive map viewer to support climate-resilient planning
 - An inventory of NbS measures applicable to Battambang to address key climate hazards
 - An interactive table of metadata (descriptions of data used in the LISA platform).

He also shared the **capacities required for managing LISA:**

- **Staff capacity:**
 - Staff need to be qualified and experienced IT administrators to manage the application effectively, which itself comprises several separate open-source software components.
 - Training will be provided by ICEM to enable staff to manage the DSS platform (typically delivered over five half-days). Preferably, the client will also have experience with spatial (GIS) data.
 - If the client lacks sufficient capacity, then a service contract with an external consultant is an alternative solution.
- **LISA platform management:**

- Which government agency has the IT capacity (hardware and staff expertise) to manage the DSS? Battambang municipality, MoE, Department of GIS?
- **Hardware requirements:**
 - 15 GB RAM, 40 GB of hard drive space, and a CPU (2 cores > 2 GHz).
 - These are typical estimates for an ICEM DSS, but the requirements will depend on several factors, including the number and type of data sets integrated into GeoServer, the size and functionality of the Shiny app, whether a Windows (higher RAM requirement) or Linux server is used, and the number of visitors.

Gender mainstreaming for LISA will be ensured as follows:

- Gender challenges, gaps, and needs for the LISA context were identified and will be continuously collected through multi-stakeholder platforms, meetings, and workshops. G will be mainstreamed into the development of LISA platform content and capacity-building activities to effectively use LISA.
- Encourage men and women stakeholders to participate in project consultative meetings and capacity-building activities on LISA data use.

3.2.2. Discussion

Mr. Sorn Sunsopheak, NCDDS, expressed his interest in the LISA platform development. He described the platform as essential as it can contribute to the government's priorities and is aligned with the promotion of Battambang as a smart and green city, noting the following points:

- From the mission plan, we see that most of the working group members at the sub-national level are technical people, while the project should also engage with the project implementers, users, and CSOs/NGOs who are key stakeholders for local development.
- We have a concern regarding project sustainability and the project timeframe that ends in June. Implementing and training on the digital platform will take time and the period until June is not considered sufficient to support the full uptake of the LISA platform. The project should consider revising the timeline, extending the scope, and including more funds and resources to ensure that the LISA platform is implemented sustainably.
- MEF is preparing the budget for climate information services at the local level. Climate information is crucial input for development planning.

Dr. Richard Cooper provided feedback on the above remarks. To ensure the project's sustainability, he noted that the project will provide training on how to use the platform and develop a training plan. The team will consider which key stakeholder will host and manage the LISA platform - for example, Battambang municipality's IT section or a department within MoE. The decision will be informed by consultations.

Mr. Em Samnang, NCDM, provided further clarification on the 1294 and PRISM systems. The 1294 system refers to a phone number provided by MPTC to send and receive voice messages for early warning to people who may be at risk. As part of the 1294 system, there are automated stations to measure river level. Access to PRISM by the public is restricted, data is preliminary, and the system is managed at provincial and local levels. Lastly, as this is a UN project, UN-CTCN should call for consultations with other UN agencies to ensure consistency across developed tools and activities.

Ms. Sau Kimsoeurn, MoWA, thanked the project team for engaging MoWA and for the consultation about gender aspects, noting the following points:

- It is important to understand who the most impacted groups by climate change are.

- When developing the LISA platform, who will be the beneficiaries? How can men, women, the elderly or the poor access information on the LISA Platform?
- Agricultural yield can be impacted by a disaster and women contribute about 70% of the workforce. Have impacts on women been considered?
- Have the impacts of climate change and access to infrastructure been assessed?
- For the organization of the technical working group, greater participation by women in decision-making was encouraged, not just the names of agencies that get involved.

Dr. Richard Cooper responded that the platform will be open to the public so everyone can access the information and discover information by sector. It is anticipated that there will be 10 members in the working group, and a balance between men and women will be sought.

Ms. Sau Kimsoeurn, MoWA requested that gender considerations be integrated into the platform, including the setting of gender quotas (i.e., having equal numbers of men and women participate in the working group and capacity-building activities).

Mr. Kol Kimony, NCDM, congratulated the project team on this essential project. He stated that the LISA project will be very useful when developed, as it will contribute to mitigating the impacts of disasters. Two climate hazards in Battambang were mentioned: flood and heat waves. One of the potential hazards for Battambang, which was not listed in the presentation, is rainfall-induced flooding, and flooding caused by river flow from upstream. The province doesn't experience heat waves, but it needs to be monitored closely.

NCDDS participants: NCDDS needs to use climate information for planning and other uses. NCDDS can provide support in building or extending LISA management to other districts. In the future, if the project is scaled up, it was suggested that the Cabinet of the Municipality and the Sangkat authorities handle data management. Additional points raised included the following:

- In Battambang province there has been a shift in land use from agriculture to residential or commercial areas, so the system should not focus too much on agriculture.
- Flash floods and drainage are key issues.
- Riverbank collapse is another issue of concern, which may especially affect women, children, and the elderly. The city needs to pay more attention to the poor, women, and children who are living along the river.

MPTC participants: It is important to ensure that local management of the platform is effective and the platform should include descriptive analyses on different types of hazards and impacts on sectors, and data disaggregated to include data on women, children, men, and farmers by gender.

NCDM participants: Until now it is still not clear who will be the owner of the LISA platform. There is a need for a designated institution to manage and coordinate the platform. Also, some of the climate risks have not yet been identified. It is hoped that after the mission, the project team will be able to identify those risks and create the information portal. NCDM suggested engagement with the Ministry of Planning (MoP) to acquire information on ID Poor 1 and ID Poor 2, and to invite the Provincial Department of Planning to provide inputs and also information related to the ID Poor.

Dr. Richard Cooper confirmed that the team will go to Battambang and identify the required information, but the team has so far not visited Battambang and are not familiar with the current context there.

Mr. En Sovann, MoPTC, asked whether the system will be upscaled to other cities, and how it will be done. Furthermore, when talking about the two issues of hazards and data information needs, we should also focus on the scale of the impacts.

Dr. Richard Cooper responded that the team will focus on what data and information are needed for decision-making. In addition to collecting secondary data, the team will conduct participatory mapping to collect primary data from stakeholders on current hazard extent and exposure.

Mr. En Sovann, MoPTC, highlighted the challenges with the widespread adoption of the 1294 system, and the limitations of its operation, noting that it is important to understand these issues so that the LISA platform will not face the same problem.

Dr. Richard Cooper stressed that, after the mission, we need to build capacity for the working group, to be identified through further consultation.

Ms. Phaychan Makara, MOWA, requested that the project should consider having specific technical working groups for collaboration and also share the information with the Ministry; and that the project should also provide a platform that can provide specific information on the impacted groups, including men, women, and marginalized groups.

Dr. Richard Cooper confirmed that gender mainstreaming would be addressed in the project.

3.2.3. Wrap-up and Closing

Dr. Richard Cooper thanked all participants, expressing thanks for their valuable ideas and comments on the LISA platform. These comments will be considered for project implementation and LISA platform development.

As the next step, the team will meet with the technical working group in Battambang and continue discussions. An online meeting is planned in March 2023 to present the results of the climate risk assessment and the prototype of the LISA platform.

3.2.4. Key identified needs for the LISA platform

- Climate information is needed by the government for planning and other uses.
- Key hazards highlighted include rainfall-induced flooding (pluvial flooding), riverine flooding, and riverbank erosion.
- The LISA platform needs to be sustainable after the LISA project completion, with an institution identified for its hosting and maintenance.
- There is interest in LISA being scaled-up to other locations.
- Identify the primary users/beneficiaries of the platform.
- The system should not focus on agriculture given the increased urbanization of land.
- The content of LISA should address hazards and impacts by sector, and disaggregate data by gender and age.
- Participatory mapping of hazard areas will be conducted during the LISA project mission.
- Concern was raised about the limited timeline to provide training and hand over the application.

3.3. Subnational Stakeholder Consultation Meeting in Battambang

Table 3: Sub-national Stakeholder Consultation meeting: date, time, venue and participants

Date and time	Venue	Participant	LISA team
11 January 23 Time: 2:00-5:30pm	Battambang Provincial Hall	Please refer to the participant list in Annex 3	Dr. Richard Cooper Mr. Miguel Coulier Dr. Lay Chanthy, Mr. Pham Tran Minh Ms. Tous Sophorn Mr. Eng Senghak

3.3.1. Opening and welcome remarks by the Deputy Governor of Battambang Province

His Excellency, Ou Dary, Deputy Governor of Battambang province, welcomed the project team in Battambang. He introduced participants including representatives from the Provincial Department of Environment (PDoE), Provincial Department of Post and Telecommunication (PDoPT), Provincial Department of Women Affair (PDoWA), Red Cross, Provincial Committee for Disaster Management (PCDM), and the Municipality of Battambang.

Figure 5: Photo of the meeting with provincial stakeholders of Battambang



His Excellency mentioned that climate hazards and disasters are quite serious in Battambang province, noting 8 types of hazards, including floods (stormwater and flash flooding), drought, riverbank collapse, storm, lightning, fire, disease, and building collapse. Two major hazards are urban flooding and riverbank collapse. The provincial authority has tried to address these hazards in the city, by stabilizing parts of the riverbank, improving drainage and establishing an EWS.

Regarding the LISA platform, he said that it would be a very important tool for responding to climate change impacts and disasters in Battambang city. He welcomed the LISA project in Battambang and asked to work together in responding to the problem of climate change. He pointed out that today's meeting is an important start to addressing these issues through LISA.

3.3.2. Overview of the LISA project and progress to date

Dr. Richard Cooper provided an overview of the LISA project, its key outcomes, previous consultations, the selection of Battambang Municipality, and the establishment of a working group for LISA platform development. In addition, he also discussed ICEM's previous work in Battambang province. Further details are included in the presentation in Annex 2.

3.3.3. Review of climate information systems in Cambodia

Dr. Lay Chanthy provided an overview of existing climate information systems (CIS) in Cambodia. His presentation gave an overview of the definition of a climate information system and climate information services, and detailed eight existing climate information systems in Cambodia:

- (i) *PIN-NCDM-Early Warning System 1294*: The '1294' system disseminates message alerts through the cell phone network to inform users about an imminent hazard and guidance for their protection.
- (ii) *Platform for Real-time Impact and Situation Monitoring (PRISM) of NCDM*: This system collects real-time information on hazards from villages, communes, districts and provinces which are then reported to NCDM.

- (iii) *Cambodia Disaster Loss and Damage Information System (CamDI) of NCDM*: This system records information about loss and damage from disaster events.
- (iv) *MoE Climate Change Data Portal*: The portal includes data on vulnerability assessments; climate finance; institutional readiness; knowledge, attitude, and practice on climate, and greenhouse gas emissions. Data is downloadable in CSV file format and content is disaggregated by administrative area (commune/district/province).
- (v) *MRC Data and Information Service Portal*: This portal provides climate information and data for countries of the Mekong region, and includes an interactive climate change atlas to visualize the spatial distribution of historical averages and future climate projections
- (vi) *Cambodia Mekong Delta Digital Atlas (CAM-MeDiA)*: The Atlas provides a contemporary knowledge base to support decision-making of national and subnational government officials responsible for planning in the Cambodia Mekong Delta. The CAM-MeDiA platform integrates multi-sectoral data sets that are sourced from the Royal Government of Cambodia, as well as from other organisations. This Atlas was designed to support the mandates of MAFF, MoE and MoWRAM.
- (vii) *Cambodia Climate Change Toolbox*: An information portal that provides climate projections in Cambodia at the country, provincial, district, and local levels. The Toolbox was developed in collaboration with MoE's Department of Geospatial Information Services and Department of Climate Change as part of the *TA-8179 CAM Mainstreaming Climate Resilience into Development Planning project* funded by ADB and implemented by ICEM. The toolbox incorporates two main sources of data: Mekong River Commission - Climate Change and Adaptation Initiative (MRC CCAI) and NASA Earth Exchange Global Daily Downscaled Projections (NEX-GDDP).

The presentation on Cambodia's Climate Information Systems can be found in Annex 2.

3.3.4. Presentation on the proposed LISA platform

Dr. Richard Cooper presented the proposed design and development of the LISA platform (refer to Annex 2).

3.3.5. Plenary Discussion

Following the presentations by Drs. Richard Cooper and Lay Chanthy, the plenary discussion was chaired by H.E Ou Dary. Key discussion points were as follows.

H.E Ou Dary: What hazards does LISA focus on to address climate change in Battambang municipality?

Dr. Richard Cooper: The national stakeholder consultation in Phnom Penh identified that flood is of most concern in Battambang, followed by drought, and thirdly heat stress.

Flood is considered a major issue, especially from stormwater runoff and overflow from the Stung Sangke River. Some municipal sangkats are vulnerable to flooding, including Slaket, Kdol Daun Teave, Ratatank, Prek Sdach, and Omal. Recent government-supported dam construction upstream in the Stung Sangke River may alleviate future flooding. Another hazard for the municipality is riverbank collapse. Drought is a smaller issue for the municipality following the increasing conversion of agricultural land for urban development.

The Early Warning System (EWS 1294) shares information about hazards and disasters. EWS1294 was established by the NGO People in Need (PIN) and is operated by the Provincial Committee for Disaster Management. Message alerts from the system are disseminated through the commercial cell phone system and loudspeakers installed in the city. More recently in 2022, under the Cambodia Climate Change Alliance, PIN surveyed flood management.

H.E. Ou Dary noted that Battambang municipality should respond carefully as LISA focuses on the municipality. He mentioned that there are three hazards to focus on for LISA, as raised earlier, but

should also include riverine flooding from the Stung Sangke River. At present, there are a few dams built upstream and future flood events may reflect such changes in the future. Participation of the Provincial Department of Environment (PDoE) in the LISA working group was suggested as LISA might need climate change and GIS information.

Dr. Richard Cooper: asked who the focal points for LISA in the municipality should be.

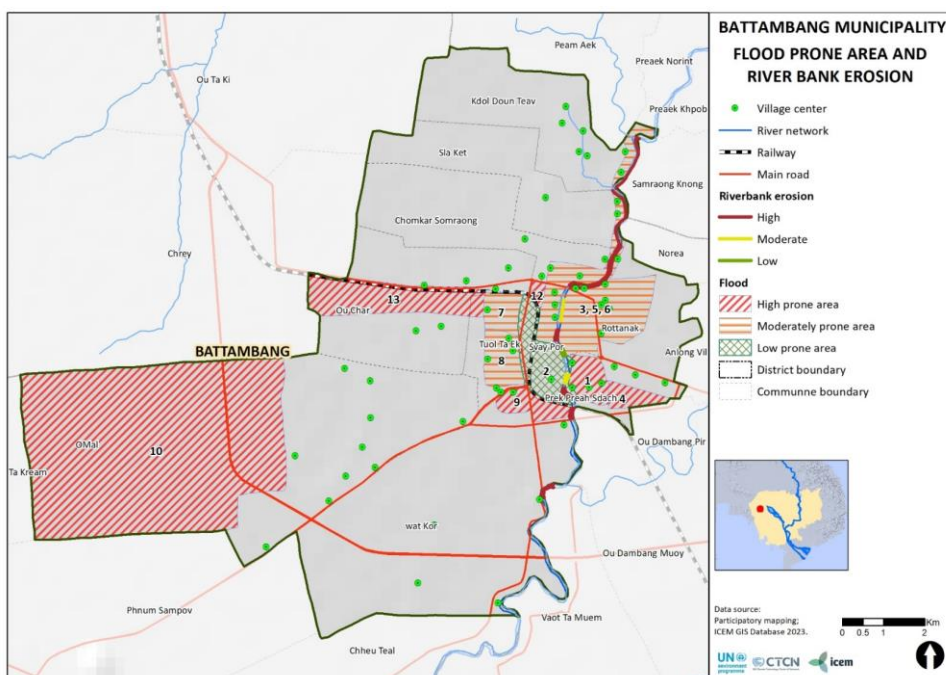
H.E. Ou Dary: The project should be supported directly by the municipality and overseen by the provincial authority. The municipality is the main focal point of LISA and the project team should discuss details with the municipality.

After the plenary discussion, meeting participants were divided into two groups for a **participatory mapping exercise** to identify the locations and magnitudes of past floods and riverbank collapse. Mr Miguel Coulier provided instructions for the mapping exercise with one group mapping flood and the other mapping river bank erosion. Participants color-coded hazard locations in red, blue, and green to indicate areas of potential high, medium and low risk respectively. In addition, participants were asked to identify vulnerable assets in the vicinity of delineated hazard locations.

Figure 6: Participatory mapping exercises with representatives from Battambang municipality



Figure 7: Results of the participatory mapping



3.3.6. Key identified needs for the LISA platform

- Eight types of hazards affect Battambang province, including floods (stormwater and flash flooding), drought, riverbank collapse, storm, lightning, fire, disease, and building collapse, of which two are of major concern - urban flooding and riverbank collapse.
- It would be good for the LISA tool to address climate change impacts and disasters in Battambang city.
- Some sangkats in the municipality are worse affected by floods from stormwater runoff and overflow from the Stung Sangke River.
- Drought is a smaller issue for the municipality following the increasing conversion of agricultural land for urban development.
- The municipality is the main focal point of LISA and the project team should discuss details with the municipality.

3.4. Meeting with Battambang Municipality

Table 4: Meeting with Battambang municipality: date, time, venue and participants

Date and time	Venue	Participant	LISA team
12 January 23 Time: 8:00-11:30am	Battambang Municipal Hall	Please refer to the list of participants in Annex 3	Dr. Richard Cooper Dr. Lay Chanthy, Mr. Pham Tran Minh Ms. Tous Sophorn Mr. Eng Senghak

3.4.1. Welcome remarks by the Deputy Governor of Battambang Municipality

This consultative meeting was opened by the Deputy Governor of Battambang municipality, Mr. Sek Chantra. **Mr Sek Chantra** introduced his colleagues from the relevant offices of the municipality and sangkats. He warmly welcomed the LISA project team and appreciated the LISA project initiative in Battambang municipality. He believed that LISA will be a very useful tool for the municipality to respond to future climate change events, as well as in its use for planning and investment.

3.4.2. An overview of LISA and progress

Dr. Lay Chanthy provided in Khmer an overview of the project and progress to date.

3.4.3. Plenary discussion

The plenary discussion addressed the following questions:

- **Question 1:** is there any physical infrastructure to be provided under LISA as other climate projects provided some infrastructure to control riverbank collapse?
- **Question 2:** Will the LISA platform perform as an early warning system to disseminate warnings to people about an imminent disaster event or a platform to provide climate change information and climate projections for city planning?

Addressing both questions, **Dr Lay Chanthy** noted that LISA is a web-based platform to provide climate change information, including climate change projections, for the city’s decision-makers and planners to mainstream city development activities in the context of climate change.

For data collection and operation of the LISA platform, **Mr Sek Chantra** requested LISA consider supporting an IT person to manage the system and information effectively. Mr. Chantra reported that three staff will be appointed for Battambang municipality: Mr. Tourt Chanratana, Deputy Chief of Administration, Mr. Song Seung, Chief of the Public Works Office, and Mr. Un Bunrath, Chief of the Office of Law. Since LISA requires considerable data from provincial departments, and given the municipality is at a lower administrative level, he suggested having a focal point in the provincial

authority to communicate and facilitate collaboration with key departments. He suggested a person from the Secretariat of Provincial Disaster Management.

After the plenary discussion, participants were divided into two groups to complete the participatory mapping exercise that commenced the day before. Dr. Lay Chanthy provided instructions on the flood mapping exercise and each group worked on the same mapping exercise to identify municipality flood areas. Participants color-coded hazard locations in red, blue, and green to indicate areas of potential high, medium and low risk respectively. In addition, participants were asked to identify vulnerable assets in the vicinity of delineated hazard locations.

3.4.4. Key identified needs for the LISA platform

- LISA will not be an early warning system, but for the city’s decision-makers and planners to mainstream city development activities in the context of climate change.
- Staff were appointed by the municipality to facilitate data collection for the LISA platform.
- A focal point from the provincial administration will be proposed to facilitate data sharing with the ICEM team.

3.5. Meeting with Technical Staff of Battambang Municipality

Table 5: Meeting with technical staff of Battambang municipality: date, time, venue and participants

Date and time	Venue	Participant	LISA team
12 January 23 Time: 2:00-4:00pm	Battambang Municipal Hall	Mr. Sek Chantra, Deputy Governor of Battambang Municipality Mr. Song Soeung, Chief of the Office of Public Work of Municipality Mr. Tuot Chanratana, Deputy Director of Administration Mr. Un Bunroth, Officer	Dr. Richard Cooper Dr. Lay Chanthy, Mr. Pham Tran Minh Ms. Tous Sophorn Mr. Eng Senghak

3.5.1 Discussion

The meeting was chaired by **Mr. Sek Chantra**, Deputy Governor of Battambang municipality, with the discussion facilitated by the LISA team. The discussion focused on the identification and collection of spatial data required for the LISA platform. The project team shared a list of data requirements that were prepared before the meeting. Dr Richard Cooper provided an overview of the data list and highlighted key data sets needed from the municipality.

Municipal staff helped to identify which provincial departments were likely to hold the requested data. Administrative data such as boundaries, population distribution, village locations, and municipal assets are available from the municipality. Other types of data may be available from PDoWRAM or the People in Need (PIN) organization, as PIN conducted a climate change vulnerability assessment for Battambang municipality in 2022. The municipality suggested that the project team contact PIN to acquire data from their recent work and appropriate provincial departments to find data on infrastructure, land use, social services, and socioeconomics.

The municipality shared three reports with the LISA team: (i) PIN’s 2022 report on Flood Mitigation Recommendations for Battambang Municipality, (ii) a Report on the Land Use Master Plan of Battambang City, and (iii) a Report on Three Rolling Investment Plans of Battambang Municipality.

3.5.2 Key identified needs for the LISA platform:

- The preliminary list of data requirements was shared by ICEM with the municipality.
- Potential provincial departments holding relevant data were identified.
- A proposed meeting with PIN was suggested to acquire data from their flood mapping study in Battambang in 2022.

3.6. Meeting with Provincial Committee for Disaster Management

Table 6: Meeting with Provincial Committee for Disaster management: date, time, venue and participants

Date and time	Venue	Participant	LISA team
13 January 23 Time: 2:30-4:00pm	PCDM office	Mr. Kham Samrueb, PCDM Officer Mr. Kheun Tola, PCDM Officer	Dr. Richard Cooper Dr. Lay Chanthy Mr. Pham Tran Minh Ms. Tous Sophorn Mr. Eng Senghak

3.6.1 Discussion

The meeting started with a brief introduction to the LISA project and platform by Dr. Richard Cooper. Dr. Lay Chanthy led the discussion on the establishment of the stakeholder working group and the identification of potential members from the provincial departments, including from the Secretariat of the Provincial Committee for Disaster Management (PCDM), Provincial Department of Environment (PDoE), Provincial Department of Public Work and Transportation, Provincial Department of Construction and Land Use, Provincial Department of Post and Telecommunication, and Provincial Department of Women Affairs.

Figure 8: Meeting with PCDM officers of Battambang



Mr. Kham Samrueb agreed to take on the role of key focal point at the provincial level to help facilitate coordination, communication, and collection of data/information from relevant provincial departments, as identified above. PCDM agreed to prepare a list of potential focal points from other provincial departments and submit to H.E Ou Dany for his official approval.

Regarding climate data, **Mr. Kheun Tola** responded that PCDM has limited data since it works on disaster management. PCDM focuses on reporting (monthly, semester, and annually) to NCDM and the collection of information from villages, communes, and districts of Battambang. It was suggested that the municipality may hold local climate data. Furthermore, under CCCA’s support, the municipality hired PIN to conduct a study on flood vulnerability in Battambang city.

Mr. Kham Samrueb added that PCDM operates EWS-1294, with the platform managed by NCDM. PCDM’s responsibility is to collect information from automatic flood monitoring stations that were installed under the EWS1294 project along high-risk rivers and to complement this with information gathered by MoWRAM. In the past, PCDM prepared disaster risk maps of Battambang in 2017 through

a consultative workshop and subsequently collected spatial data on disaster risk in 2019, though the provincial disaster risk maps have not since been revised due to delays caused by the COVID-19 pandemic.

For the collection of near real-time disaster information, **Mr. Kheun Tola** asked the team to review NCDM’s PRISM platform. This system might provide some relevant information for LISA. PRISM is a web-based system for reporting near real-time disaster events. The LISA team will request NCDM for access to review its data content.

PCDM agreed to facilitate the collection of data from provincial departments, though it may take more time from PDOWRAM.

At the meeting’s conclusion, the team agreed to establish a LISA telegram group for the stakeholder working group. The Telegram group will be created by Dr. Lay Chanthy. Mr. Kham Samreub will identify focal points from relevant departments and share the details with Dr. Chanthy. Any future communications with provincial departments can be made through Mr. Kham Samrueb.

3.6.2 Key identified needs for the LISA platform:

- PCDM agreed to help facilitate and expedite data collection from the provincial departments
- PCDM will help identify focal points from relevant provincial departments
- The team was advised to review the datasets used in NCDM’s PRISM platform
- A LISA Telegram group will be established for the stakeholder working group.

3.7. Field Trip to Flood Prone Areas and Riverside Landslide Locations

Table 7: Field trip in Battambang

Date and time	Venue	Participant	LISA team
13 January 23 Time: 4:00-5:30pm	Field visit	Mr. Song Soeung, Chief of the office of public work	Dr. Richard Cooper Mr. Pham Tran Minh Ms. Tous Sophorn Mr. Eng Senghak

On the last day of the field mission in Battambang, the project team visited flood-prone areas in Battambang city and past river bank erosion sites along the Stung Sangke River. The field visit was accompanied by Mr Song Soeung, head of the municipality technical office and the person responsible for public works in Battambang city. Sites visited included a wastewater treatment facility, locations along the river at risk of bank collapse, and flood-prone areas of the city.

Mr. Song Soeung mentioned how the provincial hall and municipality pay close attention to protecting people, plantations, and infrastructure (roads, homes, and bridges) from rainfall-induced and riverine floods. People living in high-risk locations have been advised to leave and move somewhere safer. Given that the city has experienced frequent flooding in recent years, there are limited resources to strengthen all at-risk sites along the Stung Sangke River; a few sites along the river bank were repaired with funds from the government and development budgets.

Figure 9: Site visit to a river erosion site along the Stung Sangke River



3.8. Meeting with the General Directorate of Policy and Strategy

Table 8: Meeting with General Directorate of Policy and Strategy: date, time, venue and participants

Date and time	Venue	Participant	LISA team
16 January 23 Time: 9:00-10:30am	MoE	H.E Vann Monyneath, Director General of GDPS Mr. Sum Cheat, Deputy Director of DCC Mr. Saing Kimleng, DCC staff	Dr. Richard Cooper Dr. Lay Chanthy Mr. Pham Tran Minh Mr. Eng Senghak

Dr. Richard Cooper commenced the meeting with a briefing on mission activities that were conducted and completed in Phnom Penh and Battambang municipality.

H.E. Vann Monyneath then shared related information about activities and climate change projects implemented by the General Directorate of Policy and Strategy (GDPS) and DCC. H.E. Vann Monyneath indicated that the GDPS had just joined a field mission with a World Bank project on nature-based solutions for water resources and irrigation management in the northeastern provinces of Cambodia. The project aims to provide nature-based solutions for climate change adaptation in relation to water resources and irrigation management.

Regarding LISA, **H.E. Vann Monyneath** highlighted concerns about the sustainability of the LISA platform after project completion. He mentioned that some projects finish without properly addressing the sustainability of activities after the project end. Thus, for the LISA project, H.E. Vann Monyneath wants to have clarity in terms of the roles and responsibilities of ICEM and MoE, an understanding of the outputs and sustainability of the project, and highlighted the importance of subnational government capacity building on data collection and data interpretation.

Figure 10: Photo of the meeting with General Department of Policy and Strategy of MoE



3.9. Meeting with Department of Geographic Information Services

Table 9: Meeting with Department of Geographic Information Services: date, time, venue and participants

Date and time	Venue	Participant	LISA team
16 January 23 Time: 2:00-3:30pm	DGIS room/MOE	- Mr Chivin Leng, Director of Department of Geographical Information Services - Ms. Kimsroy Sokvisal, DGIS officer - Mr. Voun Chhoursonath, DGIS officer	Dr. Richard Cooper Dr. Lay Chanthy Mr. Pham Tran Minh Mr. Eng Senghak

3.9.1 Discussion

The meeting discussed the ability of the department of MIS (DGIS) to host the LISA platform.

Dr. Richard Cooper gave an overview of the development of the LISA platform for the city of Battambang and the need for an appropriate facility to accommodate the system. The LISA platform is a web-based platform that needs to be hosted by a government agency with an appropriate hosting server and IT capacity. Dr. Cooper added that the Municipality of Battambang may not be an appropriate location to host the LISA platform due to its limited hardware availability and computing capacity. He added that it would be good to have the LISA platform housed under the MoE DGIS. LISA can be expanded to other municipalities across Cambodia if LISA is successfully implemented in the city of Battambang. DGIS is an ideal location to host LISA.

In response, **Mr. Chivin Leng**, Director of DGIS, said the LISA should be hosted under DCC as this project is under DCC, noting that DGIS focuses on natural resources and not climate data. DGIS also lacks resources, including IT staff. Mr. Chivin was sorry for not being able to provide a positive reply.

In addition, Mr. Chivin shared details of the CEMIS project. DGIS has a project aimed at developing the Cambodian Environmental Management Information System (CEMIS). This project is supported by UNDP. CEMIS version 1 has been completed and now CEMIS version 2 is operating. Mr. Chivin also asked his UNDP counterpart who also joined via Zoom to present CEMIS to the LISA team.

Figure 11: Photo of the meeting with Department of GIS of MoE



3.9.2 Key identified needs for the LISA platform:

- The applications developed by the DGIS focus on natural resources and not climate data.
- DGIS lacks staff resources to host the LISA platform.

3.10. Meeting with National Committee for Disaster Management

Table 10: Meeting with National Committee for Disaster Management: date, time, venue and participants

Date and time	Venue	Participant	LISA team
16 January 23 Time: 9:00-10:00am	NCDM meeting room	<ul style="list-style-type: none"> • Dr. Soth Kim Kolmony, Advisor to director of department • Mr. Heng Leng An, Chief of Office of Information 	Dr. Richard Cooper Dr. Lay Chanthy, Mr. Pham Tran Minh Mr. Eng Senghak

3.10.1 Discussion

Dr Richard Cooper commenced the meeting by giving a briefing on the LISA team mission to Phnom Penh and Battambang. Key issues addressed in the mission included the collection of data from Battambang municipality and identification of a suitable government facility to host this LISA platform. Key points raised with NCDM included: (i) the data collection process, (ii) accessibility to the PRISM system, (iii) hosting of the LISA platform, and (iv) organisation of a meeting with PIN to request data from the 2022 vulnerability study in Battambang.

Dr. Soth Kim Kolmony informed participants that the PIN organization assisted NCDM to develop Early Warning System 1294 (EWS1294). This system is in force in every province of Cambodia. Dr. Kolmony requested that Dr Cooper draft a letter for NCDM to request a meeting with PIN at the NCDM office.

Dr Kolmony indicated that PRISM is a web-based near real-time system that enables local authorities to report potential disaster events to PCDM and NCDM. The CamDi system does not contain climate change data and is a database for recording disasters including details on loss and damage. Dr Kolmony recommended that the LISA team review the CamDi system as it provides information about the locations and history of disasters, including the city of Battambang. CamDi can be accessed online.

Regarding the capacity to hosting the LISA platform, **Dr Kolmony** and **Mr Heng Leng An** expressed support in hosting LISA under NCDM, as NCDM has a good hosting server system capacity. However, NCDM lacks qualified IT staff. To request the LISA platform to be hosted under NCDM, **Mr Leng An** suggested that ICEM prepare a letter of request to NCDM. Upon request, the NCDM team may further consult with the NCDM management team and obtain final approval from the lead ministry and the NCDM Chair. If the NCDM Chair agrees, an MOU between ICEM and NCDM should be prepared to accommodate the LISA platform.

Figure 8: Meeting with NCDM



3.10.2 Key identified needs for the LISA platform:

- The team was asked to draft a letter for NCDM to request a meeting with PIN at the NCDM office.
- It was recommended that the team review the CAMDI database for potential useful data.
- NCDM expressed interest in hosting the LISA platform.
- NCDM has a web server but lacks qualified IT staff.
- An MoU between ICEM and NCDM should be prepared to accommodate the LISA platform.

4. KEY FINDINGS AND OUTCOMES

At the end of the mission, the following outcomes to support the development of the LISA platform were identified:

4.1. Introduction and agreement of Battambang as location for LISA

The mission team met with key stakeholders at the province and municipality levels to introduce and the LISA project to be piloted in Battambang municipality. Provincial and municipality authorities, and key provincial departments welcomed the LISA project in Battambang municipality. The Provincial Deputy Governor and the Municipal Deputy Governor of Battambang expressed their support for the LISA application in Battambang City. All key stakeholders in the sub-national administration, including the provincial, municipal and sangkat levels, were advised of the LISA.

4.2. Identification of hazards

The climate threats to be targeted for the LISA platform in the municipality of Battambang were identified by the national stakeholder consultation in Phnom Penh. The identified climate hazards were verified by local stakeholders at the provincial stakeholder meeting. The mission identified three key potential climate hazards: flooding, including stormwater and river flooding, is the most severe climate hazard in the municipality of Battambang; the second potential climate hazard is river bank collapse, followed by heat stress as the third potential climate hazard.

4.3. Data/information collection for the LISA platform

Potential government sources of data were identified. Key focal points at municipal and provincial levels were identified to facilitate, communicate and gather information from relevant offices and departments within the provincial administration. The deputy head of the municipal administration unit and two other municipal officers were designated as focal points for the municipality. The Secretariat for the Provincial Committee for Disaster Management was identified as a central unit for facilitation at the provincial level.

4.4. LISA national stakeholder working group

The national stakeholder working group for the LISA project was identified. National key institutions include the Ministry of Environment (MoE), Ministry of Womens Affair (MoWA), National Committee for Disaster Management (NCDM), National Committee for Sub-national Democratic Development Secretariat (NCDDS), Ministry of Post of Telecommunication (MoPT), and Ministry of Water Resource and Meteorology (MoWRAM). Focal points from these institutions have been identified and participated in meetings and consultations for LISA. The table below presents focal point names, affiliations, positions, and phone numbers.

Table 11: National stakeholder working group

No.	Institution	Name	Position	Contact #
1	MOE/DCC	Mr. Sum Cheat	Deputy Director of DCC/MOE	012850164
2	MoWA	H.E Mey Hol	Under Secretary of State of MOWA	012 927 305
3		Mr. Meas Chivon	Chief of Office	085 425 285

No.	Institution	Name	Position	Contact #
4	NCDDS	Mr. Sorn Sunsopheak	Deputy Director of Support Program	012 922 123
5		Ms. Chin Chanrangsey	Program Office of NCDDS	092 799 521
6	NCDM	Dr. Soth Kim Kulmony	Director of Department	012 272 107
7		Mr. Heng Leng An	Chief of Office of Information	012 826 402
8	MoPTC	H.E Neang Mao	Director of Technical Affairs Of MoPTC	016840620
9		Mr. En Sevann	Technical Advisor	011738625

4.5. LISA subnational stakeholder working group

The subnational stakeholder working group for the LISA project was identified. Key subnational institutions include the Secretariat of the Provincial Committee for Disaster Management, Battambang Municipality, and relevant provincial departments. Focal points from these institutions were identified and participated in the mission’s meetings and consultations. The table below presents name, institution, position, and phone number of the subnational focal points.

Table 12: Subnational stakeholder working group

No.	Institution	Name	Position	Contact #
1	PCDM	Mr. Kham Samreub	Senior Officer of PCDM	093782188
2	Municipality	Mr. Tout Chandara	Chief of Municipal Administration Unit	017411149
3	Municipality	Mr. Song Seung	Chief of Technical Office	012 975 250
4	Municipality	Mr. Oun Bunrath	Officer of Policy of Municipality	086 797 997
5	PDoE	Mr. Ear Kimcheng	Deputy Director of PDoE	012 357185
6	PDoWT	Mr. Sal Sotat	Deputy Director	012965396
7	PDoWA	Mr. Visontha ratha	Deputy Director	012602853
8	PDoPT	Sek Chanbon	Director	012 666 361
9	PoIPD ^a	Mr. Yim Triserey	Officer of PoIPD	017529552
10	PoISD ^b	Mr. San Tithvirak	Director of PoISD	012777069

^a Provincial Investment and Planning Division

^b Provincial Intersectoral Division

4.6. Identification of LISA hosting possibilities

Identifying a suitable organization to host the LISA platform was a mission outcome. The mission team discussed hosting with three organizations including the Municipality of Battambang, the Department of GIS of MoE, and NCDM. Three criteria were considered to assess the suitability for hosting: (i) commitment of the agency, (ii) availability of hardware capacity, and (iii) capacity of IT staff. The team found that NCDM offers the best option for hosting the application.

4.7. Preparation of Letter of Agreement with GDPS

Responding to the request from the General Department of Policy and Strategy (GDPS) for the clarification of the roles and responsibilities of ICEM and DCC/GDPS, a letter of agreement (LoA) between ICEM and GDPS was drafted by ICEM. The draft LoA was shared with the Director General of the GDPS at the meeting of 16 January 2023 for their review before finalizing the agreement.

5. IMMEDIATE NEXT STEPS

These follow-up activities were identified with corresponding deadlines and responsibilities for action:

Table 13: Follow-up actions and next steps

Follow-up Action	Responsibility	Deadline
1. Final list of national working group focal points	ICEM	End of Feb
2. Final list of subnational working group focal points	ICEM, PCDM, and Battambang Municipality	End of Feb
3. Data collection from Battambang municipality	ICEM, PCDM, and Battambang Municipality	End of Feb
4. Development of prototype LISA for Battambang	ICEM	Mid-March
5. Climate risk assessment conducted	ICEM	Mid-March
6. Organisation of virtual stakeholder meeting to present results of climate risk assessment and prototype LISA platform	ICEM	Mid-March

ANNEX 1: STAKEHOLDER CONSULTATION MEETING AGENDA

Annex 1.1: National stakeholder consultation in Phnom Penh

Location: Himawari Hotel, Phnom Penh, Cambodia

Date: Tuesday, 10 Jan 2023, 8:30 – 12:00 PM

Time	Activity	Presenter/Facilitator
08:30 AM - 08:45 AM	Welcome remarks	Chairperson from MoE
08:45 AM - 09:00 AM	Participant introduction	All participants
09:00 AM - 09:20 AM	LISA project: Project overview, with key outcomes of previous consultations	Richard Cooper, DSS specialist/ Project Manager, ICEM
09:20 AM - 09:40 AM	Overview of climate information systems in Cambodia	Lay Chanthy, Climate Change Expert, ICEM
09:40 AM – 10:00 AM	Sharing of best practices from other countries.	Miguel Coulier, Climate change risk assessment expert, ICEM
10:00 AM – 10:30 AM	Plenary discussion (Q&A)	Lay Chanthy, Climate Change Expert, ICEM
10:30 AM - 10: 45 AM	Morning coffee/tea break	All participants
10:45 AM – 11:00 AM	Present initial LISA platform concept, for feedback	Richard Cooper, DSS specialist/ Project Manager, ICEM
11:00 AM – 11:30 AM	Plenary discussion on LISA concept for Battambang municipality and data needs	Richard Cooper, DSS specialist/ Project Manager, ICEM
11:30 AM - 11:45 AM	Wrap-up and closing	Chairperson from MoE
11:45 – 13:30	Lunch at Himawari	All participants

Annex 1.2: Provincial stakeholder consultation in Battambang

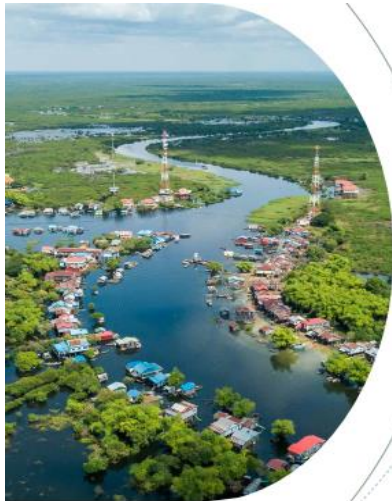
Location: Battambang Provincial Hall

Date: Tuesday, 11 Sep 2023, 1:30 – 5:30PM

Time	Activity	Presenter/Facilitator
13:30 PM - 13:45 PM	Welcome remarks	Battambang Deputy provincial governor
13:45 PM - 14:00 PM	Participant introduction	All participants
14:00 PM - 14:15 PM	Project overview, with key outcomes of previous consultations	Richard Cooper, DSS specialist/ Project Manager, ICEM
14:15 PM - 14:30 PM	Overview of climate information systems in Cambodia	Lay Chanthy, Climate Change Expert, ICEM
14:30 PM – 14:45 PM	Sharing of best practices from other countries	Miguel Coulier, Climate change risk assessment expert, ICEM
14:45 PM – 15:30 PM	Plenary discussion (Q&A)	Lay Chanthy, Climate Change Expert, ICEM
<i>15:30 PM - 15:45 PM</i>	<i>Coffee/tea break</i>	<i>All participants</i>
15:45 PM – 16:00 PM	Present initial LISA platform concept, for feedback	Richard Cooper, DSS specialist/ Project Manager, ICEM
16:00 PM – 16:30 PM	Plenary discussion on LISA concept for Battambang municipality and data needs	Richard Cooper, DSS specialist/ Project Manager, ICEM
16:30 PM – 17:20 PM	Group exercise on hazard mapping	All participants
16:30 PM - 16:45 PM	Wrap-up and closing	Battambang Deputy provincial governor

ANNEX 2: STAKEHOLDER CONSULTATIONS MEETING IN PHNOM PENH AND BATTAMBANG: PRESENTATIONS

Annex 2.1: LISA Project Overview and Progresses



Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia

**UN LISA mission:
LISA Project Overview**

January 2023



Outline

- Project summary and TA Team Members
- Project overview and key deliverables
- Progress to-date
 - Selection of municipality
- UN LISA team mission
- Immediate next steps
- Subsequent tasks/events



PROJECT SUMMARY

Project initiative: DCC/NCSD

Project funding: United Nations Climate Technology Center and Network (UN-CTCN)

Project implementation (TA Team): International Center for Environmental Management (ICEM)



TA TEAM MEMBERS

Dr. Richard Cooper
Project Manager (I1)



Mr Eng Senghak
National Operations Coordinator



Mr. Joe Ogden
Expert in web design and development (I2)



Ms. Tous Sophorn
Gender expert (N1)



Mr. Pham Tran Minh
Expert in data management and design (I3)



Dr. Lay Chanthy
Climate change and local coordination expert (N2)



Mr. Miguel Coulier
Expert in climate change risk assessment (I4)



Ms. Hoa Truong Tung
Project Coordinator



PROJECT OVERVIEW AND KEY DELIVERABLES

Objective:

Support to develop and design a local climate information system for climate change adaptation (LISA) in Cambodia

Three key tasks:

- i. Identification of the current status of the climate information systems in Cambodia;
- ii. Identification of stakeholder's needs and climate change risk assessment at the selected municipality; and
- iii. Development of LISA at the selected municipality.

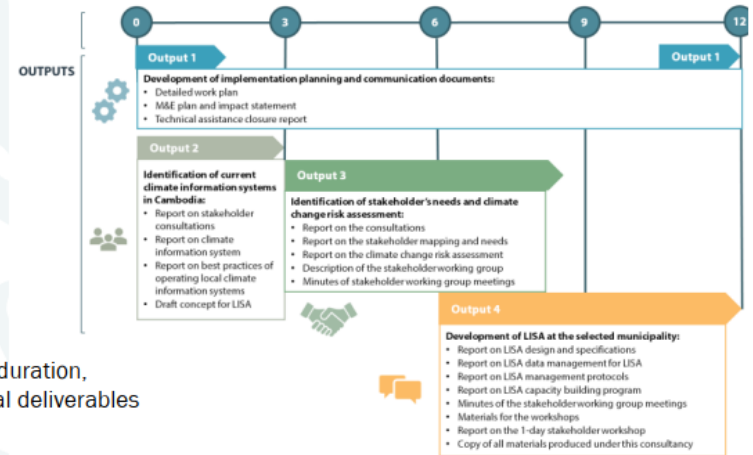


Output/Activities	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Output 1: Development of implementation planning and communication documents																
1.1 Preparation of detailed work plan																
1.2 Preparation of monitoring & evaluation (M&E) plan and impact statement																
1.3 Preparation of technical assistance closure report																
Output 2: Identification of the current status of the climate information systems in Cambodia																
2.1 A kick-off meeting and stakeholder consultations																
2.2 Review of the climate information systems in Cambodia																
2.3 Investigation of best practices of operating local climate information systems (draft concept of LISA)																
Output 3: Identification of stakeholder's needs and climate change risk assessment at the selected municipality																
3.1 Consultations to select the most appropriate municipality to design LISA																
3.2 Mapping of the potential stakeholders at the selected municipality and survey of their needs																
3.3 Climate change risk assessment at the selected municipality																
3.4 Organization of the stakeholder working group																
3.5 Organization of a meeting with the stakeholder working group (initial meeting)																
Output 4: Development of LISA at the selected municipality																
4.1 Design of contents and specifications for LISA																
4.2 Design of the process of data management for LISA																
4.3 Development of the management protocols for LISA																
4.4 Development of the capacity building program for effective use of LISA																
4.5 Organization of a meeting with the stakeholder working group																
4.6 Organization of a 1-day stakeholder workshop for government bodies and stakeholders																
4.7 Preparation of training workshop materials for deployment and management of LISA**																
Output 1: Development of implementation planning and communication documents																
1.1 Detailed work plan																
1.2 Monitoring & evaluation (M&E) plan and impact statement																
1.3 Technical assistance closure report																
Output 2: Identification of the current status of the climate information systems in Cambodia																
2.1 Report on the kick-off meeting and stakeholder consultations																
2.2 Report on the review of the climate information systems in Cambodia																
2.3 Report on the investigation of best practices of operating local climate information systems																
2.4 Initial considerations and draft concept for LISA																
2.5 Report on the consultations to select the most appropriate municipality to design LISA																
2.6 Report on the mapping of the potential stakeholders at the selected municipality and survey of their needs																
2.7 Detailed description of the climate change risk assessment at the selected municipality																
2.8 Detailed description of the stakeholder working group, with names and contact details of the members, respective instructions, gender, etc.																
2.9 Minutes of the stakeholder working group meeting with a list of participants disaggregated by gender, national level, and summary of the discussion held																
2.10 Report on the design of contents and specifications for LISA, with the initial mock-up of the system (attached and linked) ready																
2.11 Report on the design of the process of data management for LISA																
2.12 Report on the management protocols for LISA																
2.13 Report on the capacity building program for effective use of LISA																
2.14 Minutes of the stakeholder working group meeting with a list of participants disaggregated by gender, national level, and summary of the discussion held																
2.15 Materials for the workshop (e.g., presentation, consultation survey form(s), etc.)																
2.16 Report on the 1-day stakeholder workshop for government bodies and stakeholders																
2.17 Copy of all materials produced under this consultancy (including program meeting code and database)																



PROJECT OVERVIEW AND KEY DELIVERABLES

Project extended to mid-June 2023



- 12 months duration,
- 20 individual deliverables

Progress to-date

Outputs/Activities		
01	Output 1: Development of implementation planning and communication documents	
1.1	Preparation of detailed work plan	✓
1.2	Preparation of Monitoring & Evaluation (M&E) plan and impact statement	✓
1.3	Preparation of Technical assistance closure report	✓
02	Output 2: Identification of the current status of the climate information systems in Cambodia	
2.1	A kick-off meeting and stakeholder consultations	MoE, NCDD, NCDM, MoWA ✓
2.2	Review of the climate information systems in Cambodia	Initial drafts ✓
2.3	Investigation of best practices of operating local climate information systems/draft concept of LISA	Initial drafts ✓
03	Output 3: Identification of stakeholder's needs and climate change risk assessment at the selected m	
3.1	Consultations to select the most appropriate municipality to design LISA	As above, and Dept Policy Planning ✓
3.2	Mapping of the potential stakeholders at the selected municipality and survey of their needs	⊖
3.3	Climate change risk assessment at the selected municipality	This mission ⊖
3.4	Organisation of the stakeholder working group	⊖
3.5	Organisation of a meeting with the stakeholder working group (virtual meeting)	⊖



Selection of municipality

There is a **strong case for selecting Battambang**:

1. Battambang is the municipality favoured by three of the key stakeholders (NCDD, NCDM and MoWA);
2. the municipality's exposure to hazards (including riverine flood, flash flood, cyclones, and wildfire) and risk from climate change;
3. the stated commitment of the municipality to addressing climate change;
4. the availability of good data
5. Ongoing ICEM projects in region and professional network
 - WB, ADB, GIZ/MRC.
6. Data analysis to support selection



Selection of municipality

Preliminary Atlas of Battambang



Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia

Atlas for Battambang Municipality

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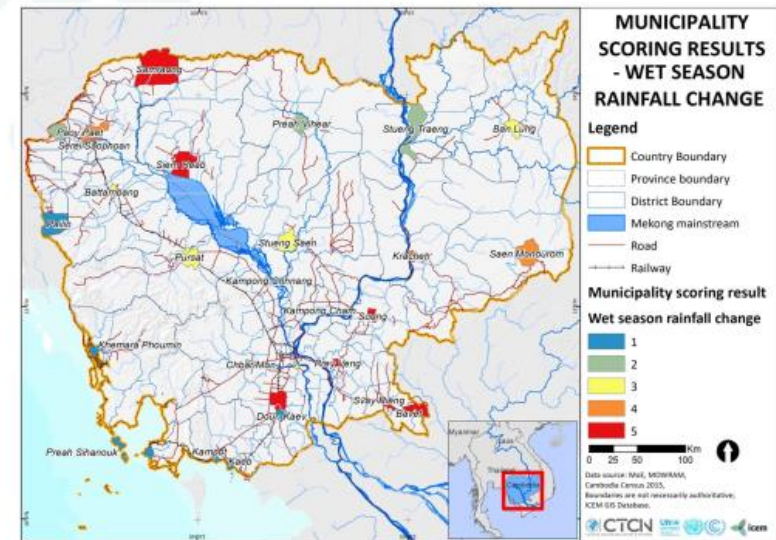
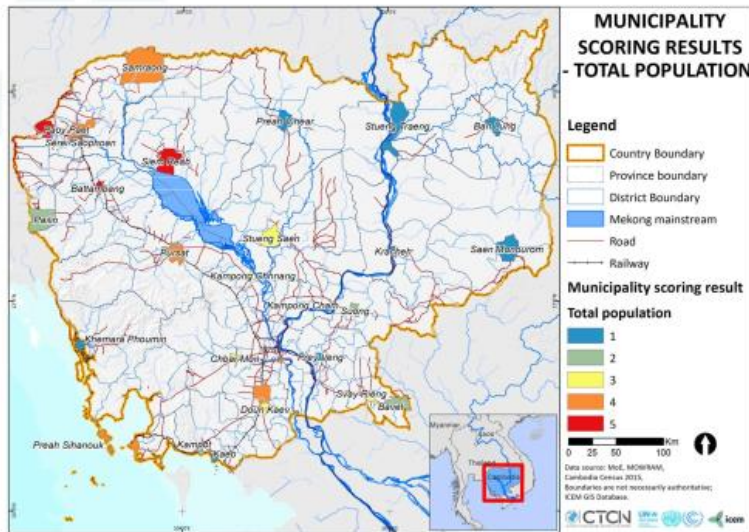
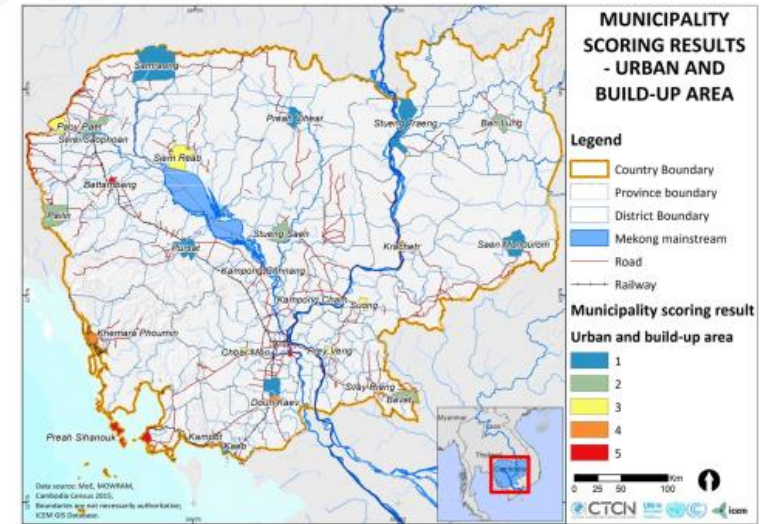
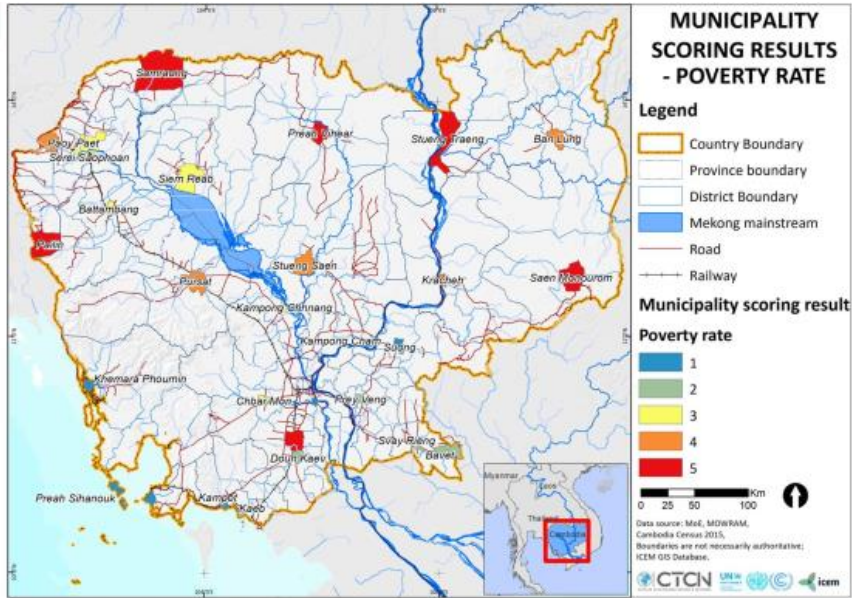


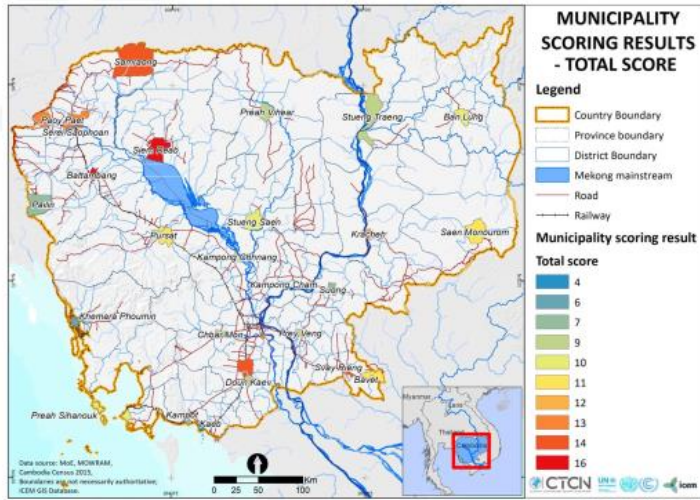
Selection of municipality

Scientific basis for selecting Battambang:

1. Analysed ranking of 26 provincial municipalities in Cambodia against four criteria:
 1. Poverty rate (2015 census)
 2. Urban area (% of urban area in municipality)
 3. Population count (2015 census)
 4. Wet season rainfall change (baseline: 1985-2005, future: 2050s)







Selection of municipality (provinces)

District name	Province name	% urban land	Wet season rainfall change (baseline: 1985-2005, future: 2050s)	Population (2015 census)	Poverty rate (2015 census)	Scoring				Sum of score	Ranked	Data available	Commitment to CC
						Poverty rate	% urban area	Population	Wet season rainfall change				
Serei Seaphoan	BANTEAY MEANCHHEY	0.65	5.8	94,979	18.25	3	2	4	4	13	5		
Paoy Peet	BANTEAY MEANCHHEY	0.92	3.4	110,691	19.42	4	3	4	2	13	5		
Battambang	BATTAMBANG	7.86	4.5	153,727	16.51	3	5	5	3	16	1	Yes	Yes
Kampong Cham	KAMPONG CHAM	20.98	6.1	40,023	9.71	1	5	2	4	12	8		
Kampong Ohmang	KAMPONG CHHNANG	3.20	3.9	42,734	16.26	3	4	2	2	11	10		
Chbar Mon	KAMPONG SPEU	0.92	3.3	49,646	16.19	2	3	3	1	9	17		
Stueng Saen	KAMPONG THOM	0.10	4.6	58,017	18.78	3	1	3	3	10	14		
Kampot	KAMPOT	2.60	-2.9	35,874	7.82	1	4	2	0	7	22		
Ta Khmeu	KANDAL	21.14	5	74,273	7.36	1	5	4	3	13	5		
Khemarakphumint	KOH KONG	1.59	-5.4	28,672	7.43	1	4	1	0	6	24		
Kracheh	KRATIE	2.00	5.4	31,673	18.96	4	4	1	3	12	8		
Seen Monourom	MONDUL KIRI	0.05	5.6	14,213	21.02	5	1	1	4	11	10		
Preah Vihear	PREAH VIHEAR	0.07	4	22,802	22.62	5	1	1	2	9	17		
Prey Veng	PREY VENG	0.95	6.1	25,579	10.09	1	3	1	4	9	17		
Pouset	PUSAT	0.03	4.2	67,055	18.87	4	1	4	2	11	10		
Ben Lung	RATANAK KIRI	0.14	5	30,482	19.55	4	2	1	3	10	14		
Siem Reap	SIEMREAP	0.93	6.2	237,469	16.38	3	3	5	5	16	1		
Sihanoukville	SIHANOUKVILLE	4.59	-6.9	78,250	8.49	1	5	4	0	10	14		
Stueng Treang	STUNG TREANG	0.04	3.8	31,214	21.01	5	1	1	2	9	17		
Svay Rieng	SVAY RIENG	1.90	6.7	47,007	13.27	2	4	3	5	14	3		
Bevet	SVAY RIENG	0.14	6.5	39,744	10.99	2	2	2	5	11	10		
Doun Kaev	TAKEO	0.98	3	44,132	13.86	2	3	3	1	9	17		
Samraong	OTDAR MEANCHHEY	0.01	-7	62,615	27.53	5	1	3	5	14	3		
Kseo	KEP	0.00	-2.3	21,019	11.69	2	1	1	0	4	25		
Pailin	PAILIN	0.16	-1.1	31,937	19.58	4	2	1	0	7	22		
Suong	TBOUNG KHMUM	0.71	6.1	37,255	9.11	1	2	2	4	7	22		

UN LISA team mission

Objectives

1. Establishment of a stakeholder working group with key sub-national and national government agencies to support the risk assessment and LISA application development
2. Agree with the stakeholder working group on the key objectives, scope, users and functionalities of the LISA platform
3. Collect data for the climate change risk assessment and integration into the LISA platform
4. Ensure gender is addressed across all activities

UN LISA team mission

Outputs

- **D3.2:** Report on the mapping of the potential stakeholders at the selected municipality and survey of their needs
- **D3.3:** Report on the climate change risk assessment at the selected municipality
- **D3.4:** Detailed description of the stakeholder working group, with name and contact details of the members, respective institutions, gender, etc

Immediate next steps

- Identify key climate change hazard(s) in Battambang municipality
- Identify/confirm stakeholders for LISA platform development working group
 - PDoE, PDoWRAM, PDoWA, PDoUP, PDoPTC, PCDM, and Department of Cross-Sectoral Integration
- Identify and collect relevant datasets for the CCA and LISA development
- ICEM will commence development of prototype LISA platform to be demonstrated in online event E3 to LISA stakeholders

Subsequent tasks/events

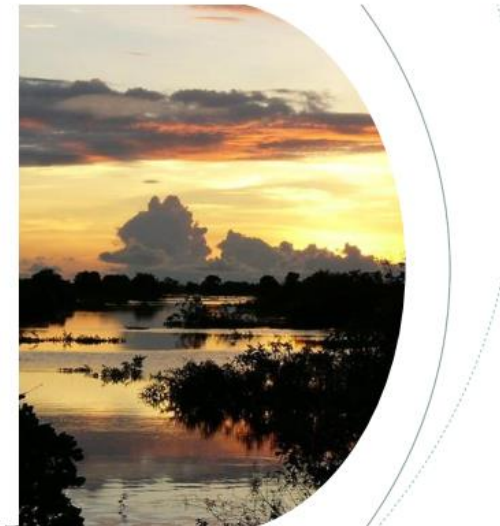
3.5	Organisation of a meeting with the stakeholder working group (virtual meeting)	☞ Climate risk assessment to be presented
04	Output 4: Development of LISA at the selected municipality	
4.1	Design of contents and specifications for LISA	
4.2	Design of the process of data management for LISA	
4.3	Development of the management protocols for LISA	
4.4	Development of the capacity building program for effective use of LISA	
4.5	Organisation of a meeting with the stakeholder working group	☞ LISA prototype to be presented
4.6	Organisation of a 1-day stakeholder workshop for government bodies and stakeholders	
4.7	Preparation of training workshop materials for deployment and management of LISA**	



Subsequent tasks/events

Events	
E1	Kick-off meeting and stakeholder consultations (linked to activity 2.1) ✓
E2	Consultations to select the most appropriate municipality to design LISA (linked to activity 3.1) ✓
E3	Meeting with the stakeholder working group (needs and risk assessment) (linked to activity 3.5) ☞ Climate risk assessment
E4	Stakeholder working group meeting (online), 10 participants (linked to activity 4.5) ☞ LISA prototype
E5	1-day stakeholder workshop for government bodies and stakeholders (linked to activity 4.6)
E6	Technical training for IT staff for managing LISA (4-5 half-day sessions) (linked to activity 4.7)

Notes



Thank you



Annex 2.2: A Review of Climate Information Systems in Cambodia



Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia

**UN LISA mission:
 Review of Climate Information Systems in Cambodia**

January 2023



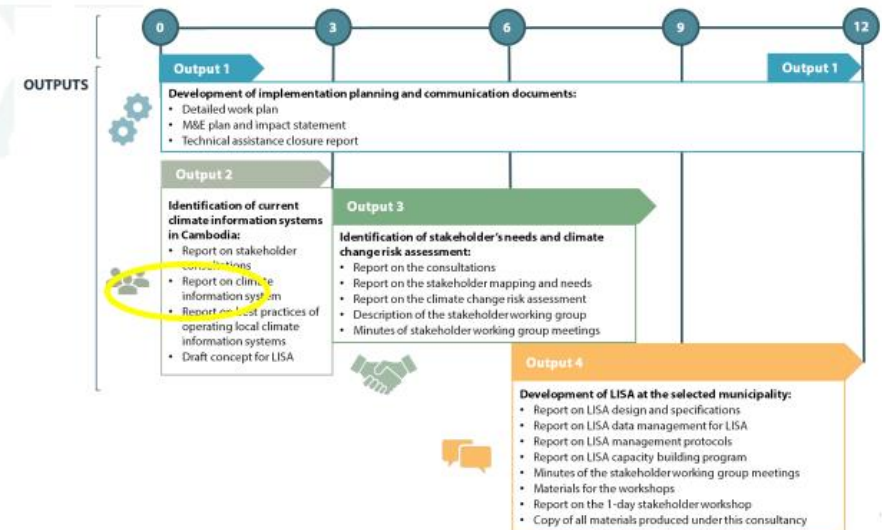
Outline

- Introduction
- What is a climate information system?
- Existing climate information systems
 - EWS1294
 - PRISM
 - CamDi
 - Climate change data portal
 - MRC Data Portal
 - Cambodia Mekong Delta Digital Atlas
 - Cambodia Climate Change Toolbox
- Key features of existing CIs



Introduction

- The *Review of Climate Information Systems in Cambodia* report focuses on reviewing the current status and operation of climate information systems (CISs) in Cambodia
- A deliverable under Output 2 of the Technical Assistance (TA) on Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia



What is a climate information system?

- No single definition for a climate information system (CIS)
- A platform that can be used to share climate data and information:
 - may contain value added information that is useful to inform decision making (also called 'climate services') for a given group of users or sector.
 - may be designed as
 - (i) an **early warning system** to alert communities of an upcoming flood or
 - (ii) used to identify areas at highest risk from climate hazards for **prioritising investment planning**.

What is a climate information system?

- An end-to-end design approach for CISs has been advocated (Trenberth 2016):
- An **end-to-end system** considers the entire process from provision of climate observations, data archiving, data access, to dissemination of climate services to end users and decision makers

Climate services: climate information tailored to the needs of users

- E.g., agricultural advisories for farmers

Existing climate information systems

1. Early Warning System 1294

- Developed by the NGO People in Need (PIN) and support of NCDM, Ministry of Post and Telecommunications, and Provincial Committees for Disaster Management (PCDMs)
- EWS 1294 is operational for all provinces in Cambodia
- Users can register to EWS 1294 by calling 1294, and receive an audio warning message issued by NCDM when there is an emergency, such as a flood or storm

Early Warning System 1294

- Data input - river level sensors, as well as information from weather stations and river stations of MOWRAM and Mekong River Commission (MRC)
- One of the main challenges of the EWS 1294 has been to ensure the operation and maintenance of the sensors.
- The outputs of EWS 1294 include warning messages along with safety instructions
- A key challenge of the EWS 1294 has been to increase its reach. Although the number of subscribers has slowly and steadily increased over the years, the system is still far from reaching the entire population at risk.

PRISM

2. Platform for Real-time Impact and Situation Monitoring (PRISM)

a web-based platform that provides information on potential risk of multiple types of hazards on communities

Data inputs - from various sources, including satellites and remote sensing sources, and EWS 1294, in which PRISM is connected to EWS 1294 to receive real time monitoring of river water level.

The outputs of PRISM are reported on an open access geospatial web-based platform (<https://www.prism-kh.info/>)



PRISM: user interface



PRISM

- Users can visualize hazard indicators over time through the interactive maps. However, rendering process takes a long time, which negatively affect user experience.
- Although PRISM is open access, information available to users is limited without authorization
- PRISM also integrates with mobile data collection platforms. This allows users to visualize data collected from impacted areas in real-time, alongside other hazard information

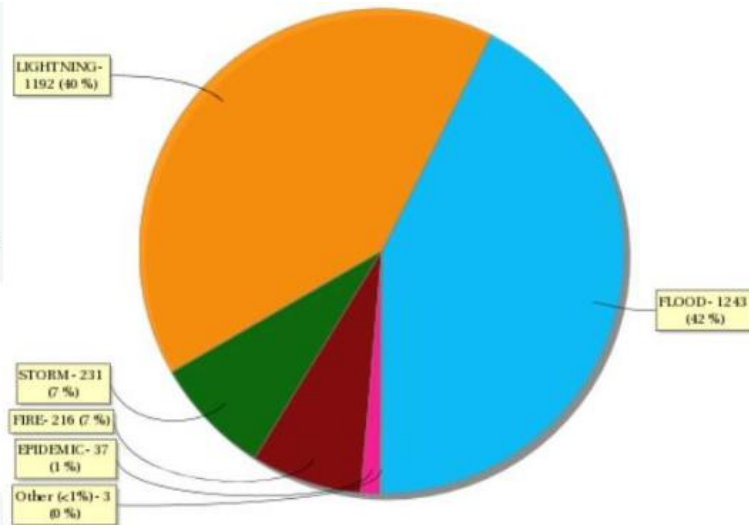


Cambodia Disaster Loss and Damage Information System (CamDI)

- Established by the NCDM, with technical and financial support from the United Nations Development Programme (UNDP).
- CamDi system was launched for official use in July 2014.
- Data was collected for eight types of hazards: flood, drought, lightning, storm, pest outbreak, epidemic, river bank collapse, and fire.
- Disaster loss and damage data in CamDI is presented in tables, charts and maps.



Example of CamDI product in chart form: ratio of deaths by disaster type



CamDI

- Data and analysis products of CamDI are reported on the CamDI website (<http://www.camdi.ncmd.gov.kh/>)
- Developed using DesInventar methodology
- The user interface is not particularly friendly and intuitive for public users as the platform contains many data variables
- There is limited information on sectoral damages



Climate Change Data Portal

- Climate change data portal (<https://ncsd.moe.gov.kh/dcc/data-portal>)
- Data inputs - from multiple sources, including government databases and development partners.
- Outputs presented in tables, charts, and maps.



Example of Climate Change Data Portal product in map form: Number of households affected by drought in 2021

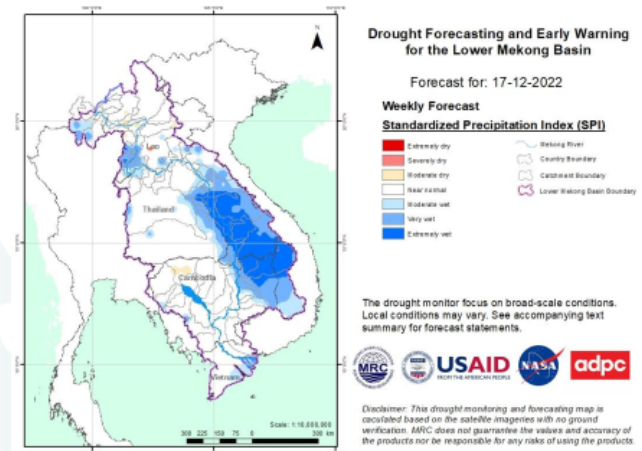


MRC Data and Information Service Portal

- Online gateway to data and products generated by the MRC
- Data inputs - related to water resources in the Lower Mekong Basin
- In Cambodia, MRC manages 17 automated telemetry, near real-time hydro-meteorological stations
- Outputs are presented in various formats, including charts, diagrams, and maps



Example of drought forecast product from MRC's Data Portal



MRC Data and Information Service Portal

- MRC's Data Portal has very good interactivity, with interactive maps and fast rendering process.
- Data and information on the portal can be easily searched and filtered.
- Graphs and maps are intuitive, with legends and explanation of the data displayed helping users understand what is presented.

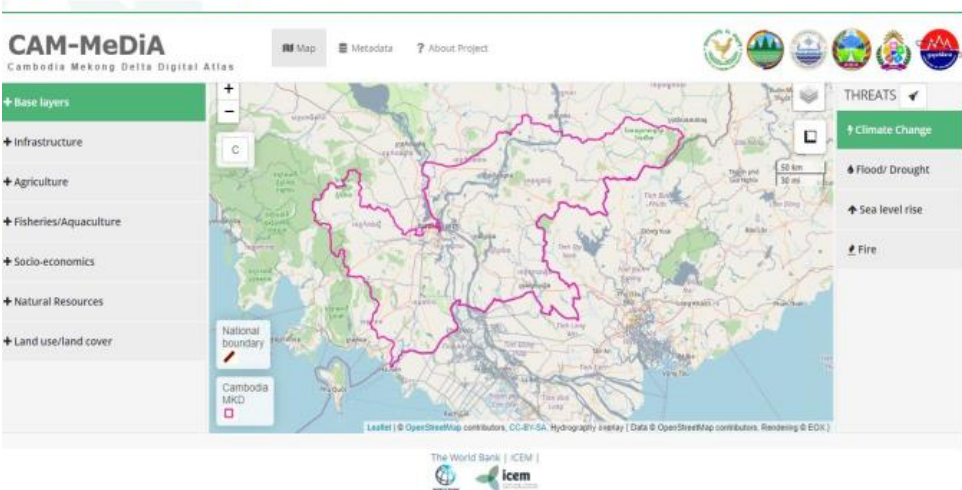


Cambodia Mekong Delta Digital Atlas

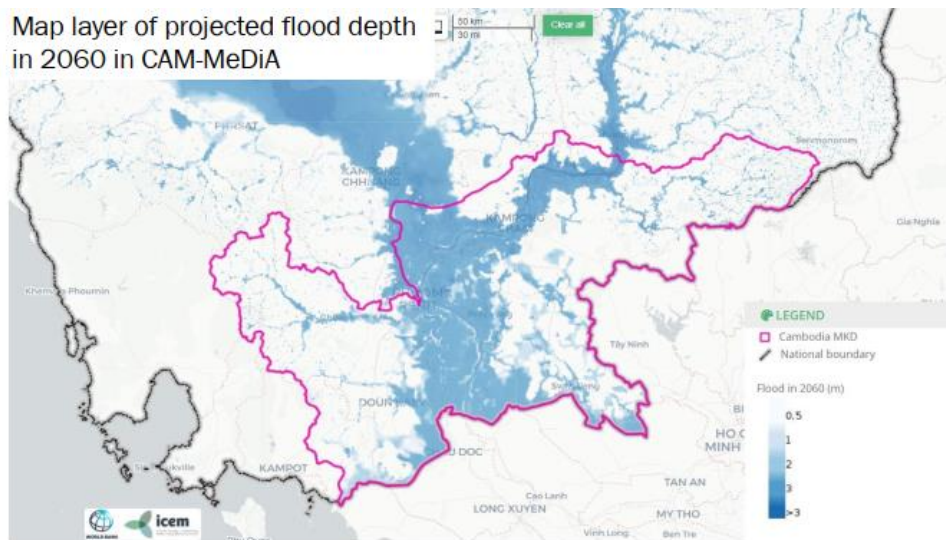
- The Atlas provides a contemporary knowledge base to support decision making of national and subnational government officials responsible for planning in the Cambodia Mekong Delta and for promoting transitions to more sustainable livelihoods in the context of climate change
- Input to CAM-MeDiA are multi-sector data sets sourced from the Royal Government of Cambodia, as well as from other organisations
- Outputs of CAM-MeDiA are a series of data and information layers presented in an interactive map viewer



Landing page for CAM-MeDiA



Map layer of projected flood depth in 2060 in CAM-MeDiA



Cambodia Climate Change Toolbox

- An information portal that provides projections and data for climate parameters in Cambodia at the country, provincial, district, and local levels
- It was developed in collaboration with MOE's GIS Services and Climate Change Departments as part of the TA-8179 CAM Mainstreaming Climate Resilience into Development Planning funded by ADB and implemented by ICEM
- The toolbox has incorporated two main sources of data: Mekong River Commission - Climate Change and Adaptation Initiative (MRC CCAI) and NASA Earth Exchange Global Daily Downscaled Projections (NEX-GDDP)

Cambodia Climate Change Toolbox

- Outputs of the toolbox are presented in data and information layers in spatial maps, graphs and tables.

Interface of the Cambodia Climate Change Toolbox



Key features of existing CISs

- All CIS were developed as separate projects
- All existing CIS are separate and not integrated
- Existing CIS have national and subnational focus (e.g., CAM-MeDiA focuses on Cambodian Mekong Delta)
- No CIS specifically focuses on urban adaptation
- The LISA platform will be unique in that it will focus on climate change and adaptation issues in an **urban setting (Battambang municipality)**



Thank you



Annex 2.3: REVIEW OF CLIMATE INFORMATION SYSTEMS from other countries



Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia

Sharing of CIS case studies from other countries

Miguel Coulier, Climate Change Risk Assessment Specialist

January 2023



Review of international practices on CIS

- Using the WMO Global Framework on Climate Services as the main reference framework
- Review of 12 cities and their approach and tools on climate information and CIS
- Assessment of the city's:
 - Commitment to addressing climate change impacts
 - Development of web-based climate information products and services
 - Existence and operation of expert groups
- 3 case studies presented today, as well as key learnings from the review

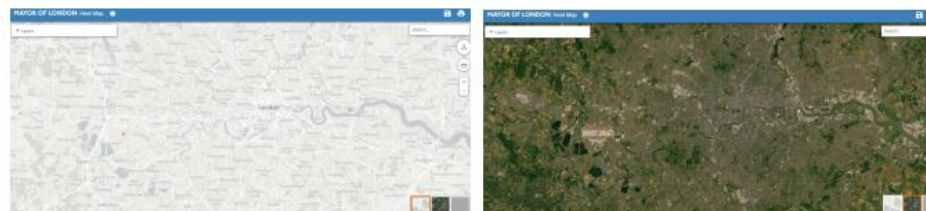


Case study 1: United Kingdom - London

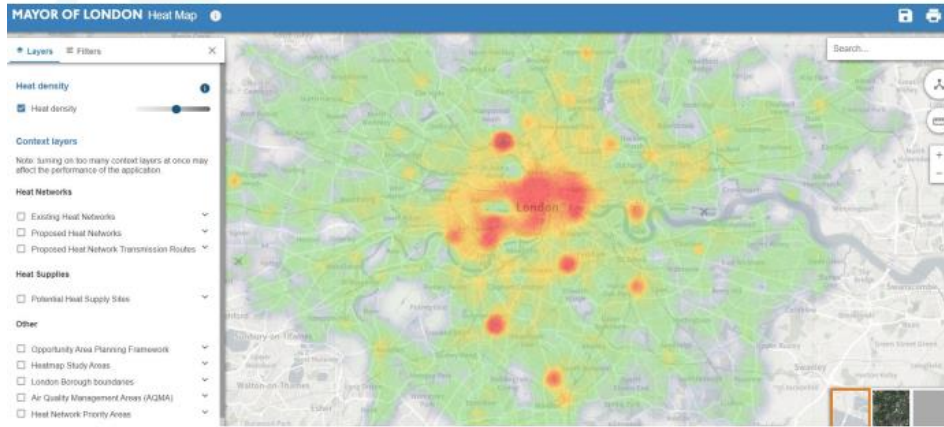
- Not one integrated CIS, but various tools
- Climate information products in the form of maps available through an ArcGIS platform:
<https://gisportal.london.gov.uk/portal/apps/webappviewer/index.html>
- Vulnerability information also available: www.climatejust.org.uk
- Lot of explanatory information on the meaning of climate hazards, climate change and vulnerability parameters



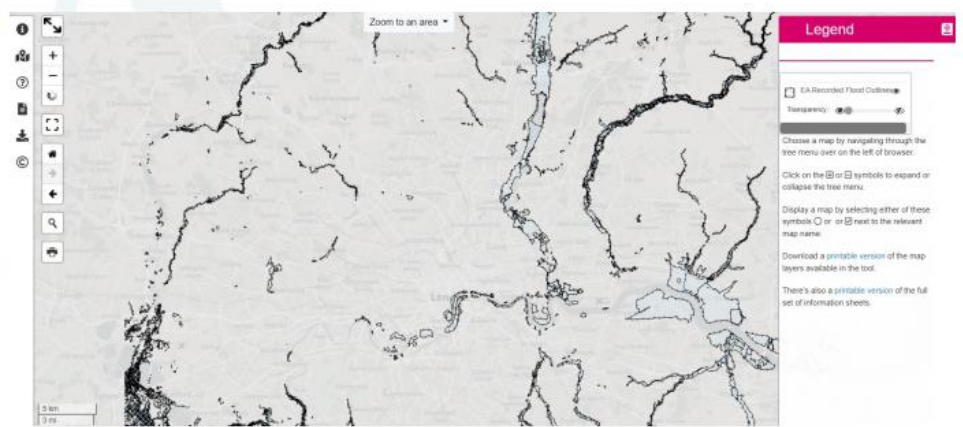
Base layers: street map, satellite, administrative boundaries etc.



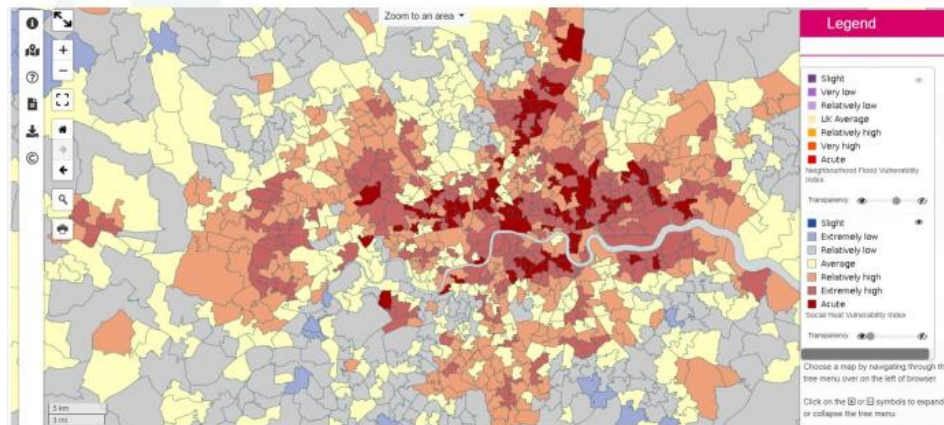
Hazard data: heat



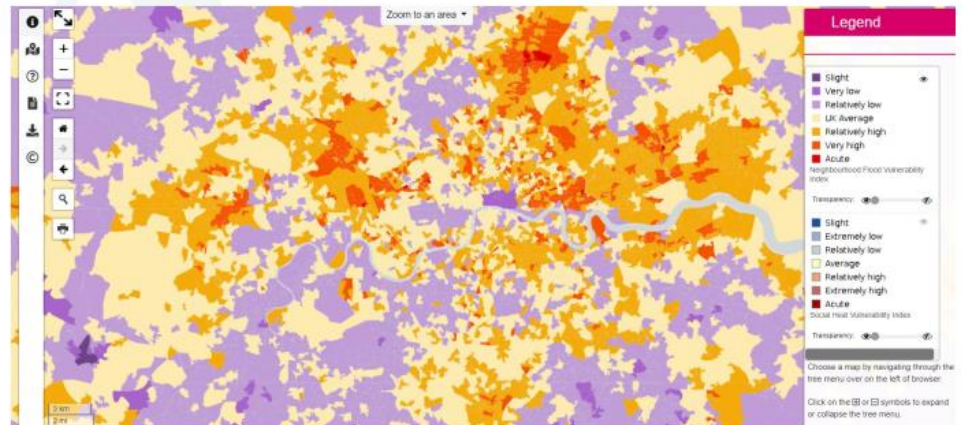
Hazard data: historical flood extent



Vulnerability data: heat vulnerability

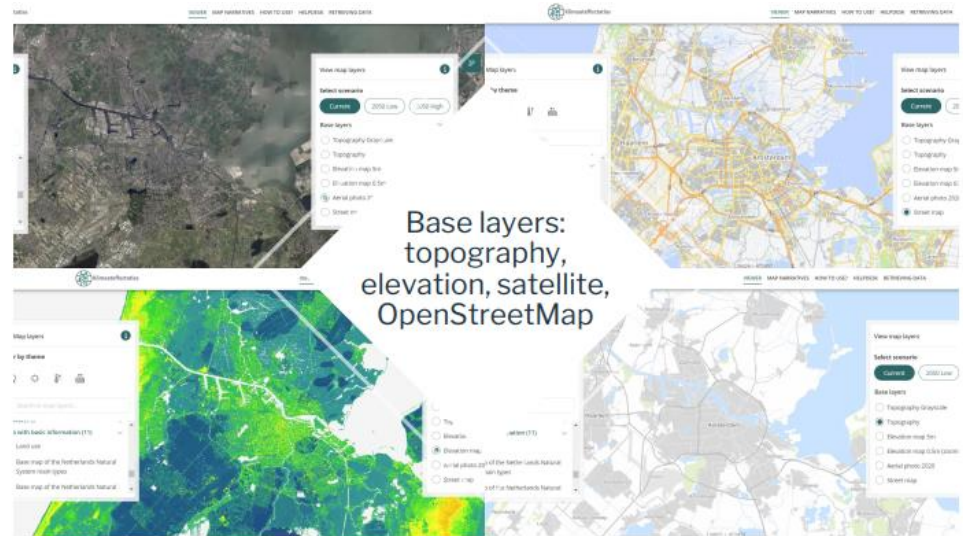


Vulnerability data: flood vulnerability



Case study 2: Netherlands - Amsterdam

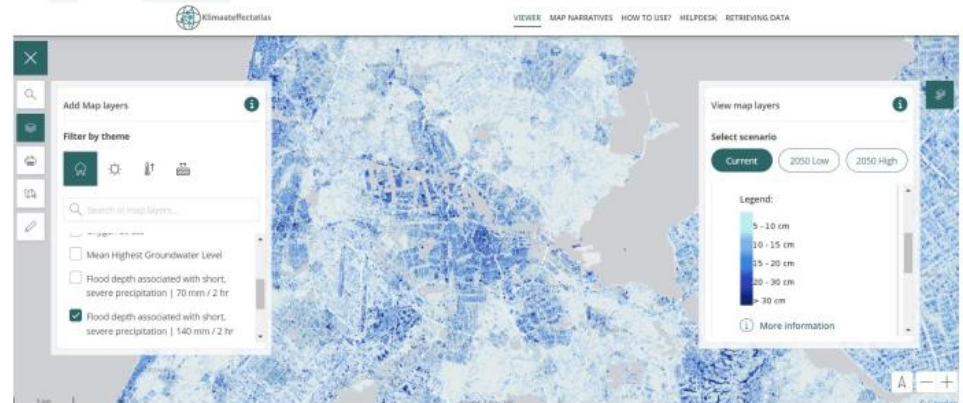
- Not one integrated CIS, but various tools
- Multi-sectoral
- Knowledge portal for all available policies, tools and relevant publications: <https://klimaatadaptatienederland.nl/en/>
- Several climate information products in the form of maps available: lots of data layers
 - National level: <https://www.klimaateffectatlas.nl/en/>
 - City level: Amsterdam: <https://maps.amsterdam.nl/klimaatadaptatie/?LANG=en>



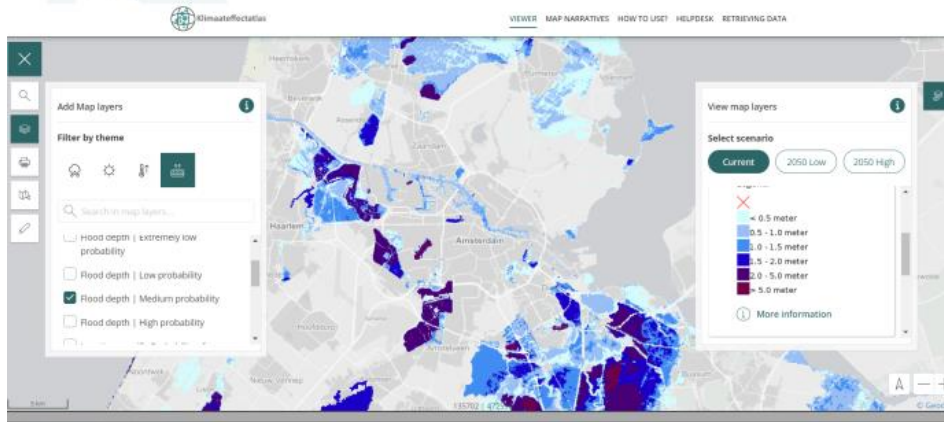
Baseline data: land use, ecosystems, natural buffer zones, water/trees/green area per neighborhood, etc.



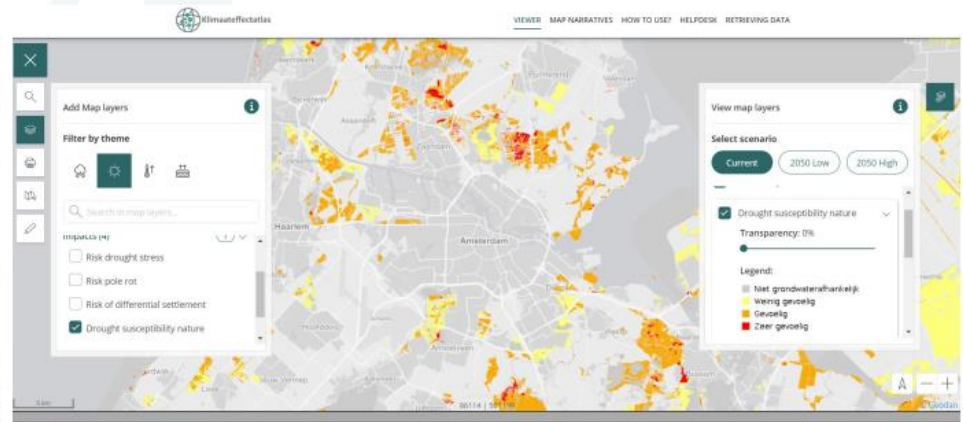
Hazard data: pluvial flood (extreme rainfall)



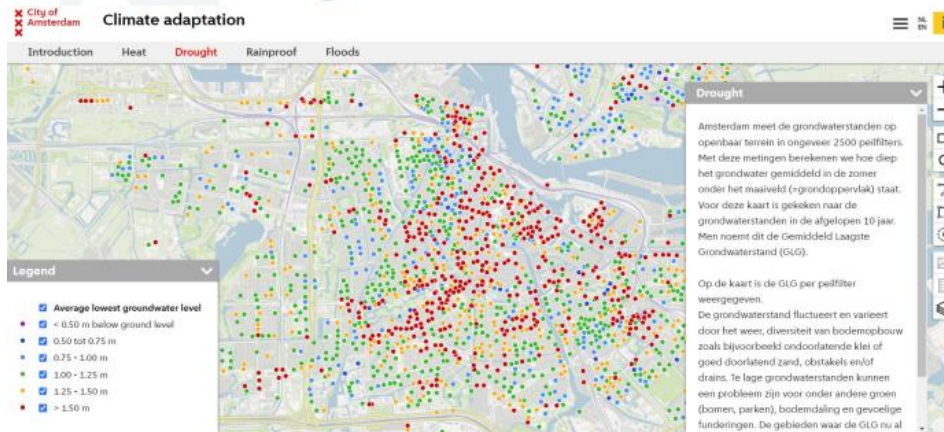
Hazard data: 1-in-100y fluvial flood (flood depth)



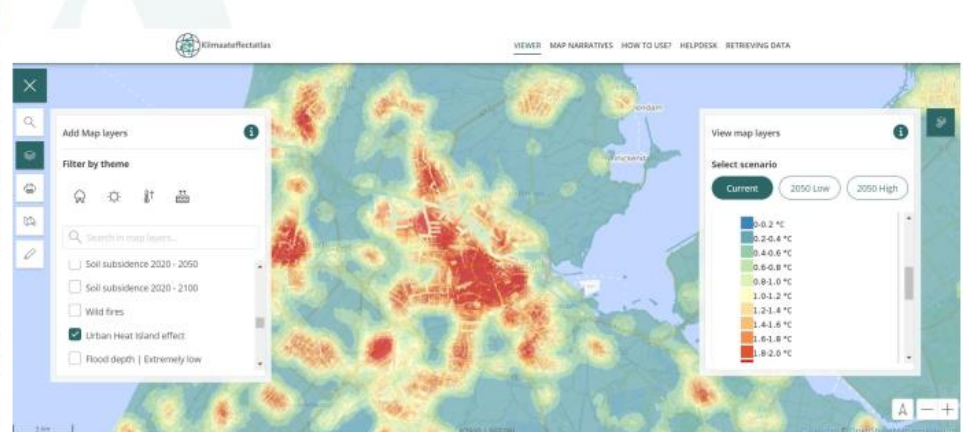
Hazard data: drought susceptibility



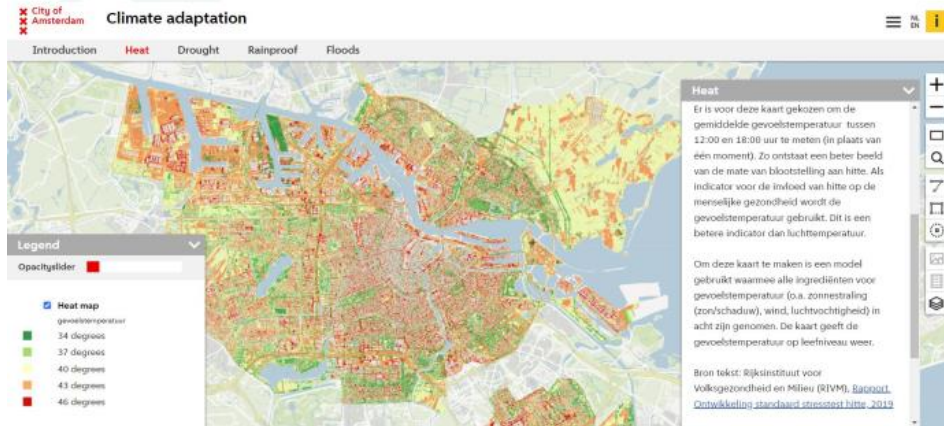
Hazard data: groundwater level



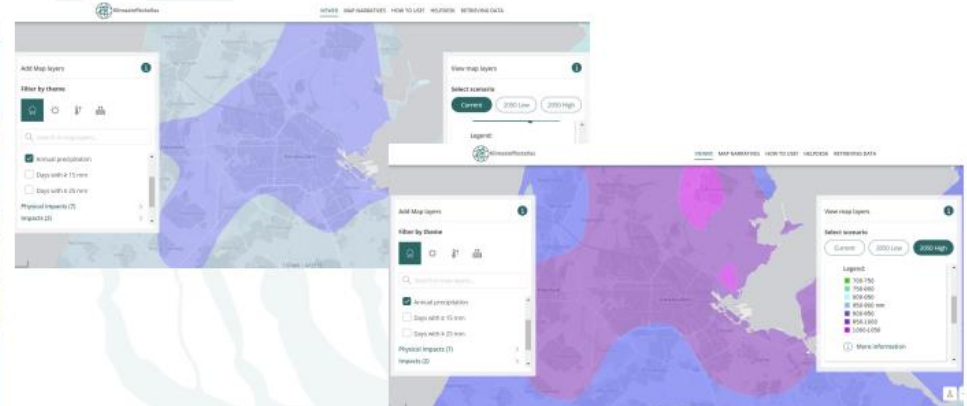
Hazard data: urban heat island effect



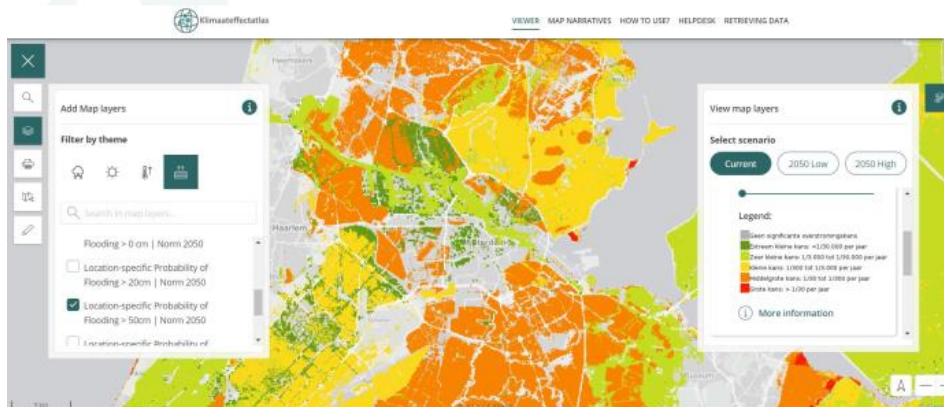
Hazard data: urban heat island effect



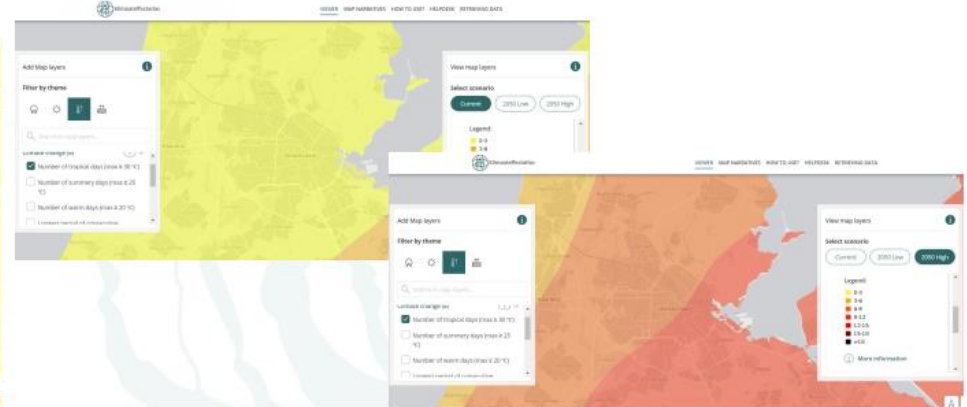
Climate data: precipitation: baseline and 2050



Climate data: flood risk in 2050

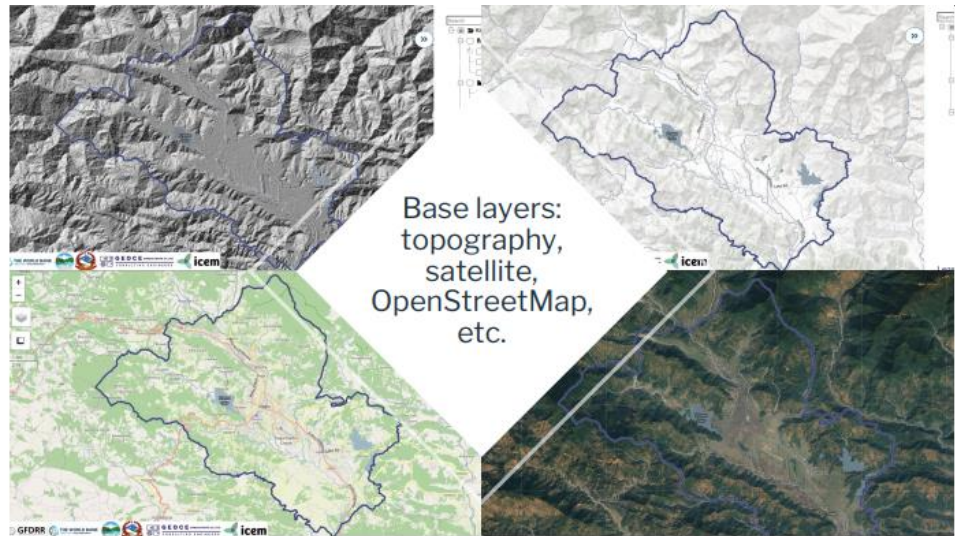


Climate data: number of hot days: baseline and 2050



Case study 3: Nepal - Pokhara

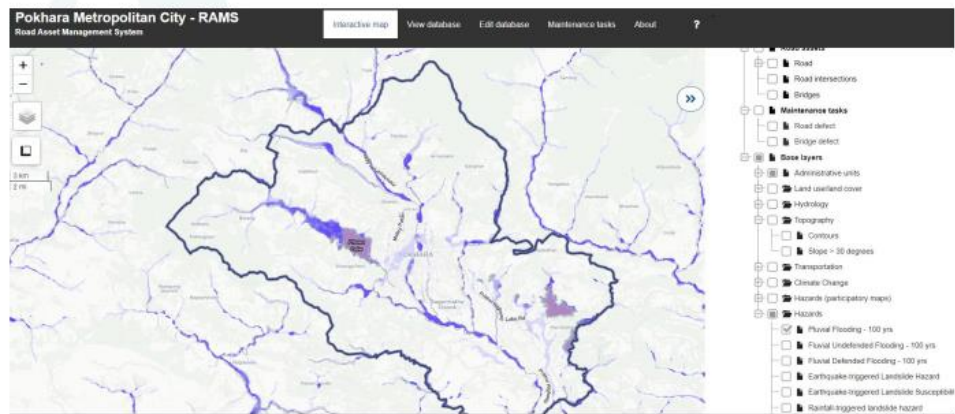
- One integrated CIS platform
- Focused on CIS for climate resilient road and drainage asset management. Contains a database of road assets, including information on level of maintenance and needs for repair
- Mainly climate information products in the form of interactive maps – with overlays possible between hazard and climate data and infrastructure data
- No information included on adaptation options



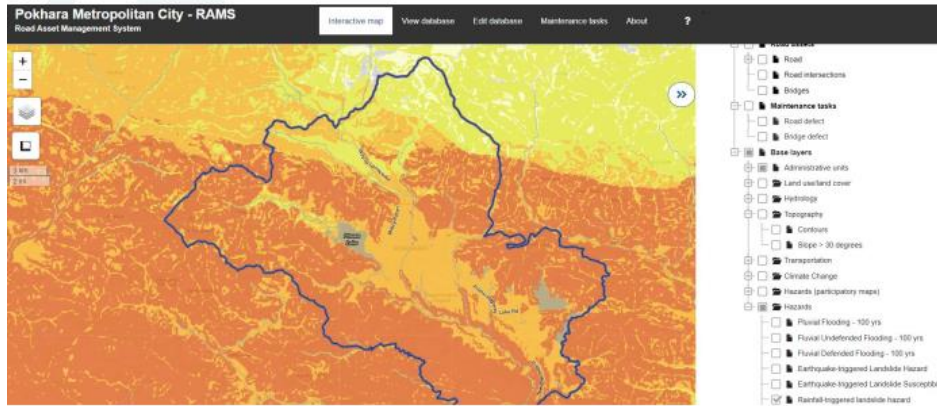
Baseline data: land use, transport network, slopes etc.



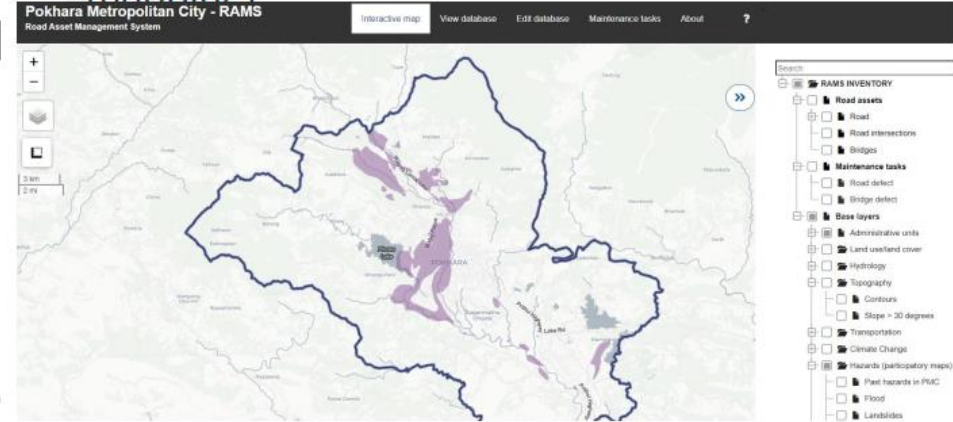
Hazard data: pluvial flood (1-in-100 years)



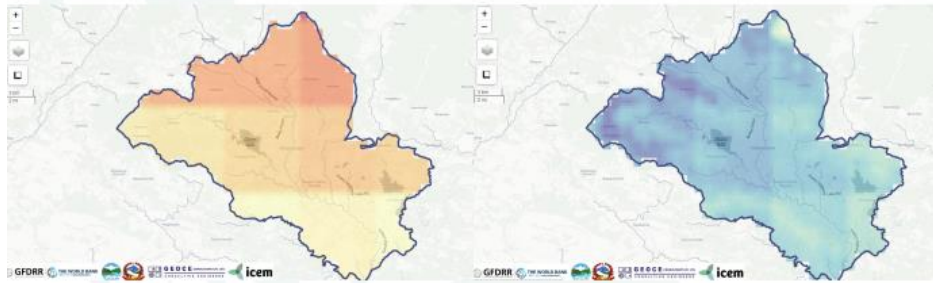
Hazard data: rainfall-induced landslides



Hazard data: sinkholes (from participatory mapping)



Climate data: temperature and precipitation change



Key learnings to inform the development of the LISA platform

- Need for one integrated platform, with interactive functionalities
- CIS should have a clear objective, targeted information products to be developed for specific hazards and be focused on specific sectors most impacted and key for socio-economic development
- CIS should integrate analyses on for example exposure, vulnerability, capacity – as overlaying data layers is insufficient
- Downscaled information is very valuable but often not available. Participatory data collection is a way to overcome some of this
- An inventory of existing or potential adaptation measures makes the climate information actionable
- To develop the CIS, the establishment of an adaptation working group (e.g., urban planners, health practitioners, water planners, DRR practitioners) and a climate scientist expert group should be considered
- Capacity to manage the system is key – with regular capacity building for municipal staff required
- Data needs regular updating

Annex 2.4: LISA Platform Concept



Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia

UN LISA mission:
LISA platform concept

January 2023



Outline: LISA platform concept

1. Initial set of recommendations for LISA
2. Purpose of LISA
3. Anticipated end users
4. Initial LISA design for Battambang Municipality
5. Using LISA for planning: Case examples
6. LISA platform management



Initial set of general recommendations for LISA from earlier reviews

- Aim to develop an end-to-end LISA where feasible
- Develop an expert climate change adaptation group to advise on adaptation measures for each key sector (stakeholder group in Battambang)
- Develop a scientific expert group on climate to tailor climate services to each sector
- Capacity building for municipal staff
 - LISA users
 - LISA platform management (CMS + data (map) platform)

Purpose of LISA

- **LISA: local climate information system for climate change adaptation**
- **TA aligns with the Nationally Determined Contribution (2020):**
 - 31. Prepare **spatial planning** (city/district/municipality) guidelines at all levels for climate change adaptation (page 36)
 - 34. Vulnerability assessment towards the development of **climate change strategic plans** to respond to the impacts on land, housings, coastal management and building due to climate change (page 36)
 - 39. Strengthening **Climate Resilient Cities** (page 37)
- **LISA focuses on climate change adaptation planning**

Anticipated end users of LISA

National level

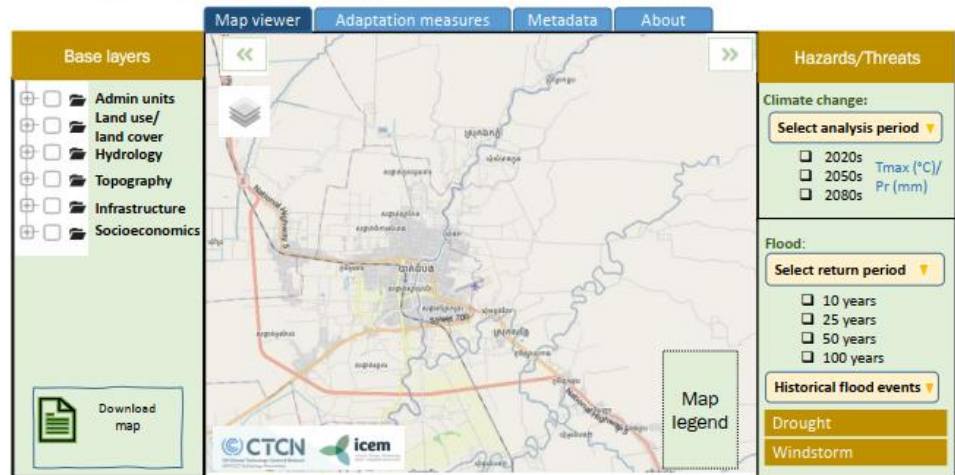
- Ministry of the Environment (MoE)
- DCC, NCDM, NCDD,
- MOWRAM,
- MPTC

Subnational level:

- Provincial Departments of Environment, Water Resources and Meteorology, Women's Affairs, Post and Telecommunications, and Battambang Cross-Sectoral Integration
- Other line agencies

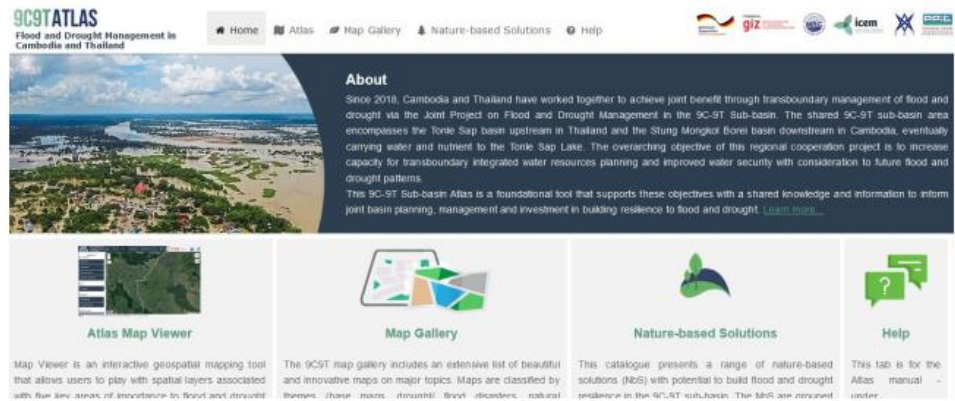
Using LISA for planning: case examples

Initial LISA design for Battambang Municipality



Mekong 9C9T Atlas (https://9c9t.mrcmekong.org/9c9t)

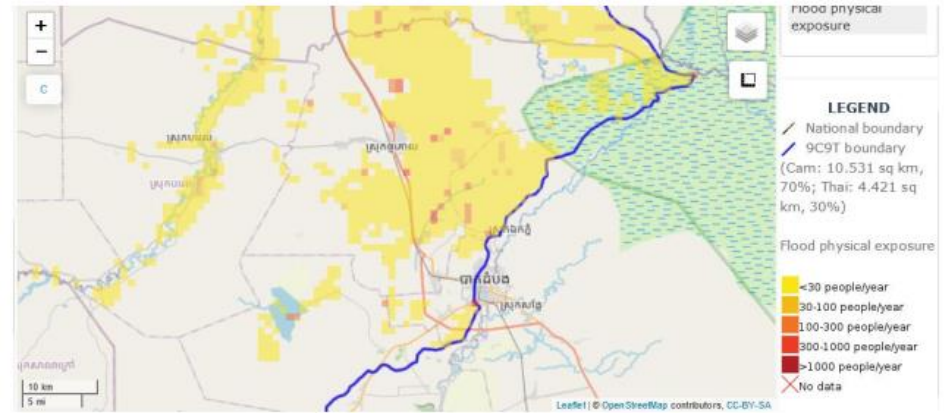
Under development



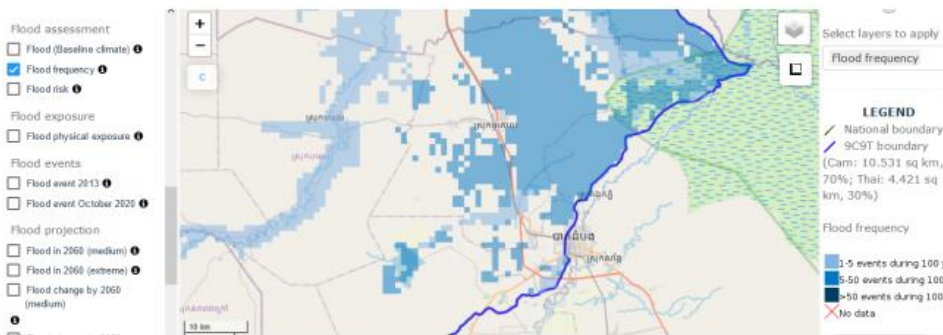
Flood physical exposure



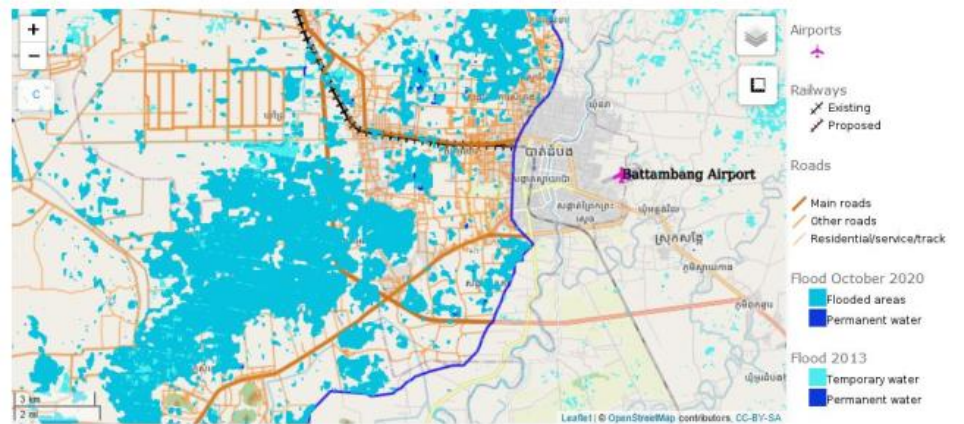
Flood physical exposure



Flood frequency



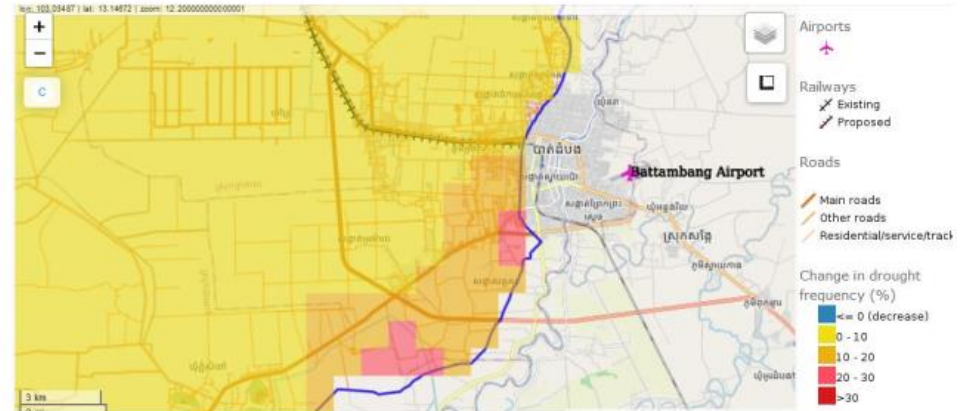
Historical floods (2013 and 2020)



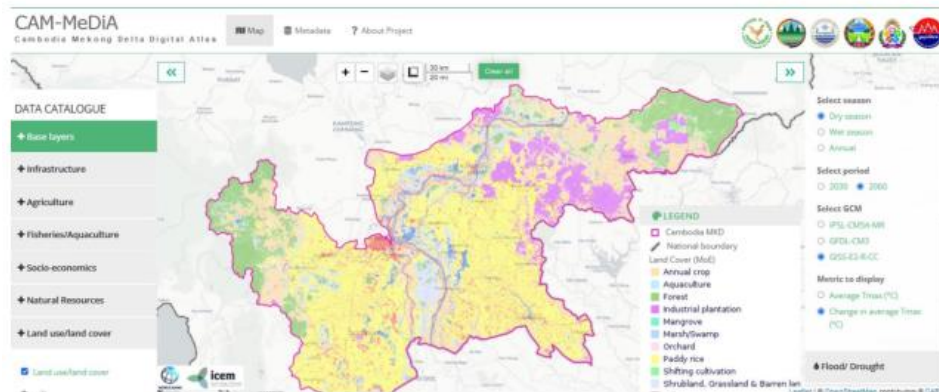
Projected change in flood by 2060s



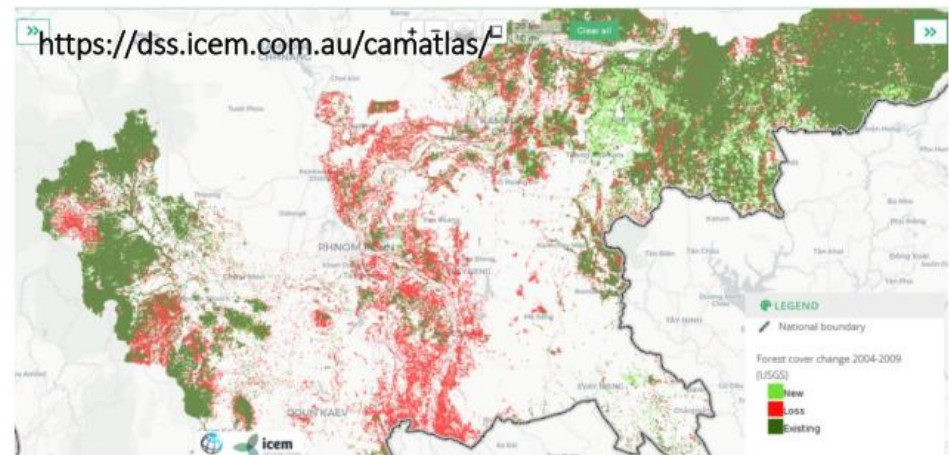
Change in projected drought frequency by 2050s



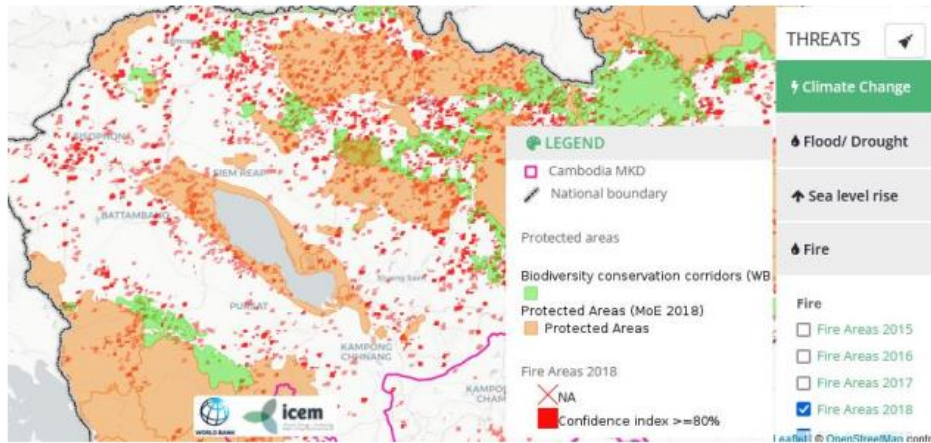
CAMATLAS (<https://dss.icem.com.au/camatlas>)



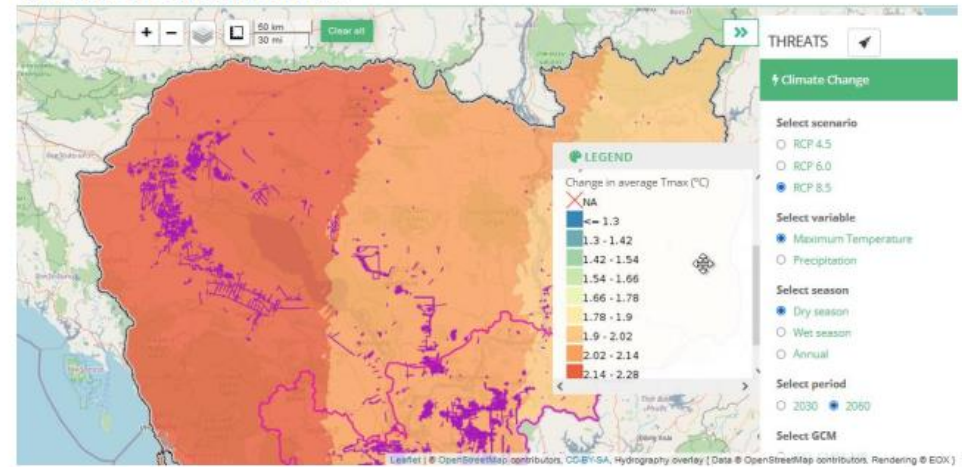
Forest cover change in the Cambodian Mekong Delta



Overlaying fire incidence (2018,2019) on protected areas



Overlaying future projected temperature change by 2060s and irrigation canal network



Initial LISA design for Battambang Municipality

Nature based Solutions for Flood and Drought Management

This catalogue presents a range of Nature-based Solutions (NbS) with potential to build flood and drought resilience in the 9C-9T sub-basin. The NbS are grouped by different sectors and purposes. Information on each NbS is displayed on a factsheet that can also be downloaded for future reference. Please select a measure to see more details.

Note that this page is under development. Thus the description of some measures has not been available and some functions may not work properly.

Measure Effect Matrix

*Note: Runoff Reduction (RR), Water Availability (WA), Erosion Control (EC), Water Quality (WQ) and Biodiversity (B) are key measure effects

Main Function: Side Effect: ✓

<https://9c9t.mrcmekong.org/9c9t>

Urban NbS measures

Urban

Upstream
Floodplains
Basins and ponds
Biodiversity band
Sediment capture ponds
In-stream development
River bank stabilisation
Agricultural (rural, peri-urban)
Urban
Basins and ponds
Biodiversity band
Bioswale
Constructed wetland

Strengths

- Traps and breaks down common pollutants.
- Improves water quality in surrounding waterbodies.

Bioswale

Application: Aquifers, rainwater management, treatment plants

Sub-group	Measure	RR	WA	EC	WQ	B
Basins and ponds	Bioretention pond	✓	✓	✓	✓	✓
	Bioswale	✓	✓	✓	✓	✓
	Constructed wetland	✓	✓	✓	✓	✓
Urban	Permeable surfaces	✓	✓	✓	✓	✓
	Green Roofs And Walls	✓	✓		✓	✓
	Rain Gardens	✓	✓	✓	✓	✓
	Storm water tree pits	✓	✓	✓	✓	✓
	Downspout planter	✓	✓		✓	✓
	Recharge pit	✓	✓			

LISA features in summary

- A knowledge base to support climate adaptation planning
- An interactive map viewer to support climate resilient planning
- An inventory of adaptation measures applicable to Battambang to address key climate hazard(s)
- An interactive table of metadata (descriptions of data used in the LISA platform)

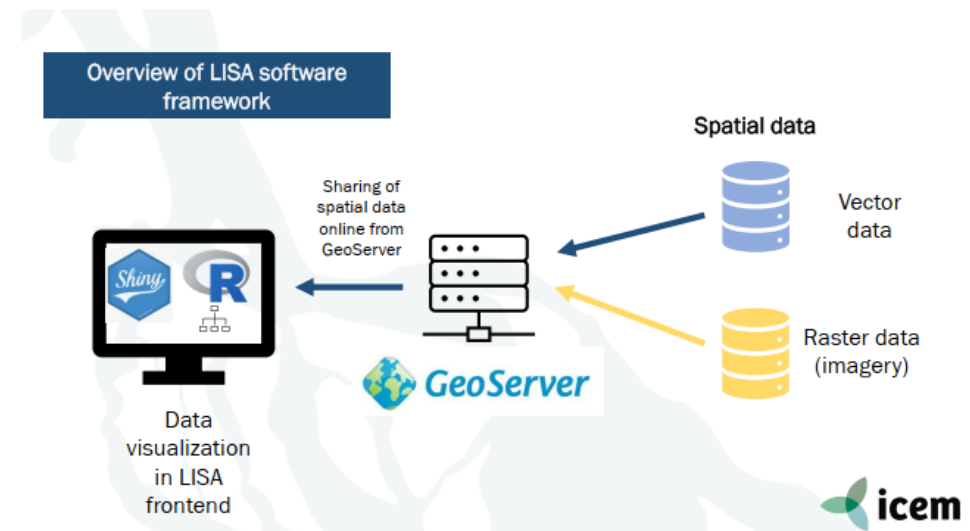
Capacities required for managing LISA

Staff capacity:

- Staff need to be qualified and experienced IT administrators to manage the application, which itself comprises a number of separate open source software applications.
- ICEM to develop a training plan to manage the DSS platform
- If the client lacks sufficient capacity, then a service contract with an external consultant is an alternative solution.

LISA platform management

1. Who will manage the DSS?
 - Which government agency has IT capacity (hardware and staff expertise)?
 - Battambang municipality
 - MoE, Department of GIS



Capacities required for managing LISA

Hardware requirements:

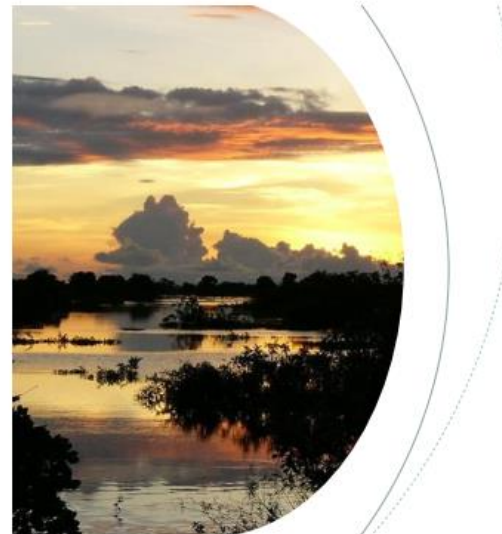
- ~15 GB RAM, 40 GB hard drive space, and CPU (2 cores > 2 GHz).
- These are typical estimates for an ICEM DSS, but the requirements will depend on a number of factors including number and type of data sets integrated into GeoServer, the size and functionality of the Shiny app, whether a Windows or Linux server, and the number of visitors.
- A WordPress CMS to be used as framework for app

Initial LISA design for Battambang Municipality



Discussion points

- Hazard(s) to be addressed and data needs
- Design/features of proposed LISA app concept



Thank you

ANNEX 3: LIST OF PARTICIPANTS AT MEETINGS HELD IN PHNOM PENH AND BATTAMBANG

Annex 3.1: Participants at the meeting with DCC on 09 January 2023, Phnom Penh

ល.រ No.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង ណែនាំ Organization	ទូរស័ព្ទ Tel. Number	អ៊ីមែល E-mail	ហត្ថលេខា 09.01.2023
1.	Mao Hak		Director	DCC	+855 78996479	maohakccd.se@gmail.com	
2.	Din Phearun		Officer	DCC	+855 70838912	dinphearun555@gmail.com	
3.	Visal Adapatation		Officer	DCC	+855 93579192	bovisals@gmail.com	
4.	Sem Savuth		Officer	DCC	+855 10723250	sam_savuth@yahoo.com	
5.	Richard Cooper		Project manager	ICEM	+66 86 704 3800	richard.cooper@icem.com.au	
6.	Joe Ogden		Web design expert	ICEM	+855 966 122 972	joe@joeogden.com	
7.	Miguel Coulier		Climate Change risk assessment expert	ICEM	+84 867 476583	miguel.coulier@icem.com.au	
8.	Pham Tran Minh		Data management and design expert	ICEM	+84 947 458 835	minh.phamtran@icem.com.au	
9.	Tous Sophorn		Gender expert	ICEM	(+855) 12-893 041	tous.sophorn@gmail.com	
10.	Lay Chanthy		Climate change expert	ICEM	(855-89) 793 307	laychanthy369@gmail.com	

Annex 3.2: Participants at National Stakeholder Consultation on 10 January 2023, Phnom Penh

គម្រោងជំនួយបច្ចេកទេសសម្រាប់ការវាយតម្លៃហានិភ័យអាកាសធាតុសម្រាប់ការបណ្តុះបណ្តាលប្រជាជនអាកាសធាតុនៅភ្នំក្រោមជាតិ និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុភ្នំកម្ពុជានាសម្រាប់ការបណ្តុះបណ្តាលប្រជាជនអាកាសធាតុនៅភ្នំកម្ពុជា (LISA)

Participants at National Stakeholder Consultation on 10 January 2023, Phnom Penh

ល.រ No.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង គ្លីប័ន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីមែល E-mail	ហត្ថលេខា 10.01.2023
1.	Sorn Sunsopheak		Deputy Director	NCDDS	+85512922123	ssspeak@ncdd.gov.kh	
2.	Soth Kimkotmony		Director	NCDM	012 272 107	soth_monny@yahoo.com	
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4.	Sum Sareuon			MPTC	012 555 080		
5.	Neang Mao		Director General of ICT	MPTC	016 840 620	mao-neang@mptc.gov.kh	
6.	Soen Pisey		Director	NCDM	067 434 567		
7.	Rim Chanra		Chief	MOWA	089 278 379	chanra_rim@yahoo.com	
8.	Meas Chiurui		Chief office	MOWA	088 20 15 224	mchiwut@gmail.com	
9.	Sun Symeut		Project Coordinator	NCDDS	092 589 012		
10.	Neang Vanny		Vice Office	NCDDS	016 66 66 504	neang.vanny@ncdd.gov.kh	
11.	Leng Heng Ar		Chief office	NCDM	012 826 402	lengheng_an@yahoo.com	
12.	Em Samnang		Deputy Director	NCDM	017595918		
13.	Eng Senghak		National Coordinator	ICEM	012 554 123	engsenghaks@gmail.com	
14.	Pham Tran Minh		Data management and design expert	ICEM	+84 947 458 835	minh.phamtran@icem.com.au	

ល.រ No.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រុមស្ថាប័ន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីម៉ែល E-mail	បាត់ដំបង 10.01.2023
15.	Sin Chanrangsey		Officer	NCDDS	092 799 521		
16.	Sim Bovisal		Officer	CCCA	093 579 192	bovisals@gmail.com	
17.	Joe Ogden		Web design expert	ICEM	+855 966 122 972	joe@joeogden.com	
18.	Lay Chanthy		Climate change expert	ICEM	(855-89) 793 307	laychanthy369@gmail.com	
19.	Tous Sophorn		Gender expert	ICEM	(+855) 12-893 041	tous.sophorn@gmail.com	
20.	Sau Kimsoeurn		Deputy Director	MOWA	+85511606627	kimsoeunsav@yahoo.com	
21.	Miguel Coulier		Climate Change risk assessment expert	ICEM	+84 867 476583	miguel.coulier@icem.com.au	
22.	Richard Cooper		Project manager	ICEM	+66 86 704 3800	richard.cooper@icem.com.au	
23.	Kosal Man		Interpreter	ICEM	+85577555390	mmksl10@gmail.com	
24.	Phaychan Makara		Chief Officer	MOWA	+85587885432	phaychanmakara@gmail.com	

Annex 3.3: Participants at Provincial Stakeholder Consultation on 11 January 2023, Battambang

គម្រោងជំនួយបច្ចេកទេសសម្រាប់ការវាយតម្លៃហានិភ័យអាកាសធាតុសម្រាប់ការបណ្តុះបណ្តាលមេត្តាករណីប្រែប្រួលអាកាសធាតុនៅថ្នាក់ក្រោមជាតិ និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុថ្នាក់មូលដ្ឋានសម្រាប់ការបណ្តុះបណ្តាលមេត្តាករណីប្រែប្រួលអាកាសធាតុនៅកម្ពុជា (LISA)

Participants at Provincial Stakeholder Consultation on 11 January 2023, Battambang

ល.រ No.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង ស្ថាប័ន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីម៉ែល E-mail	ហត្ថលេខា 11.01.2023
1.	Ou Dary		Deputy Governor	Provincial Hall	017 590 306	daryou2001@gmail.com	
2.	Visoth Ratha		Deputy Director	PDoWA	012 602 853		
3.	Sek Chanbon		Director	PDoPTC	012 666 361		
4.	Ear Kimchheng		Deputy Director	PDoE	012 357 185	chhengreach79@gmail.com	
5.	Yan Oudom		Deputy Director	CRC	017 238 368	002yanoudom@gmail.com	
6.	Seak Chantra		Deputy City Governor	City Hall	017 728 866		
7.	San Titvirak		Inter-sectoral director	Provincial Hall	012 777 069	raksan@gmail.com	
8.	Yi Titserey		Officer	Provincial Hall	017 529 552	yititserey@gmail.com	
9.	Kham Samroeub		Officer	PCDM	093 782 188	samroeub@gmail.com	
10.	Nop Pichsetha		Officer	Provincial Hall	012 576 171		
11.	Chim Vanndoum		Chief of Office	Provincial Hall	076 55 96 611	Vanndoeun99@gmail.com	
12.	Kao Chhounnara		Deputy Chief of Office	Provincial Hall	092 751 504		
13.	Kuy Chanthakech		Deputy Chief of Office	Provincial Hall	098 302 897	Kuyvanna009@gmail.com	
14.	Miguel Coulier		Climate Change risk assessment expert	ICEM	+84 867 476583	miguel.coulier@icem.com.au	
15.	Richard Cooper		Project manager	ICEM	+66 86 704 3800	richard.cooper@icem.com.au	

ល.រ No.	ឈ្មោះ: ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រុមស្នូល ស្ថាប័ន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីម៉ែល E-mail	ហត្ថលេខា 11.01.2023
16.	Lay Chanthy		Climate change expert	ICEM	(855-89) 793 307	laychanthy369@gmail.com	
17.	Tous Sophorn		Gender expert	ICEM	(+855) 12-893 041	tous.sophorn@gmail.com	
18.	Eng Senghak		National Coordinator	ICEM	+85512554123	engsenghaks@gmail.com	
19.	Pham Tran Minh		Data management and design expert	ICEM	+84 947 458 835	minh.phamtran@icem.com.au	

Annex 3.4: Participants at meeting with Battambang Municipality on 12 January 2023, Battambang

គម្រោងជំនួយបច្ចេកទេសសម្រាប់ការវាយតម្លៃហានិភ័យអាកាសធាតុសម្រាប់ការបណ្តុះបណ្តាលមេត្តាករណីប្រយុទ្ធនឹងការប្រែប្រួលអាកាសធាតុនៅភ្នំក្រោមជាតិ និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុភ្នំកម្ពុជានសម្រាប់ការបណ្តុះបណ្តាលមេត្តាករណីប្រយុទ្ធនឹងការប្រែប្រួលអាកាសធាតុនៅភ្នំកម្ពុជា (LISA)

Participants at meeting with Battambang Municipality on 12 January 2023, Battambang

ល.រ N O.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង ស្ថាប័ន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីមែល E-mail	ហត្ថលេខា 12.01.2023
1.	Seak Chantre		Deputy City Governor	Battambang City Hall	017 728 866		
2.	Song Soeung		Chief Office	Battambang City Hall	012 975 250		
3.	Em Siyeun		Commune Chief	Sangkat Kdol Daun Teav	017 698 251		
4.	Rorn Hemsocheata		Chief Office	Battambang City Hall	015 264 773	Socheata_Rornhem168@gmail.com	
5.	Sorn Poeun		Commune Chief	Sangkat Ou Mal	011 787 959		
6.	Keuoch Samol		Sangkat Council	Sangkat Rattanak	012 850 497		
7.	Chos Samreth		Commune Chief	Sangkat Pressdech	015 363 305		
8.	Em Oeun		Sangkat Council	Sangkat Svay Por	012 823 743		
9.	Chen Chamroeun		Sangkat Council	Sangkat Toul Ta Ek	092 655 455		
10	Nhim Sokun		Chief Office	Battambang City Hall	092 602 451		
11	Sok Kinna		Chief Office	Battambang City Hall	012 479 030		
12	Tuot Chanratara		Deputy Director of	Battambang City Hall	017 411 149		

ល.រ N o.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង គ្រូស្នូល Organization	ទូរស័ព្ទ Tel. Number	អ៊ីម៉ែល E-mail	ហត្ថលេខា 12.01.2023
13	Tuot Roeun		Commune Chief	Sangkat Sla Ket	012 912 844		
14	Kok Han		Commune Chief	Sangkat Chamkar Samraong	092 565 116		
15	Em Sophal		Commune Chief	Sangkat Au Char	012 764 949		
16	Pham Tran Minh		Data management	ICEM	+84 947 458 835	minh.phamtran@icem.com.au	
17	Eng Senghak		National Coordinator	ICEM	+85512554123	engsenghaks@gmail.com	
18	Richard Cooper		Project manager	ICEM	+66 86 704 3800	richard.cooper@icem.com.au	
19	Tous Sophorn		Gender expert	ICEM	(+855) 12-893 041	tous.sophorn@gmail.com	
20	Mao Sokuntheary		Sangkat Council	Sangket Voat Kor	061 951 445		
21	Lay Chanthy		Climate change expert	ICEM	(855-89) 793 307	laychanthy369@gmail.com	

Annex 3.5: Participants at meeting with Technical Staff of Battambang Municipality on 12 January 2023, Battambang

គម្រោងជំនួយបច្ចេកទេសសម្រាប់ការវាយតម្លៃហានិភ័យអាកាសធាតុសម្រាប់ការបណ្តុះបណ្តាលប្រជាជនអាកាសធាតុនៅភ្នំក្រោមជាតិ និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុភ្នំកម្ពុជានសម្រាប់ការបណ្តុះបណ្តាលប្រជាជនអាកាសធាតុនៅភ្នំកម្ពុជា (LISA)

Participants at Meeting with Technical Staff of Battambang Municipality on 12 January 2023, Battambang

ល.រ No.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង ស្ថាប័ន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីមែល E-mail	មាតិកា 12.01.2023
1.	Seak Chantra		Deputy City Governor	Battambang City Hall	017 728 866		
2.	Tuot Chan ratana		Deputy Director of Administration	Battambang City Hall	017 411 149		
3.	Song Soeung		Chief Office	Battambang City Hall	012 975 250		
4.	Un Bunroth		Officer	Battambang City Hall	086 797 997	bunrothun86@gmail.com	
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6.	Eng Senghak		National Coordinator	ICEM	+85512554123	engsenghaks@gmail.com	
7.	Richard Cooper		Project manager	ICEM	+66 86 704 3800	richard.cooper@icem.com.au	
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9.	Lay Chanthy		Climate change expert	ICEM	(855-89) 793 307	laychanthy369@gmail.com	

Annex 3.6: Participants at meeting with Provincial Committee for Disaster Management on 13 January 2023, Battambang

គម្រោងជំនួយបច្ចេកទេសសម្រាប់ការវាយតម្លៃហានិភ័យអាកាសធាតុសម្រាប់ការបណ្តុះបណ្តាលប្រជាជនអាកាសធាតុនៅថ្នាក់ក្រោមជាតិ និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុថ្នាក់មូលដ្ឋានសម្រាប់ការបណ្តុះបណ្តាលប្រជាជនអាកាសធាតុនៅកម្ពុជា (LISA)

Participants at Meeting with Provincial Committee for Disaster Management on 13 January 2023, Battambang

ល.រ No.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង ស្ថាប័ន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីមែល E-mail	មាត្រាលេខ 13.01.2023
1.	Kham Samroeub		Officer	PCDM	012 546 542	samroeub@gmail.com	
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3.	Lay Chanthy		Climate change expert	ICEM	(855-89) 793 307	laychanthy369@gmail.com	
4.	Tous Sophorn		Gender expert	ICEM	(+855) 12-893 041	tous.sophorn@gmail.com	
5.	Richard Cooper		Project manager	ICEM	+66 86 704 3800	richard.cooper@icem.com.au	
6.	Pham Tran Minh		Data management and design expert	ICEM	+84 947 458 835	minh.phamtran@icem.com.au	
7.	Eng Senghak		National coordinator	ICEM	+85512554123	engsenghaks@gmail.com	

Annex 3.7: Participants at meeting with Director General of GDPS/MOE on 16 January 2023, Phnom Penh

ល.រ No.	ឈ្មោះ: ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង ស្ថាប័ន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីម៉ែល E-mail	ហត្ថលេខា 16.01.2023
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2.	Sum Cheat		Deputy Director	DCC	+85512850164	sumcheat@gmail.com	
3.	Saing Kimleng		Officer	DCC	+85511496438	kimleng.saing@hotmail.com	
4.	Lay Chanthy		Climate change expert	ICEM	(855-89) 793 307	laychanthy369@gmail.com	
5.	Richard Cooper		Project manager	ICEM	+66 86 704 3800	richard.cooper@icem.com.au	
6.	Pham Tran Minh		Data management and design expert	ICEM	+84 947 458 835	minh.phamtran@icem.com.au	
7.	Eng Senghak		National coordinator	ICEM	+85512554123	engsenghaks@gmail.com	

Annex 3.8: Participants at meeting with DGIS/MOE on 16 January 2023, Phnom Penh

ល.រ No.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង គ្រឹះស្ថាន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីម៉ែល E-mail	បាត់ដេប 16.01.2023
1.	Chivin Leng		Director	DGIS	+85599515557	lengchivin@gmail.com	
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3.	Richard Cooper		Project manager	ICEM	+66 86 704 3800	richard.cooper@icem.com.au	
4.	Pham Tran Minh		Data management and design expert	ICEM	+84 947 458 835	minh.phamtran@icem.com.au	
5.	Eng Senghak		National coordinator	ICEM	+85512554123	engsenghaks@gmail.com	

Annex 3.9: Participants at meeting with NCDM on 17 January 2023, Phnom Penh

គម្រោងជំនួយបច្ចេកទេសសម្រាប់ការវាយតម្លៃហានិភ័យអាកាសធាតុសម្រាប់ការបណ្តុះបណ្តាលប្រជាជនអាកាសធាតុនៅថ្នាក់ក្រោមជាតិ និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុថ្នាក់មូលដ្ឋានសម្រាប់ការបណ្តុះបណ្តាលប្រជាជនអាកាសធាតុនៅកម្ពុជា (LISA)

Participants at meeting with NCDM on 17 January 2023, Phnom Penh

ល.រ No.	ឈ្មោះ ជាអក្សរឡាតាំង Name in English	ភេទ Gender	ឋានៈ Position	ក្រសួង ស្ថាប័ន Organization	ទូរស័ព្ទ Tel. Number	អ៊ីម៉ែល E-mail	ហត្ថលេខា 17.01.2023
1.	Soth Kim Kolmony		Advisor to the Head of Department	NCDM	012 272 107	soth_mony@yahoo.com	
2.	Leng Heng An		Chief Office	NCDM	012 826 402	lengheng_an@yahoo.com	
3.	Lay Chanthy		Climate change expert	ICEM	(855-89) 793 307	laychanthy369@gmail.com	
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5.	Pham Tran Minh		Data management and design expert	ICEM	+84 947 458 835	minh.phamtran@icem.com.au	

ANNEX 4: LIST OF SPATIAL DATA REQUIREMENTS FOR THE LISA PLATFORM OF BATTAMBANG MUNICIPALITY

This table shared and discussed with participants at meeting on 12 January 2023 with Battambang Municipality.

Theme	Sub-theme	Layers	GIS data format	Potential Government source	Status of data collection	Any comments (from Government)
Climate change (Official from government)	Temperature	Downscaled/highest resolution: Period: Annual/Seasonal/ Monthly Variables: Tmax, Tmin, T average	Raster: GeoTiff	Provincial Dept Water Resource and Meteorology	TBD	
	Precipitation	Downscaled/highest resolution: Period: Annual/Seasonal/ Monthly Variables: Tmax, Tmin, T average	Raster: GeoTiff	Provincial Dept Water Resource and Meteorology	TBD	
Hazards/ Disasters	Landslides	Current river bank collapse risk	Raster or Vector	Developed during participatory mapping exercise on 11/12 Jan 2023	Completed	
	Drought	Drought-prone areas	Raster or Vector	Contact Sangkat officials?	TBD	
		Historical Drought Map	Raster or Vector	Contact Sangkat officials?	TBD	
		Drought Hazard Map	Raster or Vector	Contact Sangkat officials?	TBD	
	Flood	Historic flood extent maps in Battambang (serious flooding in 2011, 2013 and 2020)	Raster or Vector	Provincial Dept Water Management?	TBD	
Flood Prone Area Map in Battambang		Raster or Vector	Developed during participatory mapping exercise on 11/12 Jan 2023	Completed		
Base maps	Administrative boundary	Province boundary	Vector: Shapefiles	Battambang Municipality	TBD	
		District boundary	Vector: Shapefiles	Battambang Municipality	TBD	
		Commune boundary	Vector: Shapefiles	Battambang Municipality	TBD	
		Villages	Vector: Shapefiles	Battambang Municipality	TBD	
	River	River network	Vector: Shapefiles	Provincial Dept of Land Management	TBD	
		River basin/catchment boundaries	Vector: Shapefiles	Provincial Dept of Water Management	TBD	

	DEM	High resolution DEM High accurate in elevation (vertical) DEM created from Lidar data or large scale of topographical maps	Raster: GeoTiff	Not available?	Not available	
	Topographic map and Contour line	Contour line for topographical	Vector: Shapefiles	Not available?	Not available	
Infrastructure (Existing)		Road and features (e.g., surface construction (asphalt, gravel), type, width, construction date)	Vector: Shapefiles	Battambang Municipality	TBD	
		Railway	Vector: Shapefiles	Provincial Dept of Works and Transportation	TBD	
		Airport	Vector: Shapefiles	Provincial Dept of Works and Transportation	TBD	
		Reservoirs	Vector: Shapefiles	Provincial Dept of Water Resources	TBD	
		Hydropower power plant	Vector: Shapefiles	Provincial Dept of Industry, Technology and Innovation	TBD	
		Wells	Vector: Shapefiles	Provincial Dept of Rural Development	TBD	
		Water treatment plants	Vector: Shapefiles	Provincial Dept of Industry, Technology and Innovation	TBD	
		Irrigation canals	Vector	Not available?	Not available	
		Transmission lines	Vector: Shapefiles	Provincial Dept of Industry, Technology and Innovation	TBD	
		Substations	Vector: Shapefiles	Provincial Dept of Industry, Technology and Innovation	TBD	
		Stormwater system	Vector: Shapefiles	Provincial Dept of Works and Transportation and Battambang Municipality	TBD	
Social services		Hospitals, schools, safe zones	Vector: Shapefiles	Battambang Municipality	TBD	
Socioeconomic s	Population (Latest census)	Population density (by commune/district)	Vector: Shapefiles or statistic tables	Battambang Municipality	TBD	
		Population Household size Gender distribution and age	Vector: Shapefiles or statistic tables	Provincial Department of Planning and Battambang Municipality	TBD	
		Vulnerable group (Dependency rate, age group, urban/ rural rate...) Unemployment rate	Vector: Shapefiles or statistic tables	Provincial Department of Planning and Battambang Municipality	TBD	

		Poverty rate With definition of “poverty“	Vector: Shapefiles or statistic tables	Provincial Department of Planning and Battambang Municipality	TBD	
	Migration	Indicator of number of migrants and/or remittance	Indicator of number of migrants	Provincial Department of Planning and Battambang Municipality	TBD	
Culture and natural resources		Cultural and historical sites	Vector: Shapefiles	Battambang Municipality	TBD	
		Greenspace areas (e.g., parks, ponds, gardens)	Vector: Shapefiles	Battambang Municipality	TBD	
Land use		Detailed land-use types Most recent land-use plan data (from 2015?)	Raster or Vector	Battambang Municipality	TBD (Very important data)	



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