

Stakeholder Working Group Meeting (D4.5) MEETING REPORT



May 2023

Prepared for: **UN-CTCN and MOE**

Prepared by: **ICEM**

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



DISCLAIMER

This document was prepared for the United Nations Climate Technology Centre and Network (UN-CTCN) by an ICEM consultant team engaged to undertake the *Technical Assistance – Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia*. The views, conclusions and recommendations in the document are not to be taken to represent the views of the UN-CTCN.

Prepared by ICEM Asia

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Front page image Photo by ICEM

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ABBREVIATIONS

DLMUPCC	Department of Land Management, Urban Planning, Construction and Cadastral Affairs
ICEM	International Centre for Environmental Management
LISA	Local Climate Information System for Climate Change Adaptation
MoE	Ministry of Environment
MoWA	Ministry of Women’s Affairs
MPTC	Ministry of Post and Telecommunications
NCDM	National Committee for Disaster Management
NCDDS	National Committee for Subnational Democratic Development Secretariat
PCDM	Provincial Committee for Disaster Management
PDoWRAM	Provincial Department of Water Resources and Meteorology
PDoE	Provincial Department of Environment
PDLMUPCC	Provincial Department of Land Management, Urban Planning, Construction and Cadastral Affairs
PDoPTC	Provincial Department of Post and Telecommunication
PDoPWT	Provincial Department of Public Works and Transportation
PDoWA	Provincial Department of Women’s Affairs
TA	Technical Assistance
UN-CTCN	United Nations Climate Technology Centre and Network

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EXECUTIVE SUMMARY

The purpose of the virtual meeting was to present the near-final version of the LISA platform, and highlight the approach adopted for management of the platform and proposed future training programme. This meeting included members of the stakeholder working group including representatives from national and subnational key agencies and the project team.

This consultation represents **Activity 4.5** in the project's terms of reference (*Organisation of a meeting with the stakeholder working group*), and **deliverable 4.5** is linked to this activity (*Minutes of the stakeholder working group meeting with a list of participants disaggregated by gender, materials used, and summary of the discussions held*).

There was a total of 27 participants from national government (DCC/MoE, MoWA, NCDM, MoPTC, NCDD) and subnational agencies (PDoPWT, PDoE, PDoWRAM, DLMUPCC, Battambang Provincial Committee and Battambang Municipality), and the consultant team (ICEM).

The meeting provided stakeholders with an opportunity to review and provide final feedback on the LISA platform. While participants requested additional time to study the application, valuable feedback was received during discussions, including the clarification that the application will be translated into Khmer. Challenges highlighted by the consultant team include the limited data available to conduct broader vulnerability analyses. However, in-depth vulnerability of villages to flooding was conducted and the findings from these analyses will be integrated into the LISA platform, as well as data from exposure analyses conducted on the road network, railway, schools and health centres.

Immediate next steps for the project include holding the final stakeholder workshop in Battambang on 26 May 2023, where the final version of the LISA application will be presented. Remaining deliverables to be submitted by the consultant team to the Department of Climate Change include this report (deliverable number 4.5), deliverable 2.3, and the various deliverables from Output 4 (deliverables 4.1-4.8).

1 INTRODUCTION

1.1 Project overview

The United Nations Climate Technology Centre and Network (UN-CTCN) is funding the technical assistance – *Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA)*. The project involves the creation of an intuitive and user-friendly web-based data visualization platform (called LISA) that enables users to explore future climate scenarios and potential impacts and adaptation options for future climate-resilient planning in Battambang municipality. The project is managed by the Department of Climate Change of the Ministry of Environment and is being implemented by a team of consultants led by the International Centre for Environmental Management (ICEM).

1.2 Meeting purpose

The purpose of the meeting was to present the near-final version of the LISA platform, and the approach adopted for management of the platform and proposed future training programme. This meeting included members of the stakeholder working group including representatives from national and subnational key agencies and the project team. The list of participants is given in Appendix II.

The specific objectives of the meeting included the following:

- (i) Present the near-final prototype of the LISA platform and seek feedback from the stakeholder working group for its final refinement;
- (ii) Introduce the adopted approach for data and LISA platform management, and training programme; and
- (iii) Ensure gender is addressed across project activities.

This consultation represents **Activity 4.5** in the project's terms of reference (*Organisation of a meeting with the stakeholder working group*), and **deliverable 4.5** is linked to this activity (*Minutes of the stakeholder working group meeting with a list of participants disaggregated by gender, materials used, and summary of the discussions held*).

National representatives included the Department of Climate Change (DCC) of the Ministry of Environment (MoE), National Committee for Disaster Management (NCDM), Ministry of Women's Affairs (MoWA), Ministry of Post and Telecommunications (MoPTC), and National Committee for Subnational Democratic Development Secretariat (NCDDS). Subnational representatives from Battambang included those from the Provincial Department of Public Works and Transportation (PDoPWT), Provincial Department of Environment (PDoE), Provincial Department of Women's Affairs (PDoWA), Provincial Department of Water Resources and Meteorology (PDoWRAM), Battambang Department of Land Management, Urban Planning, and Construction and Cadastral Affairs (DLMUPCC), Battambang Provincial Committee, and Battambang Municipality.

2 MEETING PROCEEDINGS

2.1 Introduction

The meeting was conducted virtually using the Zoom platform (Figure 1, Figure 2). The meeting agenda is included in Appendix I. There was a total of 27 participants from national and subnational agencies, and the consultant team (ICEM). National representatives included the Department of Climate Change (DCC) of the Ministry of Environment (MoE), National Committee for Disaster Management (NCDM), Ministry of Women’s Affairs (MoWA), Ministry of Post and Telecommunications (MoPTC), and National Committee for Subnational Democratic Development Secretariat (NCDDS). Subnational representatives from Battambang included those from the Provincial Department of Public Works and Transportation (PDoPWT), Provincial Department of Environment (PDoE), Provincial Department of Women’s Affairs (PDoWA), Provincial Department of Water Resources and Meteorology (PDoWRAM), Battambang Department of Land Management, Urban Planning, and Construction and Cadastral Affairs (DLMUPCC), Battambang Provincial Committee, and Battambang Municipality. Participants are listed in Appendix II.

His Excellency Ou Dary, Deputy Governor of Battambang Provincial Committee delivered the opening address. H.E. Ou Dary’s statement covered various key points, as follows. Climate change impacts have potential to impact livelihoods and multiple sectors of the economy in Cambodia. In the municipality of Battambang local communities are particularly threatened by flooding caused by heavy rainfall, and communities living along the riverbanks are at risk from erosion and riverbank collapse from upstream flow. Development of a **local climate information system for climate change adaptation (LISA)** will enable users to explore future climate change scenarios and to gain an appreciation of potential impacts and adaptation options for future climate resilient planning. This meeting seeks stakeholders’ comments on the LISA web-based application. The project makes a substantial contribution to data and climate projections, which may aid the policy planner in deciding which alternative solutions are preferable for the Battambang master plan.

Figure 1. Subnational (Battambang) participants of the event



Figure 2. All participants of the event



The meeting was divided into two parts:

- **Part 1** started with a presentation by Dr Richard Cooper, DSS Specialist that described the updated LISA platform, then Mr Miguel Coulier, Climate Change Risk Assessment Expert, gave a presentation on how to integrate the outputs from the climate risk assessment into the platform. Comments were subsequently received from Mr Sum Cheat (DCC), Mr Meas Chiwut (MoWA) and Mr Chhay Sarath (MPTC). Afterwards, Dr Richard Cooper continued with presentation on data and platform management, and the proposed training programme.
- In **Part 2**, Dr Richard Cooper described the next steps to further developing the LISA platform. The discussion session continued with comments and questions from Battambang and national stakeholders.

The meeting ended with closing remarks from H.E. Ou Dary, Deputy Governor of Battambang Provincial Committee.

2.2 Meeting materials

The presentation slides in English and Khmer can be found at the following link or via the QR code and are also included in Appendix 3.

https://drive.google.com/drive/folders/1m5W_1s8ygV6z3oY5Y4JX-5z7keIMTuHm?usp=share_link

Figure 3. QR Code for meeting materials for Stakeholder meeting on 10th May 2023



2.3 Presentations

An overview of the presentation is given in this section, with copies of the full presentation in Appendix 3.

Dr Richard Cooper, ICEM's DSS Specialist/ Team leader, introduced key updates of the LISA platform (Figure 4 -

Figure 10) and its ongoing development, including an overview of the map viewer, map gallery, content management system, translation to local language, immediate next steps in the project, and facilitated the plenary discussion. The development version of the LISA platform can be accessed at this link: <https://icem.com.au/lisa/>.

Figure 4. Updated design of LISA map viewer

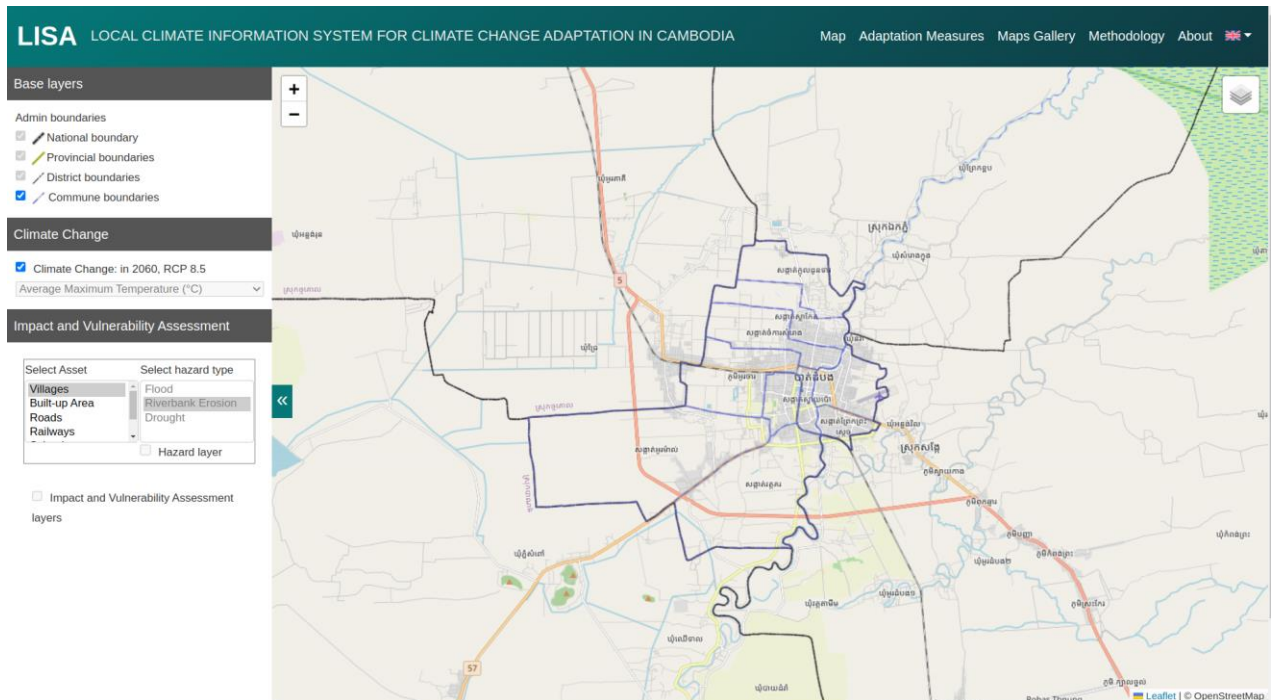


Figure 5. Exposure of built-up areas to flood

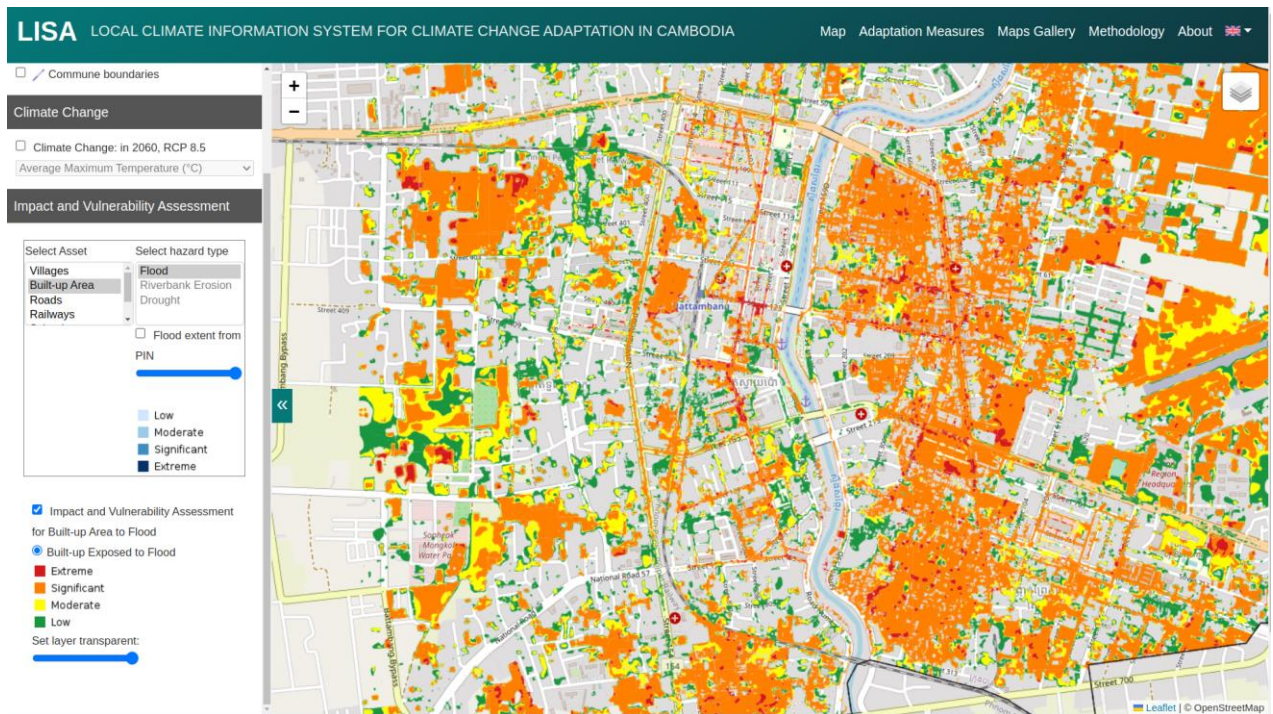


Figure 6. Exposure of railway to flood

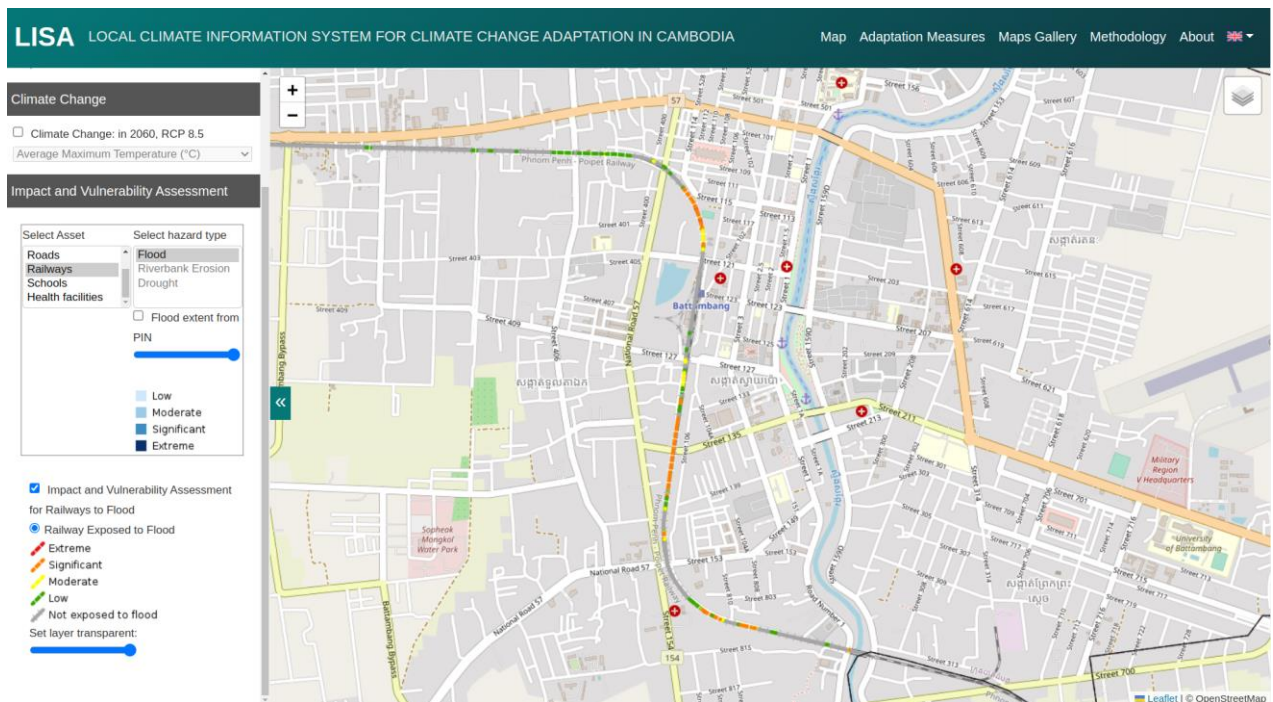


Figure 7. Exposure of roads to flood

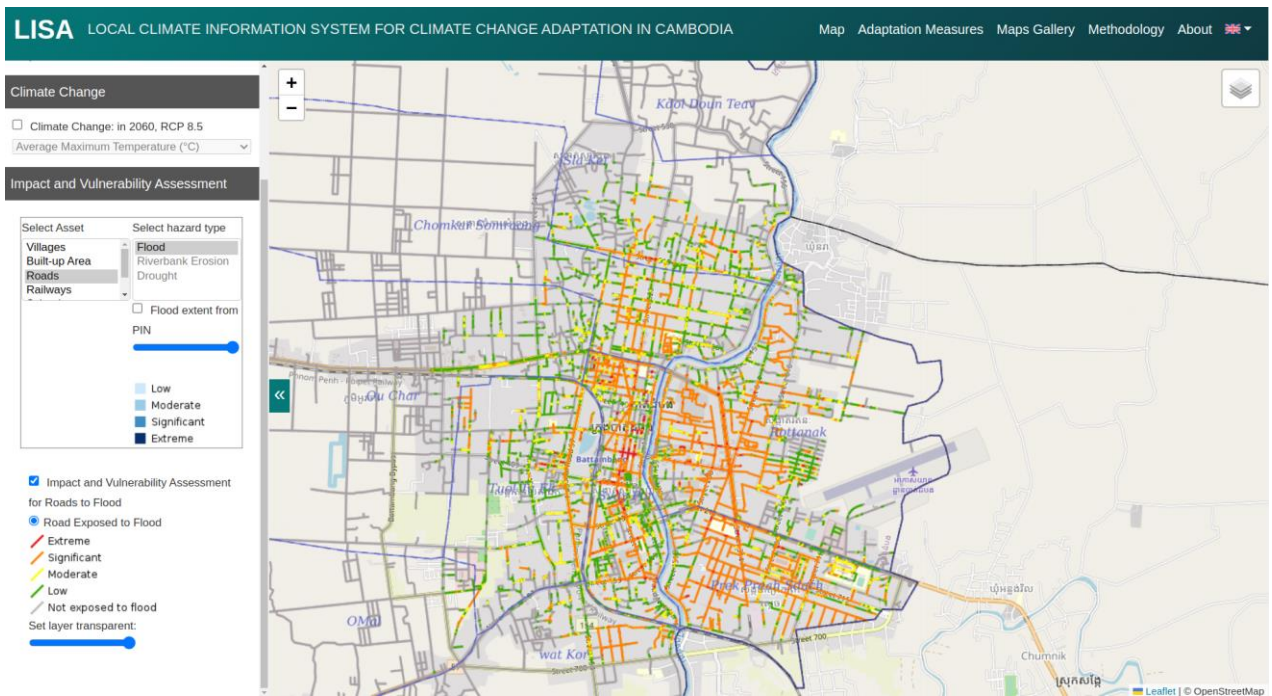


Figure 8. Map gallery

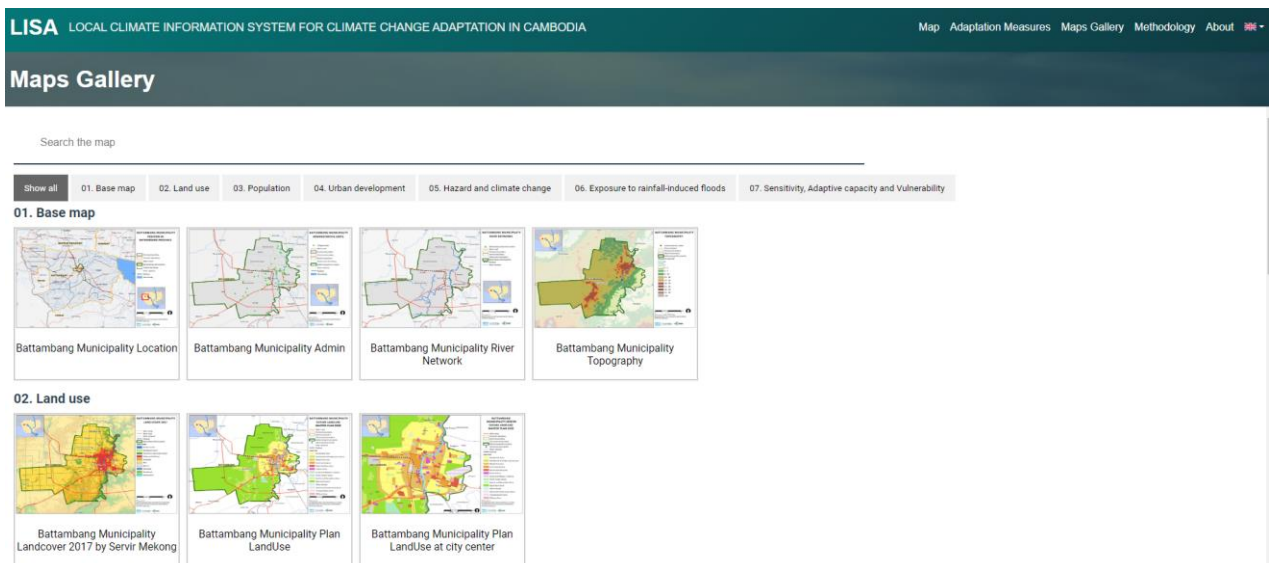
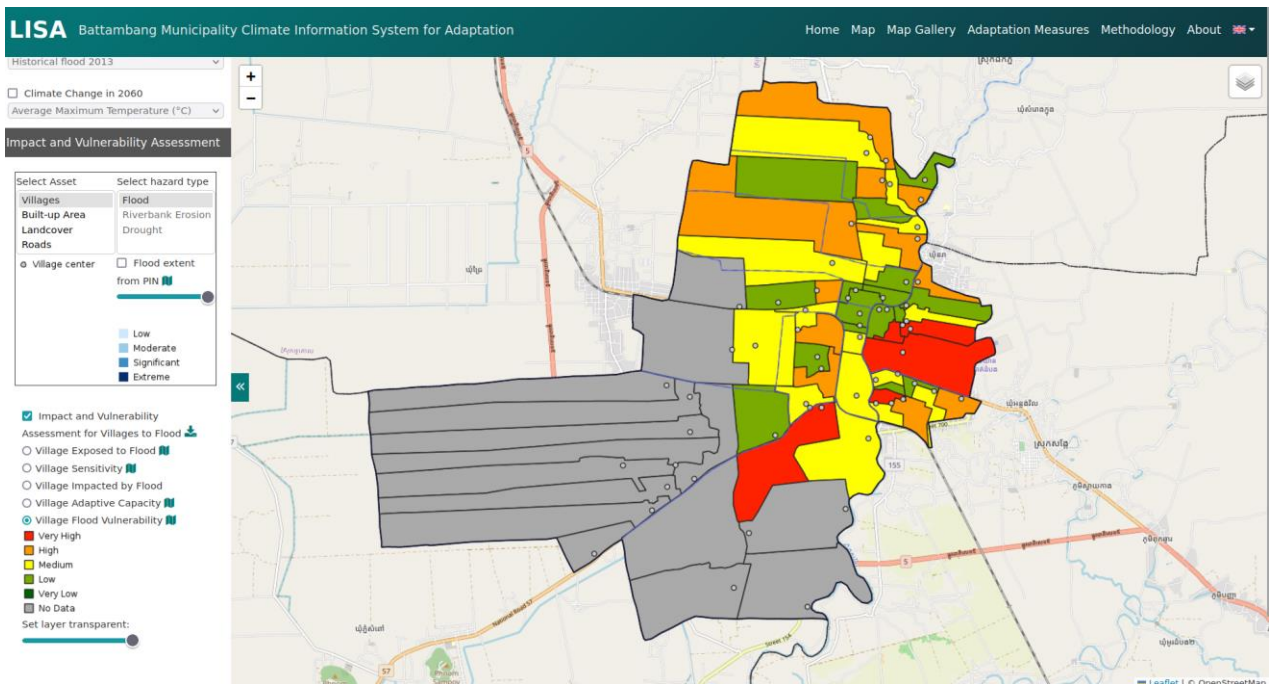


Figure 9. Village vulnerability to flood



Future final development of the application will include updating the map viewer, map gallery, adaptation measures page, methodology and translation of text into the Khmer language (

Figure 10).

Figure 10. LISA platform – About page in Khmer

អំពីគម្រោង

ជំនួយបច្ចេកទេសសម្រាប់ការវាយតម្លៃហានិភ័យអាកាសធាតុសម្រាប់ការបន្ស៊ាំនៅថ្នាក់ក្រោមជាតិ និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុថ្នាក់មូលដ្ឋាន សម្រាប់ការបន្ស៊ាំទៅនឹង ការប្រែប្រួលអាកាសធាតុ (LISA) នៅក្នុងប្រទេសកម្ពុជា



ការប្រែប្រួលអាកាសធាតុកម្ពុជា

ប្រវត្តិនៃគម្រោង

កម្ពុជាត្រូវបានទទួលស្គាល់ថាជាប្រទេសដែលងាយរងគ្រោះទៅនឹងគ្រោះហានិភ័យធម្មជាតិ ហើយត្រូវបានចាត់ថ្នាក់លេខរៀងទី១៦ក្នុងចំណោមប្រទេសដែលមានហានិភ័យបំផុតក្នុងពិភពលោក។ ដោយសារសមត្ថភាពបន្តនៅមានកម្រិត ហេតុការណ៍សង្គ្រោះ និងការពឹងផ្អែកលើទាំងស្រុងទៅលើការប្រើប្រាស់ប្រព័ន្ធព័ត៌មានអាកាសធាតុ ប្រទេសកម្ពុជាជាប្រទេសដែលងាយរងគ្រោះពីផលប៉ះពាល់នានាពីការប្រែប្រួលអាកាសធាតុ។ នៅទូទាំងប្រទេសកម្ពុជា កម្រិតទឹកភ្លៀង និងព្រឹត្តិការណ៍ទឹកជំនន់ធ្ងន់ធ្ងរ ក្នុងកំឡុងរដូវវស្សាត្រូវបានប៉ាន់ស្មានថាមានការកើនឡើងកំណើនលីក្លូណាតជាមធ្យមប្រចាំឆ្នាំ (០,៧- ២,៧០C ប៉ាន់ស្មានរវាងឆ្នាំ២០៦០ ទៅកម្រិតសីតុណ្ហភាព ១,៥-៥,៣០C ក្នុងទស្សវត្សឆ្នាំ២០៩០)។ យោងទៅតាមរបាយការណ៍វាយតម្លៃលើកទី៦ របស់ IPCC បានបញ្ជាក់ពីសញ្ញាណគ្រោះទឹកជំនន់ដែលមានភាពរហ័សឡើងខ្ពស់ ទឹកជំនន់នឹងអសមត្ថភាពរយៈពេលវែងយូរជាងមុនរួមទាំងប្រទេសកម្ពុជាផងដែរ ដែលកត្តាទាំងនោះបណ្តាលមកពីការប្រែប្រួលអាកាសធាតុ គួបផ្សំនឹងការប្រព្រឹត្តនានារបស់មនុស្ស។

ការប្រែប្រួលអាកាសធាតុអាចបណ្តាលអោយមានផលប៉ះពាល់ទៅលើវិស័យជាច្រើន ទៅសេដ្ឋកិច្ចក្នុងប្រទេសកម្ពុជា។ គ្រោះទឹកជំនន់ និងភាពកំរាមស្ងួតបានគម្រោងកំរែងដល់វិស័យកសិកម្មនិងទឹក ដំឡូងពេលដែលការប្រែប្រួលអាកាសធាតុជះឥទ្ធិពលទៅលើទិន្នផលស្រូវ តាមរយៈការប្រែប្រួលសីតុណ្ហភាព និងបរិមាណភ្លៀង។ ទឹកជំនន់ពីអតីតកាលបានបន្សល់ទុកនូវការខូចខាតយ៉ាងធ្ងន់ធ្ងរដល់ហេតុការណ៍សង្គ្រោះ ក៏ដូចជាសហគមន៍ដែលពឹងផ្អែកលើហេតុការណ៍សង្គ្រោះទាំងនោះ។ ការបាត់បង់ និងខូចខាតដល់ផ្លូវថ្នល់ជាតិ និងផ្លូវជនបទជាច្រើនពីផលប៉ះពាល់ពីគ្រោះទឹកជំនន់នានាដែលបន្សល់ពីអតីតកាលក៏ខ្ពស់ឆ្នាំ២០១១ ទៅឆ្នាំ២០១៣ បានត្រូវធ្វើការប៉ាន់ប្រមាណតម្លៃខូចខាតប្រហែល ៣៥២ និង ៤០ លានដុល្លារអាមេរិក។ គ្រោះទឹកជំនន់ត្រូវបានគេរាយការណ៍ថាជាមូលហេតុចម្បងដែលនាំអោយមានការខូចខាត ហេតុការណ៍សង្គ្រោះផ្លូវថ្នល់ បន្ទាប់ពីចំណាត់ថ្នាក់គ្រោះរាំងស្ងួត និងខ្យល់ព្យុះ។ ដើម្បីកាត់បន្ថយផលប៉ះពាល់ទាំង ពីតម្លៃទាក់ទងនឹងសញ្ញាណគ្រោះមហន្តរាយ និង ហានិភ័យអាកាសធាតុត្រូវរៀន មានសារៈសំខាន់ខ្លាំង សម្រាប់ការប្រមូលផ្តុំ រក្សាទុកព័ត៌មាន ដាក់ព័ត៌មានអាកាសធាតុអោយដំណើរការ វិភាគ និងពន្យល់បកប្រែព័ត៌មានអាកាសធាតុទៅក្នុងទម្រង់សកម្មភាពបែបប្រឹក្សាយោបល់ ស្របទៅបែបទពេលវេលាផ្សេងៗ ដើម្បីអនុញ្ញាតអោយភាគីពាក់ព័ន្ធធ្វើការប្រើប្រាស់ប្រព័ន្ធព័ត៌មានទាំងនោះនៅក្នុងដំណើរការនៃការសម្រេចចិត្ត និងការរៀបចំផែនការ។

គម្រោងនេះនឹងធ្វើការរៀបចំប្រព័ន្ធព័ត៌មានអាកាសធាតុថ្នាក់មូលដ្ឋានសម្រាប់ការបន្ស៊ាំទៅនឹងការប្រែប្រួលអាកាសធាតុដែលហៅកាត់ថា LISA។ គម្រោង LISA នឹងធ្វើការប្រមូលផ្តុំបង្កើតនូវទិន្នន័យសម្រាប់ការវាយតម្លៃហានិភ័យអាកាសធាតុ និងប្រព័ន្ធព័ត៌មានអាកាសធាតុដែលប្រព័ន្ធនេះនឹងអនុញ្ញាតអោយអ្នកប្រើប្រាស់អាចធ្វើការស្រាវជ្រាវពិនិត្យរកមើលនូវសេវាវិប្បាកាសធាតុកំរែងពេលអនាគត និងទទួលបានអត្ថប្រយោជន៍កងការប៉ាន់ស្មានទុកមនុស្ស ផលប៉ះពាល់ដែលនឹងមានកើតមាន និងការបង្កើតនូវផែនការបន្ស៊ាំសម្រាប់ផែនការជំនួយអាកាសធាតុ

Mr. Miguel Coulier, Climate Change Risk Assessment Expert, gave a presentation on how the outputs of the climate risk analysis were integrated into the LISA platform, including data on socioeconomic and demography, hazards and climate change, and impacts and vulnerability analyses.

The LISA platform can be used to answer key questions:

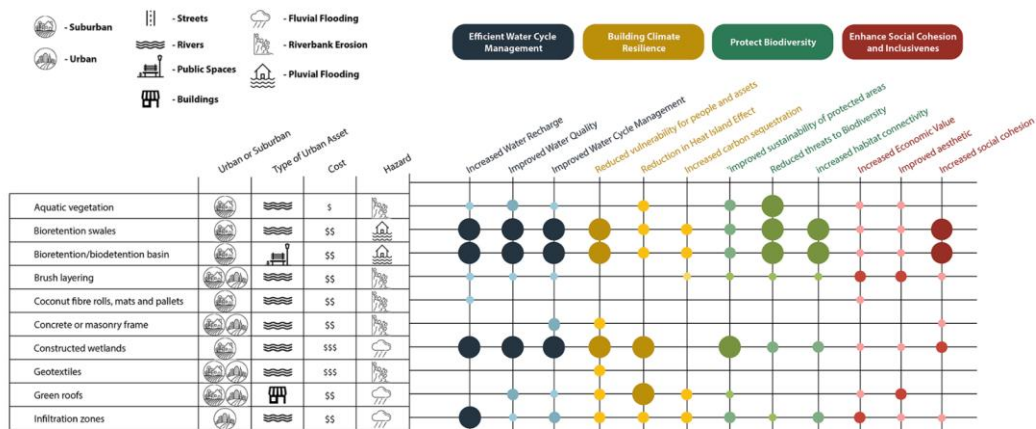
- What are the **key hazards** for Battambang municipality that may cause major loss and damage to people, infrastructure and other urban assets?
- What do the **climate change projections** indicate for Battambang in terms of changes in precipitation, hazards and temperature?
- What assets, including communities, critical infrastructure and other facilities are most likely to be **exposed** to and affected by these hazards? Where are they located?
- What **capacities**, within communities and institutions, exist to cope with these hazards or adapt to projected climate changes?
- Which assets are the **most vulnerable** to hazards and climate change and where are these located in Battambang municipality? Which hazards, assets and areas should be prioritized for risk reduction and adaptation?
- What potential **adaptation measures** can be implemented to deal with hazard and climate change threats, levels of exposure and vulnerabilities?

Figure 11 shows 23 potential adaptation measures for urban and suburban context. A user can click on a measure (left column) to reveal related technical information, which can be downloaded as a PDF file.

Figure 11. Adaptation measures

LISA LOCAL CLIMATE INFORMATION SYSTEM FOR CLIMATE CHANGE ADAPTATION IN CAMBODIA Map Adaptation Measures Maps Gallery Methodology About

Adaptation Measures



In the subsequent part of the meeting, Dr Richard Cooper delivered a presentation on data and platform management, a training programme, and next steps to finalize the web-based LISA platform.

Immediate next steps for the project were shared with participants:

- (i) Activity 4.6: Meeting with national/local government (face-to-face meeting in Battambang at the end of May), where the final version of the LISA application will be presented.

Remaining deliverables to be submitted by the consultant team include:

- (ii) Output 4: deliverables 4.1 – 4.8

The team will discuss the deployment and management of the platform with the National Committee for Disaster Management (NCDM) and Provincial Committee for Disaster Management (PCDM) in Battambang.

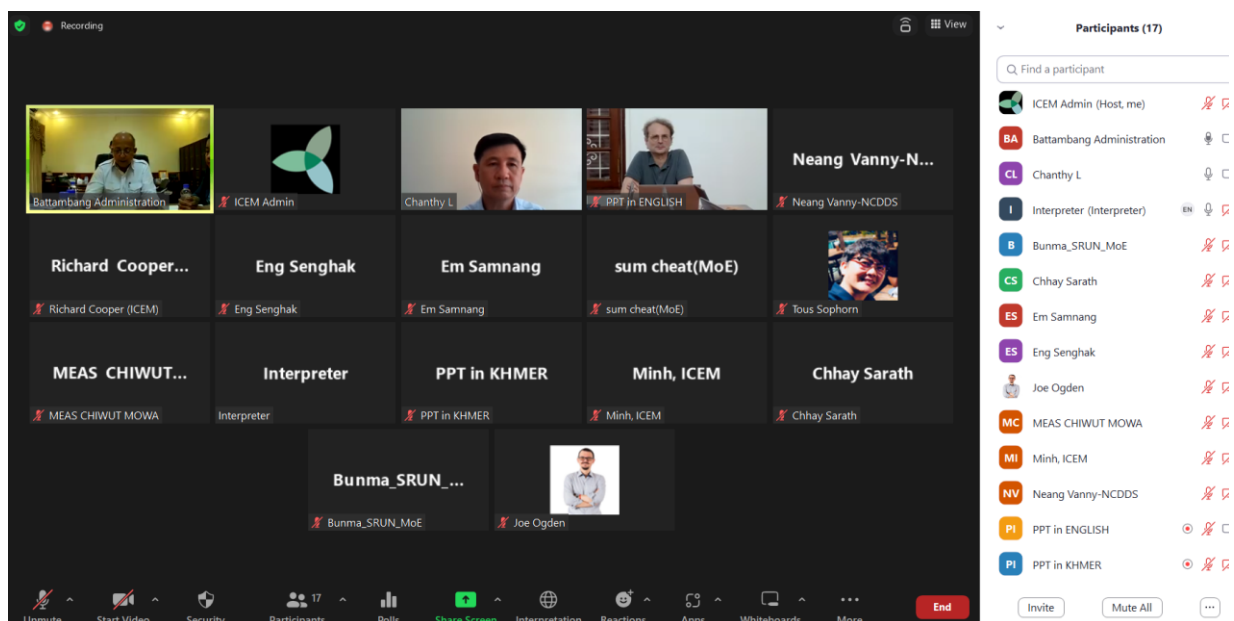
2.4 Discussion points

The challenges of hosting the LISA platform were discussed (Figure 12), with key points, as follows.

- Website domain: Dr Cooper noted the current domain of the website at <https://icem.com.au/lisa> will be changed once it is moved to a government server.
- Mr Sum Cheat (DCC, MoE) suggested that the website be housed and managed in the host province that owns this information. This would allow officials of Battambang Municipality to manage the site. Secondly, Mr Sum Cheat wants to see the updates of the LISA platform. He remembered the discussion from our previous meeting and asked if ICEM can show the changes made since that time.
- Dr Cooper responded that the application has integrated a lot of new data. Dr Cooper also suggested the need to discuss capacity building and the training programme, which is one deliverable to be finished by the end of May.
- Mr Chhay Sarath (MPTC), thanked Dr Cooper for the presentation. He asked if LISA can be integrated/linked to other applications. For instance, Battambang is a selected SMART city and can LISA be integrated. Mr Sarath also asked if LISA could be scaled-up to other provinces as Cambodia mainly focuses on agriculture and many donors support related sectoral projects (e.g., ADB, WB, AFD).
- Dr Cooper responded that spatial linked to the backend of the LISA application could be readily shared and integrated into other applications. However, it may prove difficult to integrate the frontend given differences in the software and programming languages used.

- Mr Meas Chiwut (MOWA) raised some points on gender and data, asking if different groups of people and gender had been considered in the vulnerability analysis?
- Richard and Miguel responded to this question. Data on gender was collected. For instance, the LISA platform shows where women are living in the municipality, the number of children, and highly vulnerable households.
- Mr Chhay Sarath expressed concern about who will host the platform. Who will be responsible for collecting and updating the information? LISA would be very helpful to the SMART city program and will ask those provincial working groups if they will have the capacity to handle the LISA website.
- Dr Cooper responded that the key issue is that adequate IT capacity is required to manage the LISA website.
- Mr Chhay Sarath mentioned that the training will need to be delivered in person and take place in the province.
- Battambang Municipality: there is only one IT person working in the municipality, and thus more IT people are needed, as well as relevant training. Will the project have the budget to address these needs?
- Mr. Chetra, Deputy Governor Battambang City Hall, noted that they need additional human resources to support for this work.

Figure 12. Plenary discussion during the meeting



Dr Chanthy and Dr Cooper thanked the participants for their comments and responses, and mentioned that final LISA platform will be presented on 26th May at the final stakeholder workshop in Battambang.

2.5 Closing remarks

His Excellency Ou Dary, Deputy Governor of Battambang Provincial Committee, expressed that on behalf of Battambang Municipality and Provincial Hall, he would like to pledge their full support for the project. In two weeks, we are going to attend the project workshop to see how to manage the LISA platform. We will invite provincial departments and people to attend the workshop. I would like to thank Dr. Richard Cooper, the LISA project team, and all participants for their efforts and inputs for the LISA platform's development.

3 CONCLUSIONS AND NEXT STEPS

3.1 Conclusions

The meeting provided stakeholders with an opportunity to review and provide final feedback on the LISA platform. While participants requested additional time to study the application, valuable feedback was received during discussions, including the clarification that the application will be translated into Khmer. Challenges highlighted by the consultant team include the limited data available to conduct broader vulnerability analyses. However, in-depth vulnerability of villages to flooding was conducted and the findings from these analyses will be integrated into the LISA platform, as well as data from exposure analyses conducted on the road network, railway, schools and health centres.

3.2 Next steps

Immediate next steps for the project include holding the final stakeholder workshop in Battambang on 26 May 2023 where the final version of the LISA application will be presented. Remaining deliverables to be submitted by the consultant team to the Department of Climate Change include this report (deliverable number 4.5), deliverable 2.3, and the various deliverables from Output 4 (deliverables 4.1-4.8). Importantly, the team will discuss the deployment and management of the platform with Provincial Committee for Disaster Management (PCDM) in Battambang, as a training programme needs to be drafted (deliverable 4.4 - Report on the capacity building program for effective use of LISA).

APPENDIX 1: MEETING AGENDA

Time	Activity	Presenter/Facilitator
14:00 - 14:15	Welcome and opening remarks	H.E. Ou Dary, Battambang Provincial Vice Governor
14:15 - 14:45	Presentation of the updated LISA platform: <ul style="list-style-type: none"> - Map viewer and map catalogue - Risk assessment methodology - Adaptation measures 	Richard Cooper, DSS specialist, Team leader, ICEM Miguel Coulier, Climate Change Risk Assessment Expert, ICEM
14:45 - 15:00	Plenary discussion	All participants (facilitated by Chanthay Lay, Climate Change and Local Coordination Expert, ICEM)
15:00 – 15:15	Presentation on data and platform management, and training programme	Richard Cooper, DSS specialist, Team leader, ICEM
15:15 – 15:30	<i>Coffee/tea break</i>	<i>All participants</i>
15:30 - 16:00	Plenary discussion	All participants (facilitated by Chanthay Lay, Climate Change and Local Coordination Expert, ICEM)
16:00– 16:15	Next steps for the development of the LISA platform	Richard Cooper, DSS specialist, Team leader, ICEM
16:15 – 16:30	Wrap-up and closing	H.E. Ou Dary, Battambang Provincial Vice Governor

APPENDIX 2: PARTICIPANT LIST

No.	Name	Title	Organization	Gender
A	Government Agencies in Phnom Penh			
1	Sum Cheat	Deputy Director	Department of Climate change, MoE	M
2	Bunma Srun	Officer	Department of Climate change, MoE	M
3	Meas Chiwut	Officer	Ministry of Women’s Affairs (MoWA)	M
4	Chhay Sarath	Officer	Rural ICT, General Directorate ICT, Ministry of Post and Telecommunications (MPTC)	M
5	Em Samnang	Officer	National Committee for Disaster Management (NCDM)	M
6	Heng Leng An	Chief of Office	National Committee for Disaster Management (NCDM)	M
7	Neang Vanny	Deputy Director	National Committee for Sub-national Democratic Development Secretariat (NCDD)	M
B	Battambang Provincial Government Agencies			
8	H.E. Ou Dary	Deputy Governor	Battambang Provincial Hall	M
9	Kim Sokuntheavy	Deputy Director	Battambang Department of Public Works and Transport	F
10	Tem TunTelyna	Deputy Director	Battambang Department of Environment	F
11	Tok Ratha	Deputy Chief of Office	Battambang Department of Planning	M
12	Mao Soksan	Deputy Chief of Office	Battambang Department Of Water Resources and Meteorology	M
13	Kham Somroub	Officer	Battambang Provincial Hall	M
14	Mok Sophanara	Chief of Office	Battambang Department of Land Management, Urban Planning, Construction and Cadastral Affairs	M
15	San Titvyrak	Managing Director	Battambang Provincial Hall	M
16	Visot Ratha	Deputy Director	Battambang Department of Women’s Affairs	F
17	Sek Chantra	Deputy Governor	Battambang City Hall	M
18		IT officer	Battambang Provincial Hall	M
C	ICEM team			
19	Richard Copper	DSS Specialist, Project Manager/Team Leader	ICEM	M
20	Miguel Coulier	Climate Change Risk Assessment Expert	ICEM	M
21	Truong Tung Hoa	Project Coordinator	ICEM	F
22	Pham Tran Minh	Data Management and Design Expert	ICEM	M
23	Lay Chanthy	Climate Change and National Coordination Expert	ICEM	M

No.	Name	Title	Organization	Gender
24	Tous Sophorn	Gender Expert	ICEM	F
25	Joe Ogden	Web Design and Development Expert	ICEM	M
26	Eng Senghak	National Coordinator and Administrative Officer	ICEM	M
27	Kosal Mam	Interpreter	ICEM	M

APPENDIX 3: PRESENTATIONS



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

2nd LISA Stakeholder Meeting

10 May 2023
 Dr Richard Cooper
 DSS specialist, Team Lead/Project Manager, ICEM
 Miguel Coulier
 Climate Change Risk Assessment Expert, ICEM



Agenda

Time	Activity	Presenter/Facilitator
14:00 - 14:15	Welcome and opening remarks	H.E. Ou Dary, Battambang Provincial Vice Governor
14:15 - 14:45	Presentation of the updated LISA platform: - Overview of map viewer and map catalogue - Integration of risk assessment results into the LISA platform - Adaptation measures	Richard Cooper, DSS specialist, Team leader, ICEM Miguel Coulier, Climate Change Risk Assessment Expert
14:45 - 15:00	Plenary discussion	All participants (facilitated by Chanthay Lay, Climate Change and Local Coordination Expert, ICEM)
15:00 - 15:15	Presentation on data and platform management, and training programme	Richard Cooper, DSS specialist, Team leader, ICEM
15:15 - 15:30	Coffee/tea break	All participants
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16:00 - 16:15	Next steps for the development of the LISA platform	Richard Cooper, DSS specialist, Team leader, ICEM
16:15 - 16:30	Wrap-up and closing	H.E. Ou Dary, Battambang Provincial Vice Governor

Updated LISA platform (<https://icem.com.au/lisa>)

1 2 3 4 5 6

- Purpose of LISA: to support urban adaptation
- Since March all key parts (1-6) of the LISA app have been further developed

Base layers

- Admin boundaries
 - National boundary
 - Provincial boundaries
 - District boundaries
 - Commune boundaries
- Climate Change
 - Climate Change in 2060, RCP 8.5
 - Average Maximum Temperature (°C)
- Impact and Vulnerability Assessment
 - Select Asset: Villages, Built-up Area, Roads, Railways
 - Select hazard type: Flood, Riverbank Erosion, Drought
 - Impact and Vulnerability Assessment layers

Climate Change

Climate Change in 2060, RCP 8.5

Average Maximum Temperature (°C)

Projection

Annual Average Maximum Temperature (°C)

Annual Average Precipitation (mm)

Dry Season Average Maximum Temperature (°C)

Wet Season Average Maximum Temperature (°C)

Dry Season Average Precipitation

Wet Season Average Precipitation

Changes

Average Maximum Temperature Change (°C)

Annual Average Precipitation Change (%)

Dry Season Avr. Max. Temp. Change (°C)

Wet Season Avr. Max. Temp. Change (°C)

Dry Season Average Precipitation Change (%)

Wet Season Average Precipitation Change (%)

Impact and Vulnerability Assessment

Select Asset: Villages, Built-up Area, Roads, Railways

Select hazard type: Flood, Riverbank Erosion, Drought

- Impact and Vulnerability Assessment for Villages to Flood
 - Village Exposed to Flood
 - Very High
 - High
 - Medium
 - Low
 - Very Low
 - No Data
 - Village Sensitivity
 - Village Impacted by Flood
 - Village Adaptive Capacity
 - Village Flood Vulnerability
 - Set layer transparent

- Full impact and vulnerability assessment of flood on villages conducted
- Details presented in later slides

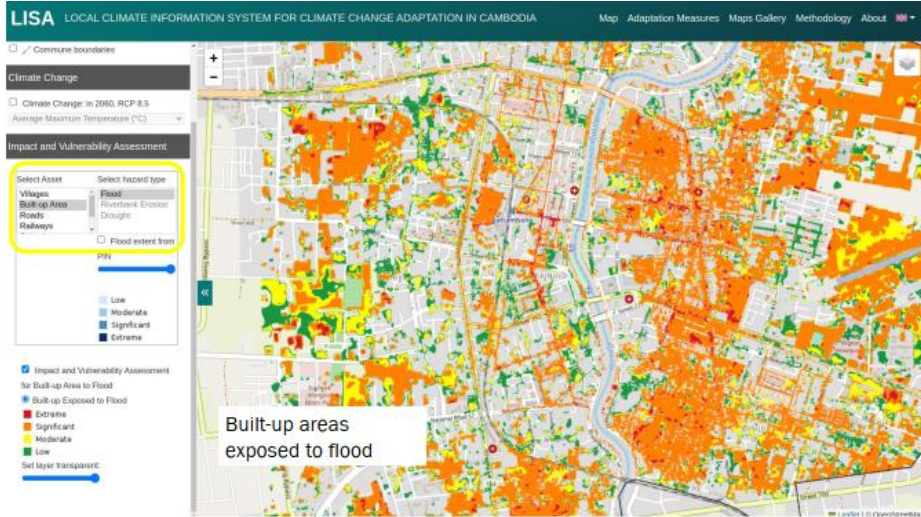
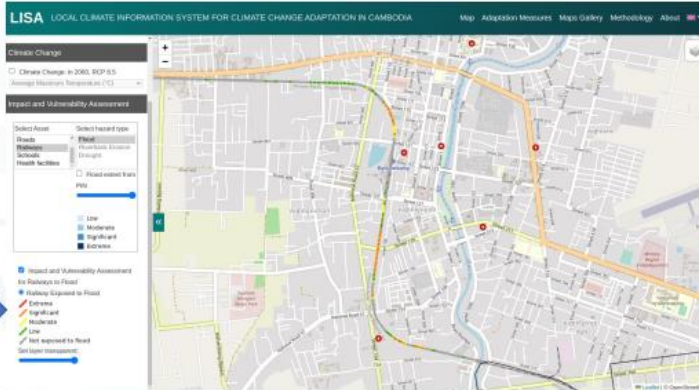


Exposure data

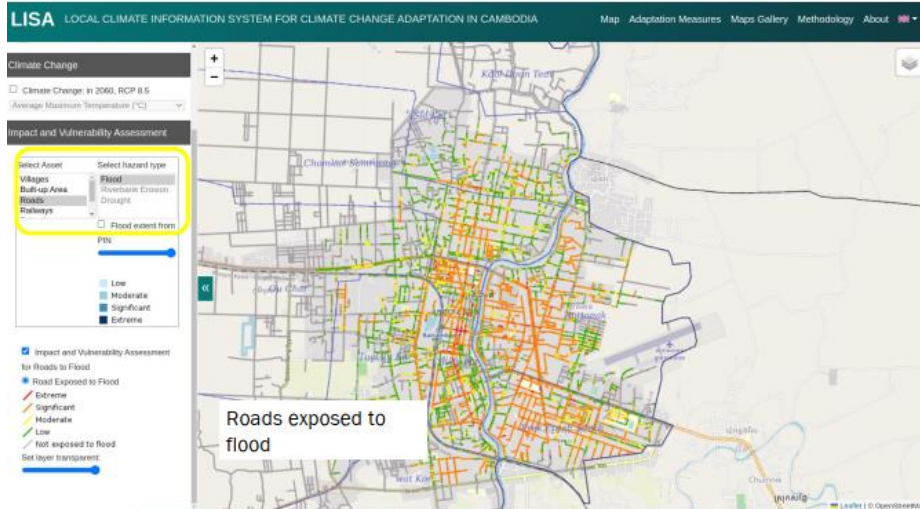
Exposure analyses only conducted for flood on other assets:

- Built-up areas
- Roads
- Railway
- Schools
- Health facilities

Railway exposed to flood

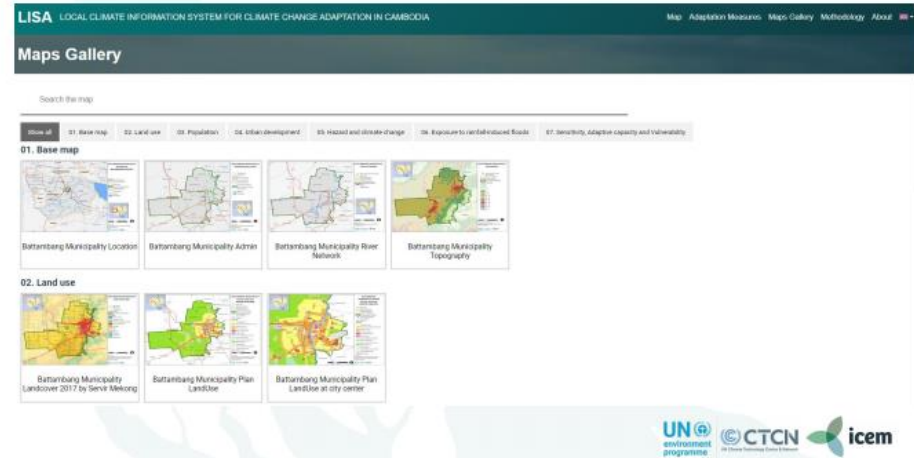


Built-up areas exposed to flood

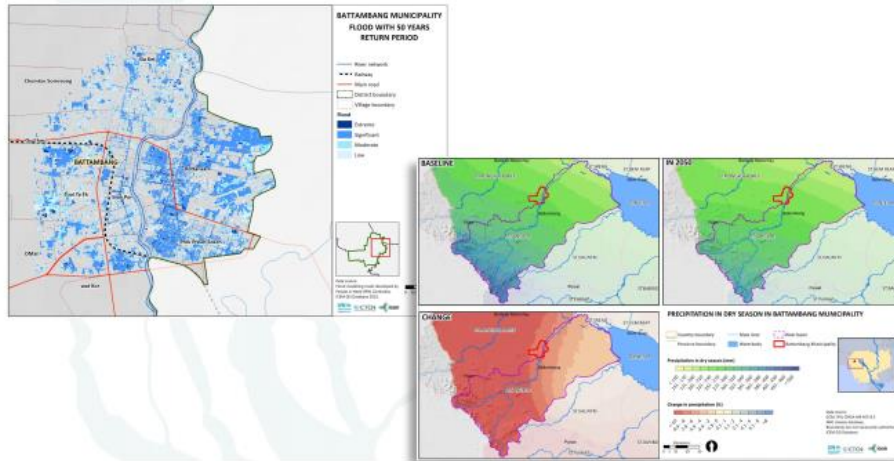


Roads exposed to flood

Updated LISA platform



Map gallery



Integration of risk assessment results into the LISA platform

1. Socio-economic baseline profile
2. Hazards and climate change threats
3. Impact and vulnerability assessment



ជំនួយបច្ចេកទេសសម្រាប់ការវាយតម្លៃហានិភ័យអាកាសធាតុសម្រាប់ការបន្តកែលម្អកម្រិត និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុក្នុងមូលដ្ឋានសម្រាប់ការបន្តកែលម្អកម្រិត និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុ (LISA) លើក្នុងប្រទេសកម្ពុជា

ប្រព័ន្ធព័ត៌មាន

កម្ពុជាប្រទេសដែលមានប្រជាជនរស់នៅច្រើនជាងគេនៅលើពិភពលោក ហើយប្រទេសដែលមានប្រជាជនរស់នៅច្រើនជាងគេនៅលើពិភពលោក។ ដោយសារសមតុល្យភាពប្រជាជនកម្ពុជាមានច្រើន ហេតុនេះការបង្កើនប្រជាជន និងការកើនឡើងនៃប្រជាជននៅលើពិភពលោក គឺជាបញ្ហាសំខាន់ៗមួយ ដែលបង្កឱ្យមានការប្រែប្រួលអាកាសធាតុ។ នៅទូទាំងប្រទេសកម្ពុជា កម្រិតទឹកភ្លៀង និងប្រិក្រមសីតុណ្ហភាព កំពុងមានការប្រែប្រួលយ៉ាងខ្លាំង ដែលបង្កឱ្យមានការប្រែប្រួលអាកាសធាតុ។ នៅទូទាំងប្រទេសកម្ពុជា កម្រិតទឹកភ្លៀង កំពុងមានការប្រែប្រួលយ៉ាងខ្លាំង ដែលបង្កឱ្យមានការប្រែប្រួលអាកាសធាតុ។ នៅទូទាំងប្រទេសកម្ពុជា កម្រិតទឹកភ្លៀង កំពុងមានការប្រែប្រួលយ៉ាងខ្លាំង ដែលបង្កឱ្យមានការប្រែប្រួលអាកាសធាតុ។

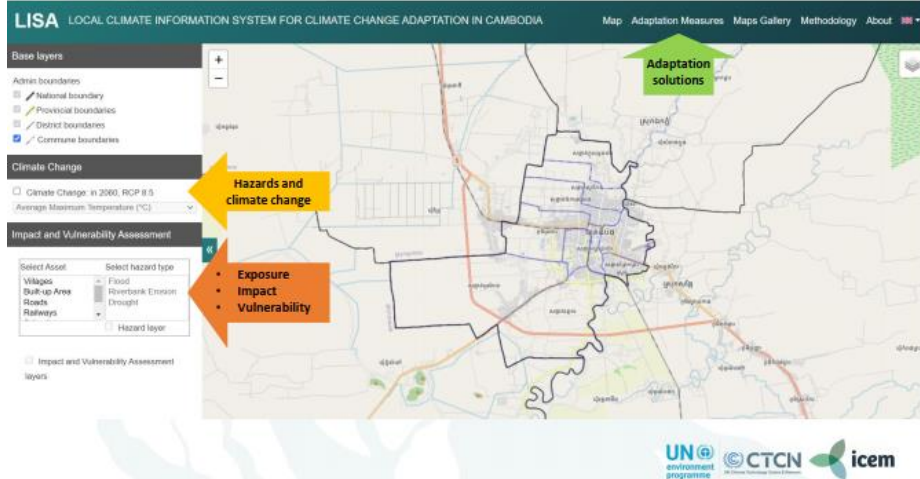
ការប្រែប្រួលអាកាសធាតុបណ្តាលមកពីការបញ្ចេញកាបូនិច្នុងប្រទេសកម្ពុជា។ គ្រោះថ្នាក់ដែលបណ្តាលមកពីការប្រែប្រួលអាកាសធាតុ គឺជាបញ្ហាសំខាន់ៗមួយ ដែលបង្កឱ្យមានការប្រែប្រួលអាកាសធាតុ។ គ្រោះថ្នាក់ដែលបណ្តាលមកពីការប្រែប្រួលអាកាសធាតុ គឺជាបញ្ហាសំខាន់ៗមួយ ដែលបង្កឱ្យមានការប្រែប្រួលអាកាសធាតុ។ គ្រោះថ្នាក់ដែលបណ្តាលមកពីការប្រែប្រួលអាកាសធាតុ គឺជាបញ្ហាសំខាន់ៗមួយ ដែលបង្កឱ្យមានការប្រែប្រួលអាកាសធាតុ។

គម្រោងនេះ គឺជាគម្រោងប្រព័ន្ធព័ត៌មានអាកាសធាតុក្នុងមូលដ្ឋានសម្រាប់ការបន្តកែលម្អកម្រិត និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុ (LISA) លើក្នុងប្រទេសកម្ពុជា។ គម្រោងនេះ គឺជាគម្រោងប្រព័ន្ធព័ត៌មានអាកាសធាតុក្នុងមូលដ្ឋានសម្រាប់ការបន្តកែលម្អកម្រិត និងការបង្កើតប្រព័ន្ធព័ត៌មានអាកាសធាតុ (LISA) លើក្នុងប្រទេសកម្ពុជា។

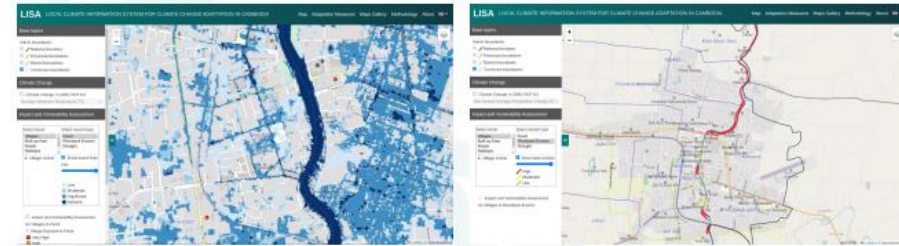
Use of risk assessment results through the LISA platform

- What are the **key hazards** for Battambang municipality that may cause major damage and losses to people, infrastructure and other urban assets?
- What do the **climate change projections** indicate for Battambang in terms of changes in precipitation and temperature?
- What **assets** including communities, critical infrastructure and other facilities are most likely to be **exposed** to and affected by these hazards? Where are they located?
- What **capacities**, within communities and institutions, exist to cope with these hazards or adapt to projected climate changes?
- Which assets are the **most vulnerable** to hazards and climate change and where are these located in Battambang municipality? Which hazards, assets and areas should be prioritized for risk reduction and adaptation?
- What potential **adaptation measures** can be implemented to deal with these hazard and climate change threats, levels of exposure and vulnerabilities?



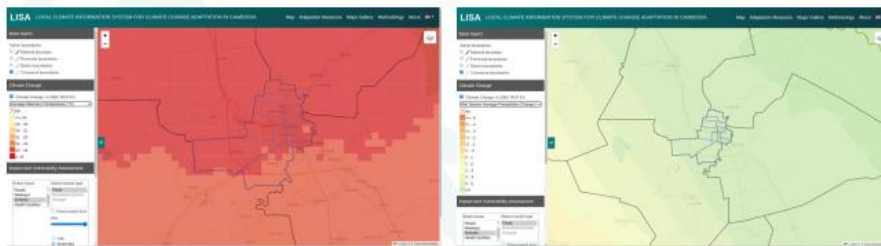


Hazard and climate change threats: flood and riverbank erosion



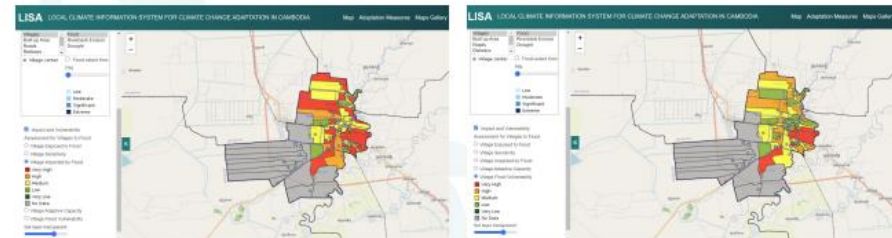
What are the key hazards for Battambang municipality that may cause major damage and losses to people, infrastructure and other urban assets?

Hazard and climate change threats: temperature and precipitation change



What do the climate change projections indicate for Battambang in terms of changes in precipitation and temperature?

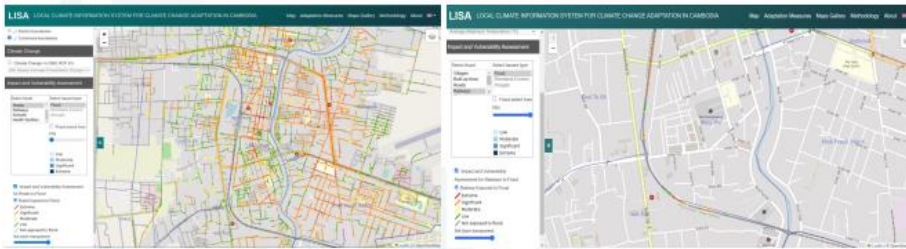
Impact and vulnerability assessment: villages



- What assets including communities, critical infrastructure and other facilities are most likely to be exposed to and affected by these hazards? Where are they located?
- What capacities, within communities and institutions, exist to cope with these hazards or adapt to projected climate changes?
- Which assets are the most vulnerable to hazards and climate change and where are these located in Battambang municipality? Which hazards, assets and areas should be prioritized for risk reduction and adaptation?



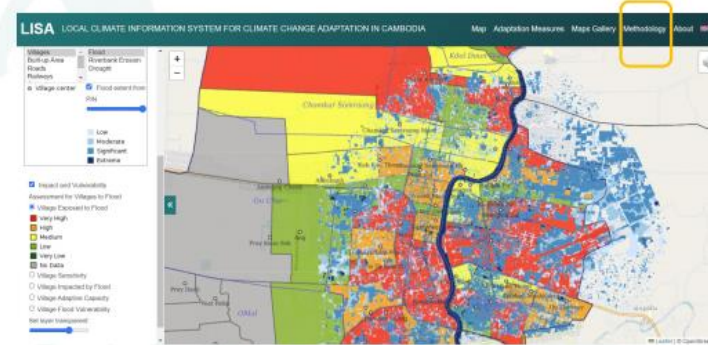
Impact and vulnerability assessment: transport



- What assets including communities, critical infrastructure and other facilities are most likely to be exposed to and affected by these hazards? Where are they located?
- What capacities, within communities and institutions, exist to cope with these hazards or adapt to projected climate changes?
- Which assets are the most vulnerable to hazards and climate change and where are these located in Battambang municipality? Which hazards, assets and areas should be prioritized for risk reduction and adaptation?



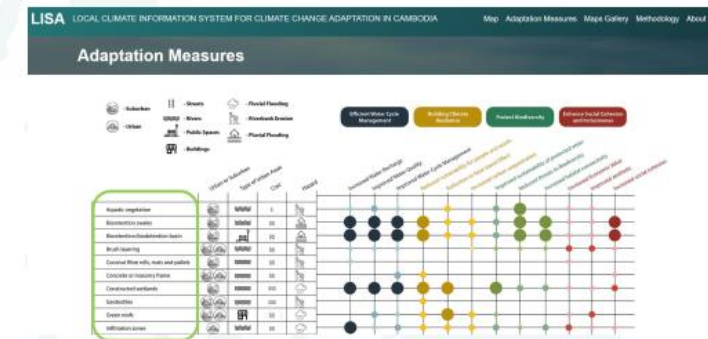
Impact and vulnerability assessment: methodology



Impact and vulnerability assessment: methodology



Adaptation measures: 23 potential nature-based solutions



What potential adaptation measures can be implemented to deal with these hazard and climate change threats, levels of exposure and vulnerabilities?



Adaptation measures: example for aquatic vegetation

AQUATIC VEGETATION			
Suburban	River	Low cost	Windbreak erosion
<p>DESCRIPTION</p> <p>This measure involves the planting of native aquatic plants (e.g., <i>Salvinia</i>, <i>Wendlandia</i>, <i>Hydrilla</i>, <i>Elodea</i>, <i>Water hyacinth</i>) or other suitable native species that can grow along the edges of the river channel where they are often under water during the rainy season. The dense, robust root systems of these plants that sink in the area around the edges of rivers to receiving and retain the water surface. This strengthens the river bed and bank toe and prevents soil from being washed away during floods while the emergent vegetation slows the flow velocity of the edge of the channel. Once established the plants will naturally filter the water thus improving water quality and they also provide many other ecological benefits beyond erosion prevention.</p> <p>Location</p> <p>Suitable for lakes, ponds and slow-moving streams. Aquatic plants are typically installed at the water's edge or in shallow in the littoral zone.</p> <p>Design options and performance</p> <p>Performance is enhanced by incorporating the plantings with other landscaping measures that provide added protection (especially when young plants are established). These include:</p> <ul style="list-style-type: none"> • Banks or poles aquatic vegetation can be protected by a line of poles or stakes near the bank to allow them to become established. 			

Challenge for: Erosion-free

Design developed under: UN-CTCN project: Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia

Adaptation measures: example for green roofs

GREEN ROOF			
Suburban and urban	Building	Medium cost	Fluvial flooding
<p>DESCRIPTION</p> <p>The term 'green roof' is collectively applied to a range of different roof types including both horizontal and sloping roofs and with vegetation coverage ranging from meadows, grasses and herbs to large trees and shrubs in the case of large buildings. Green roofs can be used to:</p> <ul style="list-style-type: none"> • Storage the first 2.5 centimetres of rainfall runoff • Meet partial storage requirements for local stormwater detention standards • Meet partial storage requirements for local stormwater detention standards • Meet partial storage requirements for local stormwater detention standards <p>There are two main categories of green roofs: extensive green roofs and intensive green roofs, as further detailed below. Extensive green roofs are thinner and lighter in construction and generally less costly. They are also easier to construct when covering an existing building. Intensive green roofs have a deeper growing layer with more soil and hence they support a wide diversity of plant species which sometimes include small trees.</p>			

Source:

- CIRIA (2010) The Su2B Manual 2010, Chapter 10: Green Roofs.
- Knapenbosch Remonster (2006) Best Practice Manual - Chapter 6: Green Roof Networks.
- Cognica Engineering (2003) Guide for urban sensitive urban design - Stormwater management for small scale development.

Plenary discussion

- Comments/queries on the LISA platform from participants

Data and platform management, and training programme

Data and platform management:

- Software components:
 - WordPress content management system
 - Leaflet map integrated into site (HTML/JavaScript)
 - GeoServer (publishes spatial data as web map services (WMS))
- Hardware requirements:
 - WordPress: 2 GB RAM, 2 CPUs, ~10 GB hard drive disk (HDD) space
 - GeoServer: 6 GB RAM, 4 CPUs, ~10 GB HDD space

Data and platform management, and training programme

- Hosting and management by NCDM?
- Capacity needs
 - IT admin expertise (minimum of 2+ IT staff)
 - Expertise in web GIS
- ICEM preparing a training programme to be submitted as part of LISA project

Data and platform management, and training programme

Training programme:

1. Deployment of LISA platform
 - (i) Deployment of WordPress site to server
 - (ii) Integration of Leaflet map into WordPress instance
2. System maintenance
 - (i) Potential problems and responses
 - (ii) Security/software updates
 - (iii) System monitoring and backups

Data and platform management, and training programme

3. Future updating/development
 - (i) WordPress CMS
 - Updating Adaptation options table
 - Updating About page
 - Translating updated English content to Khmer language
 - (ii) GeoServer/LISA map
 - Updating existing data sets as currently displayed in map viewer
 - Integrating new data for other hazards and assets currently not included in LISA platform (recommended to outsource expertise)
 - Also see next training programme item – Climate risk assessment

Data and platform management, and training programme

4. Conducting climate risk assessment
 - How to determine exposures, sensitivities, impacts, adaptation capacities and vulnerabilities of other assets and hazards:
 - road network
 - railway
 - social services (hospitals, schools)

Plenary discussion

- Comments/queries on data and platform management, and proposed training programme
 - To be discussed in more detail at the final workshop on 26th May



Immediate next steps (events)

- Act 4.6: One-day meeting with national/local gov't (26th May)
 - The occasion is to present the final version of LISA application and make recommendations for future development and scaling (Phase II to be proposed to UN-CTCN)



Immediate next steps (deliverables)

- Output 4:
 - D4.1 - 4.8

D4.1	Report on the design of contents and specifications for LISA, with the initial mock-up of the system (website) and testing results
D4.2	Report on the design of the process of data management for LISA
D4.3	Report on the management protocols for LISA
D4.4	Report on the capacity building program for effective use of LISA
D4.5	Minutes of the stakeholder working group meeting with a list of participants disaggregated by gender, materials used, and summary of the discussions held
D4.6	Materials for the workshop (e.g., presentations, satisfaction survey template, etc.)
D4.7	Report on the 1-day stakeholder workshop for government bodies and stakeholders
D4.8	Copy of all materials produced under this consultancy (including programming code and databases)

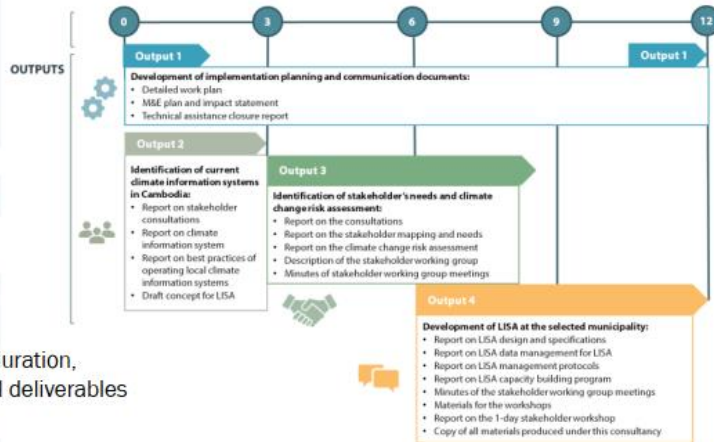
UPDATED WORK PLAN (continued to FEBRUARY 2024)

Output/Activities	2022					2023					2024						
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
01 Output 1: Development of implementation planning and communication documents																	
11 Preparation of detailed work plan																	
12 Preparation of Monitoring & Evaluation (M&E) plan and impact statement																	
13 Preparation of Technical assistance closure report																	
02 Output 2: Identification of the current status of the climate information systems in Cambodia																	
21 A list-of meeting and stakeholder consultation																	
22 Review of the climate information systems in Cambodia																	
23 Investigation of best practices of operating local climate information systems/best concept of LISA																	
03 Output 3: Identification of stakeholder's needs and climate change risk assessment at the selected municipality																	
31 Contributions to select the most appropriate municipality to design LISA																	
32 Mapping of the potential stakeholders at the selected municipality and survey of their needs																	
33 Climate change risk assessment at the selected municipality																	
34 Organization of the stakeholder working group																	
35 Organization of meeting with the stakeholder working group (virtual meeting)																	
04 Output 4: Development of LISA at the selected municipality																	
41 Design of content and specifications for LISA																	
42 Design of the process of data management for LISA																	
43 Development of the management protocols for LISA																	
44 Development of the capacity building program for effective use of LISA																	
45 Organization of meeting with the stakeholder working group																	
46 Organization of 1-day stakeholder workshop for government bodies and stakeholders																	
47 Preparation of training workshop materials for deployment and management of LISA**																	
05																	
D51 Detailed workshop																	
D52 Monitoring & evaluation (M&E) plan and impact statement																	
D53 Technical assistance closure report																	
D54 Report on the list-of meeting and stakeholder consultation																	
D55 Report on the review of the climate information systems in Cambodia																	
D56 Report on the investigation of best practices of operating local climate information systems																	
D57 Initial consultation and design concept for LISA																	
D58 Report on the consultations to select the most appropriate municipality to design LISA																	
D59 Report on the mapping of the potential stakeholders at the selected municipality and survey of their needs																	
D60 Report on the climate change risk assessment at the selected municipality																	
D61 Detailed description of the stakeholder working group, with names and contact details of the members, registration numbers, gender, etc.																	
D62 Minutes of the stakeholder working group meeting with a list of participants disaggregated by gender, materials used, and summary of the discussions held																	
D63 Report on the design of content and specifications for LISA, with the initial mock-up of the system (website) and testing results																	
D64 Report on the design of the process of data management for LISA																	
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D67 Minutes of the stakeholder working group meeting with a list of participants disaggregated by gender, materials used, and summary of the discussions held																	
D68 Materials for the workshop (e.g., presentations, satisfaction survey template, etc.)																	
D69 Report on the 1-day stakeholder workshop for government bodies and stakeholders																	
D70 Copy of all materials produced under this consultancy (including programming code and databases)																	

PROJECT OVERVIEW AND KEY DELIVERABLES

Project extended to mid-June 2023

- 12 months duration,
- 20 individual deliverables



Thank you





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